

# AIR POLLUTION—1970

## Part 4

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HEARINGS  
BEFORE THE  
SUBCOMMITTEE ON  
AIR AND WATER POLLUTION  
OF THE  
COMMITTEE ON PUBLIC WORKS  
UNITED STATES SENATE  
NINETY-FIRST CONGRESS  
SECOND SESSION  
ON  
S. 3229, S. 3466, S. 3546

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MARCH 26, APRIL 1 (LOS ANGELES), APRIL 17, AND MAY 27, 1970

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Printed for the use of the Committee on Public Works





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## AIR POLLUTION—1970

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THURSDAY, MARCH 26, 1970

U.S. SENATE,  
SUBCOMMITTEE ON AIR AND WATER POLLUTION,  
OF THE COMMITTEE ON PUBLIC WORKS,  
*Washington, D.C.*

The subcommittee reconvened at 9:35 a.m., pursuant to recess, in 4200 New Senate Office Building, Senator Edmund S. Muskie (chairman of the subcommittee) presiding.

Present: Senators Muskie, Boggs, and Dole.

Staff members present: Richard B. Royce, chief counsel and staff director; M. Barry Meyer, counsel; Bailey Guard, minority clerk; Tom Jorling, minority counsel; Leon G. Billings and Adrien Waller, professional staff members.

Senator MUSKIE. The subcommittee will be in order.

Our first witness this morning will be the distinguished attorney general of Minnesota, Douglas Head.

It is a pleasure to welcome you this morning, sir. We appreciate your interest in testifying.

You may proceed.

### STATEMENT OF DOUGLAS M. HEAD, ATTORNEY GENERAL, STATE OF MINNESOTA, AND PRESIDENT, NATIONAL ASSOCIATION OF ATTORNEYS GENERAL

Mr. HEAD. Thank you, Mr. Chairman.

Mr. Chairman and members of the subcommittee, my name is Douglas M. Head. I am the attorney general of the State of Minnesota and president of the National Association of Attorneys General.

I do not testify on behalf of the National Association of Attorneys General but as a representative of the attorneys general.

I am filing with the subcommittee a copy of my statement and my observations on these three bills before your subcommittee.

Senator MUSKIE. If you wish to submit your prepared statement and not read it into the record we will include it at this point.

(Mr. Head's statement follows:)

#### PREPARED STATEMENT OF ATTORNEY GENERAL DOUGLAS M. HEAD

Mr. Chairman, Members of the Subcommittee, I am Douglas M. Head. I am the Attorney General of the State of Minnesota and President of the National Association of Attorneys General. It is a privilege and honor for me to give you my views on the three air pollution bills now under consideration by your committee, S. 3229, S. 3466 and S. 3546.

Before discussing specific provisions of those bills, I wish to make a few general observations.

No pollution problem is more serious than the defilement of our air. You have heard from learned scientists and experts in this field and you can therefore appreciate more readily than most the danger in which we find ourselves as a result of the indiscriminate dumping of wastes into our air. It is time to take drastic steps. The time for mere discussion is over.

It is my view that the most effective approach to ensure adequate air pollution enforcement programs is to place the continuing responsibility and resources for enforcement in the hands of the states. States have time and again proven themselves more effective in enforcing the laws. Consider the record. It was the State of California which pioneered the control of automobile exhaust emissions. It was the State of New Jersey which initiated and brought to a successful conclusion recent litigation against airlines requiring smokeless combustors to be placed on certain jet engines. Attorney General Scott of Illinois has begun more than 200 lawsuits against polluters of both air and water since July 1. It is the State of Minnesota which is currently battling a major electrical utility company over the State's right to set stricter air and water pollution standards than those of the United States Atomic Energy Commission.

It is because the states have proven their willingness and ability to enforce state air and water pollution laws that I believe state action should be encouraged. Accordingly, I recommend that one of these bills should provide for a grant-in-aid program to the states to pay up to 75 percent of the cost of a state's enforcement program, which should include the authority to financially assist local communities. The federal government's share of the cost of maintaining enforcement programs is now 50 percent; that should be increased.

In addition, for those states and localities which would not have, even with grant-in-aid assistance, the resources to maintain full-time and broadly-experienced staffs of investigators, analyzers and attorneys, I recommend the creation in the Department of Health, Education and Welfare of a division which would provide technical expertise to states and local communities in their enforcement of state air pollution laws and regulations. This division would sponsor regional training sessions and continuing education functions and would be available for use by any state or locality which might need special expertise for the solution of difficult enforcement problems.

Any attempt to solve our air pollution problems must of necessity center on the major cause of such pollution: the automobile. We are told that our use of automobiles is the cause of some 60 percent of the pollution of our air. I am, therefore, pleased that two of the bills now before this committee, S. 3466 and S. 3229, both address themselves to this problem.

I support the provisions of both S. 3229 and S. 3466 which emphasize research and the development of low emission vehicles and standards, the testing and certification of motor vehicles and engines, and the testing and approval of fuels and fuel additives used in motor vehicles.

I am especially pleased to see no change is proposed which would cut back on the grant-in-aid program for assistance to states in the development of meaningful uniform motor vehicle emission testing programs and vehicle inspection programs. However, we should go further. The two-thirds grant program should be extended to cover the maintenance of programs for inspecting motor vehicle emission control devices, and each state should be required to institute such inspection programs. I endorse the emphasis of S. 3229 and S. 3466 on research, development, testing and certification. This is essential.

We should establish a reasonable timetable for the automobile industry to bring its product into compliance with safe emission standards. And we should insist on compliance with that timetable. The allegations have been made in anti-trust suits filed throughout the United States against the automobile manufacturers that, but for their collusion in withholding pollution control devices from the market, we would have essentially emission-free motor vehicles by 1975, but that now we will have to wait until 1980. Let's establish a timetable and tell the American people the day upon which all new cars will be emission free. Let's put the American free enterprise system to the challenge.

The bills before this committee all contain good provisions. As I indicated earlier, I would support increased research and expanded resources devoted to development of low emission vehicles, internal combustion engines, and fuels and fuel additives. The suggested appropriation authorization of S. 3229 for fiscal years 1971 through 1973 is not excessive; if anything, it should be raised.

I endorse the extension of authority to set emission standards for vehicles other than automobiles contained in S. 3229. I especially want to mention my support

for the provision which would place in the Secretary of Health, Education and Welfare the authority to control emissions from aircraft, other vessels and commercial vehicles. As we in Minnesota have seen so clearly in the case of the Atomic Energy Commission, pollution control authority should not be vested in the same agency which is responsible for promotion of, and the national policy concerning, the industry to be regulated. I don't want to see control of air pollution emissions compromised by policy or other considerations not relevant to the health and welfare of our people. All air pollution control programs should, therefore, reside in one cabinet-level officer.

The general appropriation authorization limits of S. 3229 again cannot be too high. It seems to me that a restructuring of our priorities is in order. As we allocate our federal resources, we must place high priority on curbing air pollution in this country.

I support the provision in S. 3229 which grants to the Secretary of H.E.W. the authority to develop specific recommended national emission standards for such organic solvents as paint.

I am pleased that S. 3229 attempts for the first time that I am aware to legislatively cope with noise pollution. It is a problem of increasing concern to medical authorities throughout the nation. We in state government are receiving more and more complaints about noise, especially from those persons who live near large airports. Medical research indicates that increasing exposure to high noise levels is impairing our hearing more and more each year. I heartily endorse a program to begin immediate research into the causes and prevention of noise pollution.

I support the toughening of the provisions in the Clean Air Act concerning testing and certification of motor vehicles and engines and compliance with such certifications provided for in S. 3466. Granting the Secretary of H.E.W. the authority to enter plants to conduct on-site testing of motor vehicles and engines is essential to ensure compliance with the Secretary's standards for vehicles and engines. I also support the provision in S. 3466 which would extend the registration of fuel additives to include the fuels themselves. I see no reason, however, why the fuels to be registered should be limited to those used in transportation. I would recommend that the bill be amended to include fuels used in electric power plants and for space heating. Fuels used for those purposes contribute about 20 percent of the total national air pollution.

The amendments to the present Clean Air Act regarding the establishment of air quality standards, as I understand them, would result in a regulatory scheme similar to that provided for in the Federal Water Pollution Control Act. That is, the Clean Air Act would require the states to adopt standards and establish an enforcement plan which meet the approval of the Secretary of H.E.W. Since Minnesota has adopted such standards and will submit its enforcement plan to the Secretary of H.E.W. in advance of the deadline, I have no trouble in supporting such requirements. Let me reaffirm, however, my view that enforcement of air quality standards can best be achieved at state and local levels. We should not tamper with that proven approach. I would have no objection to back-up enforcement authority in the federal government, such as now exists in the Federal Water Pollution Control Act and in the Clean Air Act, as it presently reads in other areas.

I support the provision in S. 3466 for stationary source emission standards. Such standards would be the corollary of the effluent standards which Minnesota has adopted to provide for improving the quality of its waters. I believe, however, that the stationary source emission standards should be set, as are the ambient air quality standards, by the states based on criteria set by the Secretary of H.E.W. and subject to his approval. As in the case of air quality and water quality standards, the Secretary of H.E.W. should have the authority to establish standards if a state fails to do so.

I agree that penalties for violations of federal air pollution laws should be increased. I suggest that a court be authorized to assess penalties of up to \$10,000 a day where violations are particularly serious, as where the violation produces serious illness or even deaths. We in Minnesota are authorized only to seek injunctions. But to give us the needed flexibility to deal with egregious, repetitive or recalcitrant violators, I will propose to our legislature next year that a civil penalty provision be added to our pollution control statutes.

I also endorse prohibiting federal agencies from making loans or grants or entering into contracts for the construction, installation, or operation of com-

mercial or industrial facilities not in compliance with air quality standards. No company should use our tax dollars to foul our air.

In conclusion, let me say that air pollution poses one of the most serious health hazards in the United States today. The head of the American Medical Association said last week that there may be a significant relationship between air contaminants and some forms of cancer. We have been told that diseases such as emphysema, heart disease, and lung cancer may be caused by air pollution. The time to act is now. Thank you.

Mr. HEAD. My comments orally will go mainly to the problems that we as attorneys general have in the enforcement of the present laws and comments on the enforcement provisions of the proposed legislation.

At the present time, we have a serious lack of staff for enforcement of the present law. Our legislatures have not been as responsive to the State matching provisions as they ought to have been.

I also am not certain from my investigation whether the State enforcement agencies such as the office of attorney general are eligible under the present law for matching funds for enforcement. We have in our State the responsibility of turning lawyers as attorney general to our pollution control agency. The lawyers serve in the agency as house counsel do the agency but they are under the ultimate supervision of the attorney general.

In Minnesota they are paid out of agency funds. In other States the attorney general has within his own office lawyers that are responsible for enforcement of State laws. In Illinois Attorney General Scott has the power to start lawsuits that are independent of his own State agencies.

I would urge that in all States there would be Federal funds to assist the proper enforcement agencies, including payment for the salaries of lawyers.

Secondly, I would urge that this bill increase to three-quarters the amount of moneys that would be paid on behalf of the Federal Government for State enforcement. It is my understanding that the present amount is 50 percent of the cost. I believe that we could substantially increase our enforcement if that could be increased to 75 percent.

At the present time under State law many States have no penalties for the enforcement of State pollution control violations. We have no civil penalties in the State of Minnesota so when we enforce the standards we can only get an injunction, and I have a very good example.

A week ago we obtained an injunction, we got a very nice letter from a group of interested persons in our State thanking us for clearing up the dumping of certain materials into the streams. Then a week later we found that it had started all over again. The violation for the injunction under our State law is \$250 a day. It does not really seem enough in order to develop true State enforcement. Therefore, I would urge, that wherever possible as we rely on State enforcement, that we encourage the development within our States of stronger civil penalties.

I am not certain that this can be done through Federal legislation but I certainly would urge that that effort be made.

We are going to go to our legislature and ask for a very substantial increase in civil penalties.

At the present time our national association has commented on the delay in the certification to the attorney general's office of the com-

mencement of many actions. Our National Association of Attorneys General has taken the position that attorneys general ought to be given the independent authority to commence action for violation of State standards independent of the pollution control agency. This has been started in the State of Illinois under Attorney General Scott. He presently has many cases, I think somewhere upwards of 200, in his State courts. He has bypassed, in effect, the State agency but he is himself commencing actions.

The attorney general of Wisconsin has announced that he will use his common law power in the State of Wisconsin to do the same thing.

We had at our last National Association of Attorneys General meeting a presentation by a law professor as to the common law power of the attorneys general to act independently of State agencies, because of the delays in the enforcement of the State standards that have been developed.

We believe that in many States there is a power to do this. However, attorneys general do not have the technical staff should we desire to encourage enforcement and therefore again to be of great assistance if not only the attorney general power was encouraged but there would be some funding assistance to attorneys general to commence such action.

We strongly support the Federal backup authority in the present laws with one caveat: That we would hope that when the Federal Government, having decided to issue an order to enforce emission standards, there would be notification to the State government so that there at least would be the opportunity for State government enforcement agencies to act within a very fixed and limited period of time if the State was receptive or willing to do so.

Now we believe that it is to the advantage of all of the citizens of the State to develop strong State enforcement procedures. Where we can encourage the States to act we believe that it will set a climate of opinion within the States for more stringent voluntary effect enforcement, and I believe we should wherever possible use State enforcement procedures.

One other thing, Mr. Chairman. We notice that there is a provision for the funding of inspection of emission control devices on motor vehicles. One of the problems has been that once the funding provisions have been established there is also provision in the law that says that this shall be in coordination with the Secretary of Transportation.

Well, I am sure that the subcommittee knows that the inspection provisions of the Federal law have been violently resisted in the States and that many States have not, and I don't feel are going to or will only after very vigorous objection comply with the motor vehicle inspection standards.

I would like to see some way of making sure that the inspection provision of the emission control device law does not fall when the motor vehicle inspection is delayed for one reason or another, that somehow there ought to be a way if a State like my own State of Minnesota has not adopted the motor vehicle inspection law—and they still have not—that we still would be pretty much compelled to install an inspection program for emission control devices.

The provision for private civil suits would be supported, I believe, by a large number of attorneys general with the caveat that I would

like, and I have circularized to my fellow members in my association for their comments, and would like to file with your subcommittee, Mr. Chairman, a supplementary statement as to their position.

The one danger that we can see from the men that I have talked with is the multiplicity of suits that would override compliance agreement already entered into by the Pollution Control Agency so that I believe that citizens should be very carefully correlated with the present enforcement provision so that we do not unnecessarily duplicate the enforcement of the law and that we do not unnecessarily clog up the course where we are in fact making very swift efforts to enforce.

These are some of my enforcement comments, Mr. Chairman, and I would be most happy to answer any questions for the subcommittee.

Senator MUSKIE. We would welcome the supplementary statement by the attorneys general on the question of class suits. I don't know whether you had an opportunity to study the record the other day when we had testimony exclusively dealing with the suits. I would suggest that you and your colleagues might like to look at that as a basis for the preparation of your supplementary statement in the light of which some questions were raised.

Mr. HEAD. I would like that very much and will try to get a copy of that, Mr. Chairman.

Senator MUSKIE. I would like to ask the staff to see that Mr. Head gets a copy of that testimony of the other day.

Mr. HEAD. Mr. Chairman, we will circularize that testimony to your membership.

Senator MUSKIE. I think that is a very important new element prospectively at least in this whole field and I am very interested in it. So I hope that when we structure the law that we do as good a job as we can and your assistance would be of value.

Mr. HEAD. Thank you.

Senator MUSKIE. In your statement you refer to the struggle the State of Minnesota is having with respect to air and water pollution standards on nuclear powered plants.

Mr. HEAD. Yes.

Senator MUSKIE. And the struggle with the AEC.

Mr. HEAD. Yes.

Senator MUSKIE. I am fully sympathetic to you in your problem.

Have you had brought to your attention the provision that passed the Senate 2 days ago and the House yesterday, Water Quality Improvement Act, section 16 in the Senate-passed bill, section 21 in the conference report, that establishes policy with respect to activities which are licensed which operate under permits of the Federal Government?

We had in mind specifically the AEC and the Corps of Engineers as the two agencies in which we were most interested. Under the provision of that section the nuclear powered plants are required to meet the standards of State water recruitment agencies so you may want to look at that provision. I will be interested to watch.

Of course, I don't suppose we can bring the AEC retroactively under that. As a matter of fact, we wrote a grandfather clause in it. Nevertheless, in terms of your problem I want to be sure that you focus on that.

Mr. HEAD. Mr. Chairman, as a matter of fact, that will be very valuable because in the State of Minnesota we expect six nuclear plants in the next decade for production of electricity. So this will of course be in effect a bill of rights to our State to establish these standards.

Senator MUSKIE. I would like to say this about it: We have been conducting hearings in another subcommittee on the siting of powerplants, legislation which I introduced. Siting is an awfully important part of this problem. We held hearings 2 days ago on siting on cliffs which you may or may not have observed.

Mr. HEAD. Yes, I heard that.

Senator MUSKIE. Clearly, we face a prospective and I think maybe very real dilemma in this country as we consider the need for increased capacity for generating power and at the same time consider the environmental impact.

You are speaking of six nuclear powerplants in Minnesota. I think on the Chesapeake Bay the number involved is about 15, as I recall. We have this problem all over the country. Utilities have been focusing increasingly on nuclear powerplants to build this capacity and yet the public—not only conservationists but the public generally is focusing now on the environmental dangers connected with nuclear powerplants.

The Consolidated Edison Co. in New York is having difficulty in getting public approval of any site for a new powerplant of any kind, no matter how fueled. So we are going to face a very difficult problem in this country in many areas unless we resolve this dilemma. This is one of the reasons we were so interested in incorporating this provision in the past law because this at least gives us a handle that I hope will force the power companies as well as the public agencies involved to focus on the problem effectively enough to be spared by one of these two forms.

Mr. HEAD. Mr. Chairman, I might add that the Northern States Power Co., which is the utility in Minnesota, has now announced that they will be building these plants and has asked to sit down with the Environmental Quality Council in effect in the State of Minnesota to discuss siting of these plants, and to work out a common agreement as to site.

Also, perhaps some better regulations of the disposition of the wastes which has now become a new issue in Minnesota. I think that perhaps that is all done voluntarily because we don't have a State agency regulating our State electrical utilities, but that is perhaps one step in a State and a power company trying to work out some of these problems.

As yet we don't have very good standards on which to make the decision. As you point out, Mr. Chairman, almost any site has some real difficulties so the balancing of interests is, I think, a very complicated one.

Senator MUSKIE. One other question: An issue that you raise that is a troublesome one is the extent to which standards should be set by on a national basis to the extent to which they ought to be set on a regional or even a local basis. The issue was raised in at least those ways by the bills before us. First establishing ambient air quality laws on a regional basis, the assumption being, of course, that the present limitation on techniques for dealing with specific air pollution problems and the needs, the severity of the problem varying as it does

in different parts of the country, that it is better to focus upon the regional approach with a national presence to spur the local effort on.

Now we have before us in the administration bill the concept of national ambient air quality standards. We have not really, I don't think, fully developed the duplications of that concept but one result we would want to avoid is the use of national ambient quality standards which set minimal standards rather than maximum. We are fearful that national standards might tend to be the norm and that we would have minimal results rather than maximum results where the problem is most severe. So that is another problem.

Then, of course, the problem is surfaced in one other way, the question of emission standards. Now again there is the difference between local emission standards and national emission standards. We are fearful that national emission standards again will tend to be minimal, whereas in the real problems of this country we need maximum standards.

Now you raise the issue in suggesting the case of the AEC problem but I think you will also raise it with respect to the general problem of enforcing air and water quality standards.

I wondered if you would like to expand on that point a little bit.

Mr. HEAD. Well, from our own State's viewpoint, I think it is absolutely imperative that the standards that are set by our own agency be reviewed by a national agency, the Department Secretary. At least I worry a little bit about it because of the heavy pressures that can be brought in a local area and a local agency for variances and delays. I worry substantially about local setting of standards without a really adequate review and that local standards can sometimes be below what the national standards would tend to be.

So I would say that notwithstanding our own experiences in the atomic energy area I would strongly support at least a very careful national review of the standards making sure that they comply with a certain national minimum.

Secondly, I do believe that a State ought to be able to exceed these national minimums because, for example, you can have areas—I think of Lake Tahoe as an example—where a State wants to protect that quality with the very highest, the utmost in environmental protection. The State ought to be allowed to do this and the citizens should have that right to do so.

I would think that we could do this comfortably.

The third point I guess is that I am most concerned about having once established standards the delays that go into the enforcement, that everyone then wants to comply but somehow compliance never really gets started. This is true in water and it is also true in air. We delay months and years even to get a good enforcement schedule. This has built up a great sense of frustration among the attorneys general, as I think you can see, and this is the reason for your own further interest in citizens' suits because somehow there has to be a greater sense of urgency moved into this area.

I would hope that once the enforcement plan is filed that the Secretary could review very carefully the enforcement plan of each State and would comment not only on the standards but on the enforcement schedules and would move to urge the State to enforce using the courts more vigorously because very often, quite frankly, it is not



until the case is certified from the agency to the court that you finally can get a good agreement to clean up the problem.

So in summary, I would very much like to preserve local initiative with the various national reviews.

Senator MUSKIE. Thank you very much, Mr. Head.

Mr. HEAD. Thank you, Mr. Chairman.

Senator MUSKIE. Our next witness is Dr. James H. Sterner, chairman of the National Air Conservation Commission of the National Tuberculosis and Respiratory Disease Association, accompanied by an old friend who has testified here before, John Charles Daly, a member of the Commission's Legislative Committee. Gentlemen, it is a pleasure to welcome you here.

**STATEMENT OF JAMES H. STERNER, M.D., CHAIRMAN, NATIONAL AIR CONSERVATION COMMISSION, NATIONAL TUBERCULOSIS AND RESPIRATORY DISEASE ASSOCIATION; ACCOMPANIED BY JOHN CHARLES DALY, A MEMBER OF THE COMMISSION'S LEGISLATIVE COMMITTEE**

Dr. STERNER. I am James H. Sterner, Chairman of the National Air Conservation Commission of the National Tuberculosis and Respiratory Disease Association.

I am delighted to have with me one of the most effective members of the Commission, John Charles Daly. I always feel embarrassed, Mr. Daly should be introducing me rather than I he.

I am employed as an associate dean and professor of environmental health at the University of Texas School of public health at Houston. In addition, for the past 3 months I have served as acting director of public health for the city of Houston, and as such, have supervisory responsibility for the air pollution control program of that city.

The National Air Conservation Commission recognizes the need for aggressive and responsible action by all levels of government and by informed citizen groups to bring about the restoration and maintenance of acceptable levels of air quality throughout the United States. Believing that the initiation and maintenance of such action is greatly influenced by the quality and character of Federal air pollution control legislation, the Commission therefore supports, and urges Congress to implement, the following legislative policies:

1. The Commission supports the extension of the Air Quality Act of 1967, and of authorizations for appropriations in support of programs and activities required by the act, through the fiscal year ending June 30, 1973. However, the Commission urges that specific spending levels be defined in the appropriation authorization, that such spending levels be fixed in consonance with the dimensions and importance of the national air pollution problem, that such spending levels provide for a substantial increase in current expenditures and reflect a clear and dramatic readjustment of national program and policy priorities consistent with the dimensions of the current environmental crisis and with the demonstrated current public interest in that crisis.

Specifically, such spending levels should be adequate to support:

Substantially expanded Federal, State, and local programs of air quality and air pollution effects monitoring in representative areas of each air quality region of the United States.

New and substantially expanded Federal research and development efforts to secure new means of motive power in replacement of the internal combustion engine; new pollution-free sources of domestic energy, such as solar energy; drastic reductions in the sulfur and pollution content of solid, liquid and gaseous fuels; development of economical means for the removal of pollution from the effluent streams of motor vehicles, aircraft, other transport systems, and from stationary sources of pollution.

Expanded Federal financial assistance for State, regional, interstate, and local programs of air pollution control.

Greatly expanded expenditures for extramural manpower development programs intended to satisfy the imminent need for several thousand new technical and professional workers in the field of air pollution control.

2. The Commission supports the continuance of section 107 of the Air Quality Act of 1967, with particular reference to those provisions of that section requiring the Secretary of HEW to develop and issue air quality criteria and to designate air quality control regions within the several States of the Union.

However, since only 28 of the anticipated 57 air quality control regions of the United States had been formally designated by the Secretary of Health, Education, and Welfare through January 17, 1970, the Commission urges that the Secretary be instructed to designate immediately all air quality control regions pursuant to the provisions of section 107 of the Clean Air Act, as amended. Moreover, we urge that section 107 be amended so as to require the Secretary of HEW to publish criteria for the following contaminants not later than January 1, 1971: hydrocarbons, nitrogen oxides, carbon monoxide, lead, fluorides, ozone, and total oxidant.

The Commission opposes legislative proposals which would eliminate section 107 of the Air Quality Act of 1967 and substitute therefore a requirement that the Secretary of Health, Education, and Welfare promulgate regulations establishing national air quality standards prior conduct of public hearings throughout the United States and without requirements for prior publication of air quality criteria documents.

We believe that the immediate designation of the presently proposed 57 air quality regions, coupled with the continuance of section 107, will lead to the early establishment of effective air quality standards. The mechanism for establishing standards at the regional level, with regional and State open hearings stimulates the involvement of citizens in the framing of community air pollution control decisions. The present requirement that such standards be in consonance with air quality criteria and acceptable to the Secretary should provide adequate assurance that regional and State standards comply with health and general welfare needs.

3. The Commission urges enactment of appropriate amendments to the Air Quality Act of 1967 requiring the Secretary of Health, Education, and Welfare after the conduct of appropriate public hearings, to promulgate regulations establishing national air quality and national stationary source emission standards to be applicable in all areas of the United States. In the case of emission standards, initial action should be directed to those industries recognized as significant con-

tributors to the air pollution problem on a nationwide basis and to those industries and sources for which the control technology has been largely developed. Government-industry research and development activities should be extended rapidly to an increasing sphere of pollution contributors, and enforcement should follow closely the availability of control measures.

However, the Commission further urges that any such amendment clearly indicate that States, air quality regions, and local units of government are free to establish more restrictive air quality and stationary source emission standards than those promulgated by the Secretary of Health, Education, and Welfare, where most restrictive emission standards are needed to achieve established regional ambient air quality standards. The Commission also suggests that regulations promulgated by the Secretary of HEW to establish national air quality and source emission standards also specify the dates on which such regulations are to become effective and that such dates be selected in full consideration of the technologic and economic problems associated with securing compliance with such standards.

The Commission opposes any legislative action which would confine the standards-setting authority of the Secretary to ambient air quality levels or to emission levels which "contribute substantially to endangerment of the public health or welfare." Our present limited ability to predict long-term medical and biological effects from levels of pollution currently encountered in the majority of our larger cities dictates a conservative and prudent course of action. We believe that the public will demand and be willing to pay for a quality of the atmosphere which is beyond that characterized by the term "endangerment." It is to the total quality of human life rather than to the mere biological survival of the species that our national policies and programs must now be directed.

4. The Commission urges that the Air Quality Act of 1967 be amended so as to require the Secretary of HEW to notify any State, regional or local jurisdiction or government, or private company, of observed violations of national air quality or stationary source emission standards and to authorize him to request the Attorney General to institute appropriate criminal and/or civil suits against private companies and individuals to bring about compliance of individual sources with national stationary source emission standards.

The Commission also supports and urges amendments appropriate to assure that violations of stationary source emission standards be punishable by fines which more realistically reflect the seriousness of the air pollution problem: for example, a fine of not more than \$25,000 per day of violation, or by imprisonment for not more than 1 year, or by both, and that violations committed after first convictions be punishable by fines of not more than \$50,000 per day of violation, or by imprisonment for not more than 5 years, or by both.

In the interest of promoting rapid and effective control of stationary sources of air pollution the Commission also opposes any amendments to the Air Quality Act of 1967 which give the Secretary the power to grant an indefinite exemption to any industry or establishment from compliance with national, State, or local stationary source emission standards.

5. The Commission urges the enactment of amendments to the Air Quality Act of 1967 so as to prohibit Federal agencies from making loans, or grants or entering into contracts for the construction, installation, or operation of any commercial or industrial facility that does not comply with national stationary source emission standards, or with more stringent emission standards adopted by State, regional, or local authorities having jurisdiction over the territory in which such plants are to be operated. The Commission also supports legislation to prohibit Federal agencies from purchasing goods and services from commercial or industrial facilities that do not comply with National, State, regional, and/or local stationary source emissions standards.

6. To promote more rapid and effective control of pollution emissions derived from the operation of motor vehicles, the Commission urges the enactment of such amendments to the Air Quality Act of 1967 as may be necessary to secure the following ends:

Opportunity for employees of the Department of Health, Education, and Welfare to enter premises in which automobiles are manufactured for purposes of inspections to determine compliance with regulations and standards promulgated by the Secretary without the necessity of giving advance notice to the owners and operators of such premises.

Testing by the Secretary of HEW or his employees of newly manufactured motor vehicles to determine whether their performance conforms with "certificates of conformity" issued by the Secretary for prototype engines and vehicles as specified in section 206 of the Air Quality Act of 1967.

Federal grants to appropriate State air pollution control agencies to assist in the development and support of uniform motor vehicle emission device inspection and testing programs.

7. Also in the interest of more effective and rapid control of motor vehicle pollution problems, the Commission urges that section 210 of the Air Quality Act of 1967 be amended so as to require that any fuels or additives thereto, intended for use in the transportation of any person or thing, shall be registered with the Secretary of the Department of Health, Education, and Welfare; that the maker of such products shall include with his request for registration complete information concerning the chemical or physical properties of any such fuel or fuel additive; that the Secretary be empowered to require the manufacturer of any fuel or fuel additive to furnish such information as may be reasonable and necessary to determine the emissions resulting from the use of such fuel or fuel additive and the effects of such emissions on human beings, the quality of the air environment, on property, plants, and on the use or performance of any emission control device or system which is in general use or likely to be in general use for the purpose of preventing or controlling motor vehicle emissions.

We further urge that the Secretary be empowered to remove from the registration list any fuel or fuel additive which he finds, after appropriate public hearing, to be a danger to the public health, welfare, and safety or to substantially interfere with the adequate performance of the motor vehicle pollution control device system.

We suggest further that such amendments include provisions declaring to be unlawful the sale of any fuel or fuel additive not regis-

tered with the Secretary and declaring any violation of such provision to be punishable by a fine of not more than \$25,000, 1 year's imprisonment or both for any first offense and by a fine of not more than \$50,000, of not more than 5 years imprisonment, or both for any second or subsequent offense.

8. The Commission urges the adoption of amendments to the Air Quality Act of 1967 so as to require the Secretary of Health, Education, and Welfare to conduct an air quality surveillance and emission inventory program in each air quality region of the United States. We believe that such legislation should require the Secretary to conduct such surveys and to publish the results thereof, not less frequently than once each 2 years, and that these published results should be distributed by the Secretary to air pollution agencies, public officials, and other interested citizens within the air quality region to which the report pertains. We further believe that such legislation should empower the Secretary to conduct such surveys utilizing employees of the Department of HEW, employees of other Federal agencies, or that he be permitted to contract for the conduct of such surveys with State and local agencies or with nonprofit institutions.

9. The Commission urges the enactment of amendments to the Air quality Act of 1967 appropriate to assure that implementation plans required by that act specifically include emission standards and schedules for the implementation of such standards; plans for the organization and staffing of air pollution control agencies, and for the continuing training of the employees thereof; necessary intergovernmental cooperative arrangements and financing plans; provisions for the periodic inspection of stationary sources of air pollution located within the region, including inspections involving chemical and physical testing of sources; the rendering of periodic reports to the public on the status of air quality within the region and compliance by individual sources of air pollution with established national, State, and local emission standards.

It has been my privilege to testify before earlier congressional committees dealing with air pollution. This present testimony urges more drastic action, based on the belief that the present degree of effort will not achieve the needed improvement in the quality of the air we breathe in a time span with reasonable likelihood of preventing serious injury and damage. In spite of the good programs which have been mounted in several of our cities, the increasing pace of pollution has left us standing still or slowly falling behind in our control effort.

Thank you.

Senator MUSKIE. Dr. Sterner, thank you very much for your excellent statement and your specific suggestions of which your paper is filled.

I think that your presentation helps put many of them in perspective, it is very useful to us.

Mr. Daly, would you want to add anything informally?

Mr. DALY. Only, Mr. Chairman, that I think it is significant as represented by labor, the media, the academy, and this is a consensus. There are specific elements of it which perhaps as individuals we may have some reservations but that we should find in so broadly based an

element of our general public weal a common idea and common approach. I think it has got particular value.

Senator MUSKIE. I would like if it would be possible within the time limitations to explore the implications of all of the suggestions that the paper contains.

I would like to ask a few questions, however, if I may.

Yesterday we had testimony from Lawrence E. Blanchard, Jr., executive vice president of Ethyl Corp., in which this statement is found. I wonder, Dr. Sterner, if you would like to comment on it. It is appropriate to ask you to inasmuch as you have concerned yourself with the problem of fuel and fuel additives. This is the statement:

There is no proof that lead in the atmosphere is any health hazard to the public.

I wonder if you might like to comment on that.

Dr. STERNER. I would agree that at the present time there is little evidence of real hazard to society from the level of lead presently encountered. Now we must, however, consider two factors here: One, our ability to judge long-term effects from lead is a very crude measure at this particular time. I would agree that there is probably no lead intoxication resulting from the levels presently encountered but I don't think we can dismiss it simply because we have not been able to explore this with the kind of long-term studies that are going to be needed to make a decision of vital importance.

Senator MUSKIE. How your answer poses a very interesting challenge for us or problem. The long-term low level implications of many groups are present so we have two approaches. One, do we continue our exposure to them until we do know which might then result in a situation beyond repair, or do we deal with these now on the chance that the long-term low level exposure would prove to be and demonstrably prove to be unfavorable? Which approach do we take?

Dr. STERNER. I think we need to develop a mechanism. You may remember that before an earlier meeting of the committee I proposed that the scientific community develop the kind of body which would consider the responsibilities in this area and hopefully be able to guide legislative bodies with respect to the actual hazard or toxicity of these materials. I am not proposing that the scientific community make the judgments involving all of the economic and social and political aspects. But if we had a good, hard judgment based as to biological effect from people who are most competent and able to make that judgment, broadly representing the scientific and professional community, I think you then would be in a much better position to make the overall decision on the cost benefit for society.

Senator MUSKIE. Now with respect to lead, it seems to me we have a choice. As a layman I am impressed that it would be easier to build an automobile that could operate without leaded gasoline than it would be to prove that lead in gasoline is harmful to health.

Dr. STERNER. That is true, excepting there are other effluents from the automobile that we have not been able to deal with successfully, for example, the problem of carbon monoxide. Granted, where we can eliminate one that is recognized as more potentially harmful, we would be wise to correct it.

Senator MUSKIE. Now I think it is relevant to a discussion you have opened up to refer you to the latest criteria issued by the Department. In your statement you urge the issuance of this criteria on carbon monoxide. Have you had a chance to study that?

Dr. STERNER. I have had a chance just to peruse it, I have not received a copy for study.

Senator MUSKIE. Let me call your attention to two or three statements in this document.

I think it presents us with a problem of do we do something with this after the horse has been stolen, or do we do something about it before that? This talks about—well, let me read. There is this statement:

“An exposure of 8 or more hours to a carbon monoxide concentration of 12 to 17 milligrams per cubic meter”—that is 10 to 15 parts per million—“will produce a blood carboxyhemoglobin level of 2 to 2½ percent in non-smokers. This level of blood carboxyhemoglobin has been associated with adverse health effects as manifested by impaired time interval discrimination. Evidence also indicates that an exposure of 8 or more hours to a carbon monoxide concentration of 30 parts per million would produce blood carboxyhemoglobin of about 5 percent in nonsmokers,” and so on.

Now in the city of Chicago, for example, there is a chart on pages 6.6 and 6.7 that shows the concentrations of carbon monoxide in various metropolitan areas. The one on Chicago indicates 16 parts per million and that is in excess of the figures I have read. The 16 parts per million are exceeded 30 percent of the time in Chicago, and at 10 to 15 parts health effects occur.

In Cincinnati, Denver, Los Angeles, Philadelphia, St. Louis, San Francisco, Washington, there are similar indications of the present concentrations of carbon monoxide, concentrations which 30 percent of the time in Chicago have adverse health effects.

Now what do we do about it? We know that as long as we have an automobile population of over a hundred million, of which more than 80 million have no control of technology at all, that as long as those cars can move freely in metropolitan areas we are not going to be able to do anything about these concentrations of carbon monoxide which now exist unless we prohibit the movement of privately owned automobiles in our cities, unless we move much more rapidly than we are to develop mass transportation facilities.

Would you like to comment, Doctor?

Dr. STERNER. I completely agree that the urgency of the problem, the rapidity of movement of the problem, is something that I am afraid very few of us appreciate. I think it is moving away from us at the present time and I think our efforts to control it will not be adequate in the foreseeable future unless we make a great deal more active attempt to get at the heart of the problem.

Senator MUSKIE. I would like to use this document to make a point. You say in your testimony that we ought not to discontinue the requirement for the issuance of these criteria. The reason I would like these criteria is that they have nothing to do with any proposal for what ought to be done on this area. This simply tells us what the effects of these problems are. So they are objective, factual, at the least as factual as modern research and knowledge makes possible.

So this ought to be the foundation for any program for dealing with these problems. I know that many industry sources don't like these because these effects are effects that impose terrible burdens of cost and research upon them but that they would like to avoid. They prefer standards which are more practical.

Mr. DALY. I think, Mr. Chairman, actually this is one reason there is such a marked emphasis in our commission on the need for an expanded and continuing research program at the Federal level, which is adequately funded. In all of these areas we tend to find ourselves dealing with parameters which are certainly soundly based scientifically but are admittedly inexact, imprecise, et cetera, and we need to get more definitive information to struggle with these problems about how you specifically take attitudes toward carbon monoxide emission, of course, or lead additives. On the additive issue, it would be better if we thought of that problem in terms of additives rather than lead additive, because I think there is a problem or possibility of a development of a new additive to these carbon fuels that might really be very damaging. If there is reasonable concern about lead, if we went to some kind of process which is followed in drugs, for instance, drug registration with data to support the adequacy of research and approve the safety of use for the public, I think we can do it with additives and in the process all of that information we have about lead currently, together with that declaration which would come from the Ethyl Corp. as to its scientific findings would be there a matter of record, and with any marked change in the technology of this particular area of research would do exactly what is now done in HEW, which is pull back the authorization to distribute.

Senator MUSKIE. Senator Baker has been interested in this field of research and has introduced legislation which I was proud to cosponsor to establish national laboratories which would be scientific but that would also go beyond purely the scientific and explore the implications of what we are doing to the environment.

I don't know whether you have had any opportunity to study that, Dr. Sterner or Mr. Daly.

Mr. DALY. As a matter of fact, Mr. Chairman, we did make a recommendation with respect to the future structure and organization of the entire pollution problem at the Federal level. In it we recommended authorities in air, water, occupational, and other basic pollution problem areas, which would recognize the interrelationships of pollution. We had the solution for one in the water field, but created a new problem in the air field, and our thinking was based on what we had in the National Institutes of Health. I think, as you know, we had this approach as a water program back in the early sixties. It came, I think, almost to the point of fruition.

I think the approach is a sound one, and we should have it in the single city where you can have a close cooperative and coordinate effort, but all of the disciplines involved with the pollution field.

Dr. Sterner is much more competent to discuss this intelligently than I because he understands the H factors and things which I have to look up. I think as an approach to the problem the need to get all research going and in one place with a very, very high degree of cross-communication is something that should be done yesterday rather than tomorrow.



Senator MUSKIE. Do you want to comment?

Dr. STERNER. It seems like this is where we came in 10 years ago. I remember serving on an Office of Science and Technology Committee to consider the establishment of a national environmental health center and the development of environmental health centers in universities. This program was delayed by decision that such a Federal unit could not be located within 50 miles of Washington.

Since that time each one of the programs has grown so large that there has been, I think, a serious problem as to whether you can bring all of these interests together in an effectively integrated program.

The NIH program in environmental health now in the North Carolina triangle is attempting to solve the interrelationships of problems, particularly the small dose spread over a large population. I think that this needs considerable enhancement, and it should be brought into a closer relationship with the other elements in environmental health program.

Senator MUSKIE. Thank you very much.

Senator Boggs.

Senator BOGGS. Thank you, Mr. Chairman. I want to compliment Dr. Sterner and Mr. Daly on their fine presentation this morning. I was unable to be here in time to hear all of it, but I have read most of it and I shall read it thoroughly.

Do you have any concern that the national standards you recommend would become minimal standards?

Dr. STERNER. I think this is a danger. You will notice we put an escape hatch in here that local regional areas could establish more rigorous standards if they were needed to meet the ambient air quality desired by that community.

Senator BOGGS. Later, you recommend that States be permitted to set more stringent standards. Should this include the opportunity, at that level, for public hearings?

Dr. STERNER. Very definitely.

Senator BOGGS. You believe in public hearings all the way through to obtain citizen participation?

Dr. STERNER. Very much so.

Senator BOGGS. I certainly agree with you.

Dr. STERNER. This problem gets so remote and so obscure that the average citizen says, what can I do about this other than protest? Protest is certainly one way of getting attention but we need an intelligent input into decisionmaking. Our local air pollution control agencies need this support of the community, of the citizens. This has been the major activity of the National Air Conservation Commission, to stimulate across the country organized concerned and activist citizen groups.

Mr. DALY. Senator, I would describe our approach to the problem of national emission standards. Taking the position in support of national emission standards really reflects our opinion that very probably as much as 80 percent of the landmass of the continent of the United States would not come under an air quality region by the normal designation. We wanted some basic national level which would apply to this vast area which would not be included in one of the air quality regions, so out of the blue someone would build a new town and we would have a mess on our hands. We do feel, however, the national emission standard should have a second place to the establish-

ment of the air quality regions, and the air quality criteria in those regions, and get the program soundly based and have a floor under it that would cover the areas that would not be expected to get into a region.

Senator BOGGS. Thank you.

The question of lead in gasoline has been brought up. Do you have any thoughts or observations on a study that I understand was made by the Bureau of Mines? That study found that the elimination of lead from gasoline, as presently used, would require increased use of aromatics in gasoline, and result in an increase in the hydrocarbons released to the atmosphere.

Dr. STERNER. I am not qualified to speak on this.

Senator BOGGS. Thank you, gentlemen.

Mr. Chairman, many of the provisions in the legislation before the committee go to the issue of participation of the public in standard setting and enforcement procedures. Mr. Frank Potter, executive director, Environmental Clearing House, Inc., has written an article which I would like to insert in the record following our colloquy with Dr. Sterner, that discusses many of the issues of public participation. I would like to also add that Frank Potter and his organization have assisted me in securing scientific comment on amendment No. 153 that I have introduced to amend S. 2005, the Resource Recovery Act of 1970. I believe his report will be of great help to us.

(Mr. Potter's statement appears on p. 1197.)

Senator MUSKIE. Without objection, so included.

Senator BOGGS. Mr. Chairman, I must leave for a short time to attend an executive session of another committee.

Thank you.

Senator MUSKIE. Senator Dole?

Senator DOLE. Very briefly, I want to get into the area of public hearings. The administration bill, S. 3466, provides for public hearings at the time of the formation of the State plan. Do you feel there should be public hearings prior to that time?

Dr. STERNER. I think there is great educational value in discussing the quality and the quantitative factors of the environment, even though, admittedly, the average citizen has difficulty grappling with these things.

Senator DOLE. In addition it is rather hard for me to understand how a public hearing in New York City, for example, might have any relationship to standards in Kansas.

Dr. STERNER. We would thoroughly agree. These hearings should be in Kansas with respect to your regional problems there.

Senator DOLE. The point I make is that the right of the public is protected if a hearing is authorized prior to implementation of a State or regional plan.

With reference to gasolines, there was some discussion yesterday by those in that business that they are violently opposed to the Secretary determining what the additive should be in gasoline and prescribing the standards.

As I understand your statement, you indicate there should be registration but not necessarily determination by the Secretary of HEW as to what goes into gasoline, is that correct?

Dr. STERNER. That is right, but then there should be demonstration of the safety of the addition of any material to the fuels in actual use and also that it does not interfere with the effectiveness of any control devices that we may have.

Senator DOLE. We had testimony yesterday from Mr. Blanchard of Ethyl Corp. that there is no proof whatsoever that leaded gasoline is injurious to public health.

I reminded him of hearings held by this committee in 1966 which indicated there was some evidence to the contrary. Do you have any comments on that question?

Dr. STERNER. I think we are dealing with the same kind of problem that we are with a hundred other hazardous or potentially hazardous materials. It is the same story with DDT, for example. We all have the traces of DDT in our body. Is this harmful at this level and at this stage? No one can say. For example, if we could make an assumption that we had 30 micrograms of lead per hundred cc. of blood and this was the national average, at what level of increase would we become concerned? When it became 32 micrograms, 35 micrograms?

We know that the average level was very high, say 80 micrograms, we would certainly find some of the classical overt lead intoxication.

We are not smart enough at this state of the game to say when a small increase is important. One of the difficulties is that we cannot consider lead alone but must consider it in the context of 100 or more other hazardous, or potentially hazardous insults from other causes. This is going to make the problem more difficult and require us to be more prudent in our present judgments.

Senator DOLE. Thank you, Mr. Chairman.

Senator MUSKIE. Thank you very much, gentlemen. We are most appreciative.

Dr. STERNER. Thank you, Mr. Chairman.

(The statement of Frank M. Potter, Jr., submitted by Senator Boggs, follows:)

## PROGRESS MEANS POLLUTION: AN IDEA WHOSE TIME HAS COME—AND GONE

(By Frank M. Potter, Jr.<sup>1</sup>)

### I. INTRODUCTION AND SUMMARY

Knowledgeable men today appear to be in general agreement that mankind faces a new dimension of environmental crises—that, however distant the prospect may appear, we have developed the power to so degrade the environment in which we live and upon which we depend that the quality of our lives—possibly our existence itself—is at hazard.

The reasons underlying these crises are varied, but they seem to spring from a common source: our ability to manipulate the physical world has progressed faster and farther than have the social institutions and protective mechanisms which might act as controls over that ability. In the midst of the technological revolution, individuals become demoralized and ineffective; private enterprise has no motivation to tamper with the goose that lays the golden egg, and the government is inadequately stimulated to take forceful steps to resolve the dilemma.

Our environmental problems are not entirely the legacies of deficient social institutions: a certain amount of ecological perturbation is inevitable and is indeed important to the survival of civilization as we know it. Nonetheless, while the ecology of the Earth is under considerable stress as a result of man's actions,

<sup>1</sup>Executive Director, Environmental Clearinghouse, Inc., copyright, 1969, Frank M. Potter, Jr.

and will continue to be so, the lack of ability to devise better corrective social restraints upon rampant technology appears to be the decisive factor in the environmental crises that confront us.

Not until we are able to step far enough away to see the crises and the institutions in the same context will we be in a position to diagnose the problems and begin to prescribe remedies. Such a comprehensive review may, it is hoped, suggest ways in which we may make those institutions more responsive to the needs of man and the laws of Nature.

Current environmental problems vary in effect and force, but they are nothing if not pervasive: existing at all levels of society, from local to international. They evidence the lack of an adequate information base, unresponsive and ineffectual techniques for technological evaluation and restraint, rapid rates of physical change compounded by a critically slow social reaction time, all further magnified by a surprising lack of consensus on the environmental goals that we really wish to achieve.

Pollution, which we may define as using a resource in such a way as to make it less desirable for other uses, is inevitable only until we can develop adequate tools for dealing with it. The government will never do the job by itself. The key to the problem, if any exists at all, seems to lie rather in putting stronger weapons into the hands of the public—helping it to precipitate the necessary reforms through judicial and other channels. That process would be greatly facilitated if we were able to require those who intend to make use of common resources to disclose their intentions and the expected consequences of their actions far enough in advance to allow less directly interested parties to consider possible unanticipated consequences and if necessary to force a public review in which the range of social costs and benefits might be explored impartially. Also, the burden of showing the need for action should be shifted from the public to those who wish to make use of public resources.

Current public concern with environmental issues shows no signs of slackening and, assisted by new ways of funding environmental protection programs, must provide the ultimate impetus for any upturn in what has been a rapidly declining quality of life for all men.

Pollution is becoming increasingly international in scope. Here the issues will be less easily resolved, chiefly because of the lack of effective non-violent sanctions. The best available tool for counteracting global environmental problems may lie only in effectively mobilizing world opinion.

Current proposals for treaties for the use of the oceans and the ocean floors provide a useful exercise in developing imaginative steps to protect a vital part of the ecology of the Earth. The best hope for a workable device for this purpose might lie in the creation of an organization to serve as an Ombudsman for the Seas.

## II. THE INSTITUTIONS—HOW DID WE GET WHERE WE ARE?

### A. *The Individual*

No rational person consciously acts to degrade the quality of his own life. He may do so through inattention, neglect or general hopelessness—and to some extent most of us do—but rarely if ever does an individual set out deliberately to foul his own nest. It is difficult to find a current newspaper without at least one story on environmental problems; and people who read these stories react to them. This reaction may take the form of amusement; more often, and with increasing frequency, the reaction is sympathetic. Environmental concerns are no longer the private preserve of the birdwatchers: the same bell tolls for us all.

In 1969 the National Wildlife Federation commissioned two polls on American environmental attitudes. The polling organizations reached similar conclusions; most people are actively concerned about environmental problems, and would prefer that their taxes be devoted to a greater proportion of the costs of solving these problems than is now the case. The level of concern rises with income, and varies inversely with age.

Over 50 percent of those interviewed felt that the government was devoting insufficient attention to environmental problems and was providing insufficient financial support toward their resolution. Over 80 percent felt personal concern, and most of these were deeply concerned.

What then keeps them from the barricades?

Apathy is the most common explanation, but the surveys appear to rule this out. The most significant inhibitor of action may rather be that we are too easily

convinced of our own political impotence. The larger the social grouping, the more difficult it is for any person to make a significant impact upon group decisions. On the other hand, when aroused, people can take and have taken effective action.

A coalition of citizens joined forces in 1969 to require a reluctant U.S. government to quadruple the amount of funds to be used for waste water treatment facilities. They did so by informing their elected representatives that this was a matter of specific, personal and urgent priority; their representatives listened and responded.

The lack of adequate information is also a powerful factor, but this too can be overcome. Today there is almost a superabundance of data about environmental destruction, and by no means all of it is the uninformed emotional outpourings of a few fuzzy-headed radicals (and reactionaries), as some have claimed. Respectable and respected scientists and citizens are picking up the cudgels and are making sizable impressions with them.

A few years ago a small and determined group of citizens banded together to oppose the largest utility in the United States, fighting plans to construct a major hydroelectric plant within 50 miles of New York City. They stopped the utility in its tracks. That company was Consolidated Edison, the plant was the Storm King project, and the Federal Power Commission, which must decide whether or not the plant should be built, still has not decided the case. The strong case made by the citizens depended in large measure upon the fact that they were able to propose alternatives to the project, supported by a wealth of technical and engineering detail, to suggest that New York's serious power problems could be met by less damaging methods. Although Con Edison has not yet given up the project, it has adopted the alternatives and many sophisticated agency-watchers consider it unlikely that the plant will ever be built.

Another more philosophical issue must be considered. Assume that we, individually or collectively, are confronted with a clear option: do we live very well for a short period, or do we cut back economic growth in favor of long term survival for the species? With or without volition, we appear to have adopted the former course of action, and it is by no means clear that we would act much differently if the choice were clearer. "Après moi, le deluge" is a life-style confined neither to France nor to the Eighteenth Century. This conflict permeates the environmental issues of the day, at all levels of each institution.

As individuals, we tend to be somewhat ambivalent about the importance of an environmental conscience. In some respects, many people fail to observe even a minimal degree of environmental good manners. For example, a shift in public attitude would produce an instant halt to the littering of our highways, but no such shift is visible. With very little effort, we could easily educate our children in the importance of environmental responsibility; yet if anything our children seem to be taking the lead in educating us. A national Environmental Teach-In is scheduled for April, 1970 in schools and colleges across the country, and there are signs that problems of pollution are occupying a rapidly increasing portion of the attention of young people. A more encouraging sign could scarcely be imagined.

It is important to distinguish between the actions and attitudes of individuals and those of the groups into which they form themselves to consider environmental problems. The biggest problems faced by citizens' groups seldom involve a lack of motivation; they are typically financial. It is rarely to anyone's economic interests to oppose a polluter; this means that the concerned citizens must themselves assume these costs, although the financial burdens involved in speaking out against a powerful and well-financed industry or government agency may be substantial. Although these are not usually publicized it is known that the costs of carrying on a major controversy may exceed \$500,000. We cannot reasonably expect any group to bear such a burden, nor should we as long as that group is acting to protect assets that are common and valuable to all. At the same time, of course, we have a legitimate interest in seeing that public subsidies will be employed only in valid and meritorious cases.

It might also be noted that citizens may not always organize themselves to protect an environmental *system*. One group may be interested only in visual pollution, while another is interested in noise, and it is an unfortunate fact of life that the normal resolution of a pollution problem is to push it into another area which may not be so vigorously defended. The public concern with power generation facilities producing air pollution in the form of coal dust, oil droplets, and increased sulfur dioxide emissions has played a significant role in the

encouragement of nuclear plants, which involve none of these problems but which may have their own problems in terms of radioactive and thermal pollution of cooling water. What we need is groups with a *total* environmental concern.

### B. Private Institutions

Private businesses suffer to an extent from the same lack of information that plagues individual citizens. Unlike those citizens, private companies can usually afford expert advice, but for a number of reasons that advice is not always sought.

The horizons of the private decision-making structure are deliberately limited to those factors which are considered to be of immediate importance, principally economic. The hidden social costs of organized activity—what the economists term “externalities”—tend to be thrust out of the decision matrix. These costs still exist, however, and must be borne by society as a whole if not by the agency which creates them. A classic example would be a pulp processing plant which emits fumes of hydrogen sulfide, causing wrinkled noses and peeling paint for miles downwind. The resulting inconvenience, possible health costs and certain increases in maintenance costs have not traditionally been imposed upon the agency which created them. Instead they have been imposed upon society generally, regardless of the capability or willingness of individual members to bear them. And of course as Garrett Hardin has clearly shown, the short-term interests of the entrepreneur may be directly opposed to the long-term interests of society generally [G. Hardin, *The Tragedy of the Commons, Science* (13 December 1968)].

This system is not inherently evil, nor are its managers committed to profit at the expense of the public. Indeed, some private companies have taken significant steps to limit the disadvantageous social consequences of their operations at considerable internal cost, quite beyond what they were required to assume by law. Unfortunately, a voluntary approach to reducing environmental problems does not appear to be adequate to a rational, long-term approach to resolving them.

The forces of competition tend to minimize such voluntary efforts: few men or companies, however public-spirited they may be, are prepared to expend large sums upon the internalization of indirect costs. Nor can they do so without incurring the wrath of stockholders even further removed from the environmental affronts which they have indirectly created.

The mechanisms for balancing social costs against economic values must be found outside the private institutions themselves, and they are: this is a major function of government. It is important to note that the *laissez-faire* philosophy which at one time characterized the attitude of American government toward at least American industry is inappropriate to the problems which both confront today. It is also apparent that on environmental issues the government is likely to expand its control-oriented program. Public attention has already been focused on air and water pollution as appropriate areas for concentration of effort. There are other areas in which governmental action must be anticipated: among them noise, solid waste disposal, and the byproducts of energy transfer are mentioned with increasing frequency.

Governmental overview, if impartially and reasonably imposed, need not be hostile to the private sector; it may even be in its short- as well as long-term interests. The National Association of Manufacturers has never been known as a hotbed of social activists, and yet members of NAM operating committees have endorsed proposals for a strong federal body overseeing environmental issues. Businessmen have to breathe, too, and are prepared to accommodate themselves to the ecological imperative, so long as their fellows are subject to the same rules.

We cannot assume that this increased governmental concern will take place without some economic disruption. Marginal producers will feel the pinch most strongly, and some may not survive. Nevertheless, the important consideration to be borne in mind is that the rules must be enforced fairly and impartially upon all parties.

Polluting industries have most often resisted pressure to clean up their operations by claiming that the measures proposed are unduly prohibitive or confiscatory. Their chief means of resistance has usually involved threats to pull up their stakes and move to a more permissive climate. It is believed that this last resort has been adopted infrequently, if at all, and that it is only likely to occur where a producer has found himself impossibly squeezed between falling profits and rising costs. It has also been alleged that these are the marginal producers whom the next strong wind will blow away in any case, so that little lasting economic damage ever occurs.

In concluding the discussion on private institutions, it might be useful to stress the distinction between those which exist to make a profit and those which do not. The non-profit groups, smaller in size, financing and influence, have only recently begun to interest themselves in environmental issues. The interest of the private foundations in these topics may recently have been diminished by changes in the tax law, which seem to discourage the kinds of intervention which may have political implications. If this turns out to be lasting, the cause of environmental protection will have received a severe setback in the United States.

### C. *The Public Sector*

Governments appear to be unresponsive to the environmental problems of today, and seem even less likely to be adequate to those of tomorrow. In major part this appears to be due to the fact that the pace of technological change has so accelerated that governments, as presently oriented, find themselves unable to adapt to new problems and to exercise the type of control for which they were originally constituted.

#### 1. *Executive Branch*

Although the problems of the executive branch are essentially similar throughout the hierarchy, it is important to bear in mind that the mass of government workers, the *lumpenbureaucracy*—marches to a drumbeat that only it can hear, which (if it exists at all), is faint indeed. Higher levels of government, although presumably more responsive to broad social needs, generally find their choices so circumscribed by business-as-usual decisions further down the line that their theoretically available policy options become dissipated by the inertia of the machinery. This phenomenon is by no means peculiar to environmental problems, although these tend to be somewhat more acute because of the high stakes involved and because the new issues do not fit easily into existing patterns of bureaucratic stimulus and response.

In practically every agency of government, at almost every level, there develop strong and seemingly almost irresistible pressures to maintain the *status quo*. As one progresses from local to national bureaucracy this inertia rapidly increases. A random example: very early in the 1950's the Eisenhower Administration stated a strong preference for private power development as against public power, but it was not until the Kennedy Administration took office eight years later that the direction of the government had changed enough for it to become an effective supporter of private power. Nor could the Democrats reverse the trend.

There are also powerful personal influences that affect the career civil servant—influences that are environmentally, in current bureaucratized, “counter-productive.” As one observer has put it, “the paramount objective of the permanent bureaucracy is permanence.” This contributes directly to the institutional resistance to change already noted. Agency employees tend to react self-protectively, and in so doing they protect their own institutions. Examples of this tendency may readily be found: it was probably the principal roadblock encountered by Ralph Nader's “Raiders” in their government agency investigations during the past two summers, who often ran up against a blank, noncommunicative, bureaucratic wall.

The same conspiracy of silence resulted in the attempted burial of several agency reports on the controversial supersonic transport, all of which were unfavorable and all of which had to be wrenched from unwilling bureaucratic hands by actively concerned Congressmen. It was to combat this reaction that Congress recently passed the “Freedom of Information” Act, requiring disclosure of all but certain specified documents—a public law which has been honored far more in the breach than in the observance.

This problem is compounded by a frequent lack of clear policy direction from the upper levels of government to the lower. New policies may be found in new regulations and pronouncements which go religiously unread, or they trickle down by word-of-mouth through a number of communicants, each with his own built-in bias. This communications system serves as an efficient filter for any content which may fortuitously have crept into the public statements of the man or men on top.

These problems should not be ascribed solely to bureaucratic malevolence. Their problem is essentially the same as that of the private citizen: they are not programmed to relate everyday decisions to any specific action of the government machinery. Moreover, the results of yesterday's decisions are rarely com-

municated to the decision-makers as a corrective for tomorrow's programs. To be sure, there is enough feedback that everyone knows when the dam doesn't hold water (which happens), but when a dam destroys a delicate ecological balance and wreaks havoc in the local community, this is rarely perceived as a real-world problem, reported back and worked into the apparatus in such a way as to avoid similar problems in the future.

Still another aspect of the problem is that government agencies compete with one another. For example, for decades there has been a mute and polite war between the Departments of the Interior and Agriculture: the first casualties of this war have frequently turned out to be the environmental considerations. Countless examples of this competition have been observed: timber cutting practices on public lands and in National Forests, pesticide regulation (if that is the correct word for it), dam building and soil conservation are just a few. The same kind of competition may occasionally be found between the public and private sectors of the economy: once again environmental considerations usually are among the first items to be jettisoned when the order comes to lighten ship.

This competition is healthy in some respects, and the public may even occasionally benefit. For instance, several years ago, the Army Corps of Engineers conceived and attempted to give birth to a plan to build a high dam on Alaska's Yukon River which would flood hundreds of thousands of acres of land in the process. This dam was successfully opposed by the Fish and Wildlife Service of the Interior Department on the grounds that it would do untold damage to the wildlife in the region. The operative word here is "untold"—no one knew just how much damage would have been done, and the Corps was not seriously interested in finding out.

Governmental competition has other consequences as well: although they operate with public funds, governmental agencies are under pressure to maximize the value of the funds that they expend. This is not undesirable, but it produces the same problems affecting the private sector: agencies are subjected to great pressure to externalize social costs. The budgetary restrictions placed upon the head of a large operating government agency are no less severe than report is not much more aware of the importance of environmental factors than those upon the directors of a large corporation, and the body to which they is the average stockholder of American Telephone & Telegraph Corporation. This analogy ought not to be pressed, since it lies within our grasp to improve the ecological understanding of the Congress within a realistic time-frame, and it will be difficult to do the same for the average citizen.

Finally, the actions of government agencies acquire considerable momentum, which must be maintained if they are to continue to survive and grow (C. N. Parkinson, *Parkinson's Law*, Houghton Mifflin Company, 1957). The Corps of Engineers pursues an aggressive program in promoting its projects. A major factor in this system is the method of calculating the costs of these projects against the projected benefits to be provided. Cost/benefit calculations have, however, tended to inflate the benefit side of the equation while downgrading costs. It is not that the Corps wants to dam every river and dredge every harbor in America so much as that an institutional myopia has crept in, magnifying immediate objectives and obscuring the relationship of those objectives to the needs of society.

## 2. Legislative Branch

The essential function of the legislative branch of government is to formulate and to review policy. In so doing, it operates under constitutional or other social restraints, and it must of necessity paint with a broad brush. Translating basic policy decisions into specific go and no-go decisions is never an easy task, and is often complicated by pressures within the executive branch to change the policy decisions themselves. This can be done on a small scale and is done, often without significant risk since legislative oversight is inclined to be sporadic.

More importantly, policy is only as good as the information upon which it is based, and this information tends to be biased, conflicting, fragmentary and/or out of date. Turning to the U.S. Congress as a case in point, consider the effect of the following factors upon the theoretical nonbias with which a policy decision is supposed to be approached:

1. *The nature of the proposal.*—Most legislation enacted by the Congress is first proposed by agencies in the executive branch. (This, incidentally, may not be quite so common today: the legislative proposals of the present Administra-



tion have been criticized as somewhat sporadic. Many of the bills now before the Congress, however, are holdovers from earlier years, and the basic pattern seems to have changed very little.) Support for these measures tends to be channeled well in advance of their consideration—facts are marshalled, charts are prepared, as are witnesses. A frequent byproduct of this process is that the Congress may focus on the wrong issues.

2. *The Congressional Committee structure.*—Committees of the Congress, and especially their ranking members, are the principal focus of much of the power in Washington. This apparatus determines which bills shall be heard, whether testimony in opposition shall be considered, and if so, how it will be rebutted. Unless the issue is a prominent one, under the attention of the press and the public, or unless a maverick Congressman digs in his heels, those controlling the Committee have a relatively free hand in developing the arguments for and against the bill; hence they control its future.

3. *The bias of Congressional leaders.*—The environmental crisis is a relatively new phenomenon, and the young are, in general, more concerned with the problems than are their elders. This is as true in the Congress as it is elsewhere, and the result is that many of the older members, who exercise greater control over legislative action than do their younger colleagues, are visibly less inclined to move vigorously to meet the new challenges. Exceptions to this generalization can easily be found, but its general truth is not seriously questioned. The effect of this bias toward inaction ought not to be discounted.

4. *The adequacy of the testimony itself.*—Assuming that the measure is a reasonable one, and that the controlling committee is interested in developing the true issues, the witnesses called to testify may nonetheless not be the best available. Witnesses on environmental issues have tended to be the elder statesmen—established scientists and professionals whose views on new problems and on the need for new approaches have been colored by their own studies and viewpoints, which may be considerably out of date. A review of nongovernmental scientific testimony over the past few years shows several names which tend to crop up again and again; these individuals (who may be spectacularly well qualified in their areas of competence) may occasionally edge into areas in which they are not so well qualified to speak, and often seem to respond to the unspoken needs of some committee members to be reassured that “things are not all that bad, and somehow technology will find a way.” Although not every witness falls into this category, it happens often enough to constitute a real problem. There is a need to develop the base of scientific testimony available to the Congress on environmental issues and to see that the younger men and women (who in some respects at least have a greater stake in the future than do their elders), whose factual knowledge may be far more current, shall also be heard.

5. *The context of the legislative decision.*—Another conflict, not at all restricted to environmental issues, faces the legislator who must decide whether to favor the interests of his own constituency as opposed to those interests which he may or may not perceive as national. Thus Congressmen and Senators from the West are generally inclined to favor legislative proposals to open public lands for development (mining, grazing, lumbering, oil exploration, etc.), whereas the interests of the entire country might seem to favor retaining these lands in a less vigorously exploited condition. How to measure the interests of local areas against those of society is a serious question; this task may be one of the most significant functions of government.

The broad nature of the authority and responsibility of the legislature may prevent it from exercising effective control over the actions of the organizations under its theoretical direction. Aspects of this problem have already been alluded to. The policies that the legislators are called upon to define are so broad that they cannot possibly be spelled out in detail, and yet it is in those details that the actions of government become manifest, and where the shoe pinches most cruelly.

The legislative mechanism may also be criticized for one factor which has been instrumental in allowing the institution to survive: its slow reaction time. The Congress is a highly conservative body—deliberate in adopting new courses of action, and slower to change them once adopted. This is a source of strength, preventing today's fad from becoming tomorrow's straitjacket, but it is also a real source of danger to the system. Science and technology have transformed the world of mid-twentieth century into something that was quite unimaginable fifty years ago. The rate of change is accelerating, and it is a brave man who claims that he can predict the state of the world in the

year 2000. Shrill voices may decry technology and demand that there be a halt to new technological development: they are no more likely to be heeded than were the machinery-wrecking Luddites of nineteenth-century England. Whether they are right or wrong is quite beside the point; barring massive catastrophe, technology will not be significantly curbed and the rate of technological change will almost certainly continue to accelerate.

New technology creates new social conventions, which in turn affect legislative policy. Yet the mechanism for determining that policy are keyed to technological considerations that may have been out of date in 1789, and to decision-making processes that have remained essentially unchanged since the days of Roger Bacon. Consider another example: that of massive climatic change. Scientists tell us that urban development and energy transfer now have a significant effect upon global weather patterns. We hear on the one hand of the "greenhouse effect", which tends to raise atmospheric temperature as a function of increased carbon dioxide production, and on the other of increased amounts of pollution in the air, which tends to raise atmospheric temperature by decreasing the amount of solar radiation reaching the Earth's surface. Some scientists, extrapolating present activities, speculate that it would take ten years to decide which is the more powerful effect, and that by then large scale climatic changes may be irreversible. This view is by no means commonly held, but it is under serious consideration by men whose voices ought to be heard. They have not been heard by the Congress, and if they were, they would be outnumbered ten to one by men saying "we are not certain, we do not know, and we should take no action until we do."

These problems are not the exclusive province of the Congress; they are those of the scientific community and they are ours as well, as humans with a presumptive interest in survival. There is no way to force these problems to the front, conjoined as they are with an historically validated precedent for doing nothing—yet.

Legislators tend to focus upon institutions rather than upon individuals—to see the needs of the larger groups, whose existence depends upon traditional thought patterns and legal fiction. A water pollution problem is perceived as that of a municipality or an oil company, an air pollution problem as that of a manufacturer. Yet it is individuals whose favor the legislator must seek if he is to survive. This suggests in turn that if individuals can organize themselves to be heard as an institution, concerned with environmental survival, the legislators will respond. This has not yet happened generally—no significant environmental lobby has yet made its voice heard on the national level; if any exist elsewhere, their story has not properly been told.

### 3. *Judicial Branch*

The courts exist to see that the written and unwritten rules of society are followed—that the policies formed by the people and their elected representatives are observed. Within narrow limits, recognized and indeed insisted upon by society, the courts have been successful in this function.

As a means of achieving rational decisions on environmental issues, the courts are usually ineffective. Their influence could increase, but this would require a significant departure from the usual legalistic approach and would involve the recognition of a basic and inalienable human right to a livable environment. Such a decision appears to be only a remote possibility. Without this new constitutional approach, the courts will almost certainly be hamstrung by inadequate policies adopted by the legislature and by common law rights which were defined centuries before the current environmental problems appeared.

Lawyers are adept at pouring old wine into new bottles, and efforts are under way to push the courts into a more enlightened attitude on environmental questions by torturing old principles of law into new shapes, designed to meet the needs of the time. Principles of sovereign trust, of public and private nuisance, and of public rights in private property are being dragged out, dusted off and sent into battle, but may well be expected to return on their shields, bloody and bowed. In time, the law could adapt, but it is time that we lack.

The basic defects go deeper than theories and tactics: only in rare instances can the courts make decisions with more than local force and effect. The U.S. Court in Southern New York may properly hold that the Federal Department of Transportation must observe certain procedures specified by statute that may have escaped the Department's notice, and that for this reason a highway

shall not be built over the Hudson River. At the same time the same Department in apparent disregard of the same procedures seems to be traveling down the same path in favoring the construction of longer runways into the Columbia River. Technically the decision of the New York court is not binding in Oregon; the Oregon courts are free to disagree with their Eastern brethren and such disagreements are in no way uncommon. A means does exist for resolving interjudicial disputes: the Supreme Court of the United States. That Court, however, is already operating under a fearful load and can devote only a limited amount of its energies to environmental questions, however imperative they may appear to be.

The courts also lack an adequate information base upon which to make their decisions. The common law system is grounded upon the adversary system, the theory being that each side will present the most favorable case, and that the court will then resolve the dispute on the basis of the evidence before it. The environmental problems arising today are highly complicated—so different from the land disputes and tort actions of centuries ago that they hardly bear comparison. In theory, expert testimony ought to be available to both sides to support their cases; in practice, this simply does not work. Even if environmentalists can afford to hire experts (and they often cannot), experts cannot always be found. It is a rare electrical engineer who will agree to take the witness stand on behalf of opponents to a power plant or transmission line: he knows well that other utilities may thereafter hesitate to contract with him for services in circumstances that may be wholly unrelated to the present controversy. Conscientious men do exist and someone may be found to testify, but it is not easy; cases have been lost and will continue to be lost for this reason. Without that interplay of expert testimony, the court is at a major disadvantage, and the decision is likely to suffer.

Even if experts can be found by all parties, the court's information problems are not thereby solved. Technical questions are already difficult, and they are growing more complex. Judges spring from different backgrounds, but the law operates upon the theory that their experience is essentially irrelevant to the issues that they must decide: historically, ignorance has been a prime virtue, the court acting as the *tabula rasa* upon which the cases of the opposing parties may be written. This is a manifest absurdity, but it is the way the law grew, and it is a fact that lawyers with weak technical cases prefer judges with little technical competence.

Another weakness built into the judicial system from the environmental standpoint is its tendency to delay decision. Combined judicial and administrative delays have postponed the Storm King decision by five years and if the parties fight down to the wire another two or three years delay is likely. This delay has in many respects worked in favor of the conservation group, but this happy state of affairs is not the rule. Citizens opposed to a particular proposal or project are usually forced to seek injunctive relief from the courts; they may and often do find that this relief cannot be obtained without their posting a substantial bond, which is quite beyond their means. The result is that while they work their way through the courts, the opposition is busily "doing its thing"—building or digging or chopping down—and by the time that the court is ready to decide, the essential question has become moot. Injunctive relief is typically the only possible hope for environmentalists, since the alternative is a damage suit, and it is a basis tenet of such organizations that money cannot replace what is threatened.

Constitutional revision has been proposed as a means of providing a clearer and more enforceable definition of our rights to an undergraded environment. New York State has adopted such a program, and similar efforts have been mounted on a national level. An Environmental Bill of Rights would indeed be a valuable too, but no such proposal has a chance of even being seriously considered without vastly increased pressure upon the Congress and upon the legislatures of the several states; there is no evidence that such pressure is forming. Consequently, at present such a step must be considered too remote to be seriously considered.

#### *B. The National and International Nature of Environmental Problems*

Much of this paper has been devoted to American institutional and environmental problems. Neither category is exclusively ours: England has had and continues to have serious air pollution problems; the Russian sturgeon is virtu-

ally extinct, and with it, a valuable national resource; Tokyo displays almost every conceivable environmental problem; and the indiscriminate use of pesticides has wreaked havoc in South American ecosystems.

Environmental problems are not peculiar to specific ideologies or geographical locations, although these may play a role. At least in part, the problems arise because of identifiable human failings and are encouraged by continued human inadequacies.

Pollution is limited by neither internal nor external political boundaries: dirty air and water pass from country to country with no restriction, and people downstream and downstream can only suffer, possibly comforted by knowing that their hands are not likely to be any cleaner than those of their neighbors.

The international community is rapidly becoming aware of the nature of the problems presented by environmental degradation. Sweden has taken an important step by proposing a world-wide Conference on the Environment for 1972, under the auspices of the United Nations. The general question is one on which many nations can agree, but our complacency with this happy state of accord must be tempered by the realization that agreement is usually easy to reach in principle, until specific problems arise. Everyone is against pollution, but the ranks of enthusiasts quickly thin as specific problems arise and specific remedies are proposed.

As we have noted, man has been less than successful in his dealings with environmental problems on the local and national level. Internationally, our record is even worse; nor do the histories of the international fish and whaling commissions encourage a sanguine view of prospects for the future. The United Nations, in turn, has neither the constituency nor the commitment to act as a source of resolution for the foreseeable international environmental conflicts. It was not created for this purpose, and would require extensive internal change if it were to take them up seriously.

As in the case with national problems, we are challenged to develop new ways to attack international pollution. In so doing, we must take account of the deficiencies built into the system and, wherever possible, should adapt corrective techniques to the situation as we find it, not as we would have it.

#### *E. Patterns of Institutional Inadequacy*

The preceding review of social institutions reveals some basic patterns: problem areas where difficulties appear to be concentrated and where effort may profitably be devoted to provide a more enlightened context for environmental decisions.

Perhaps the most important of these is the lack of adequate information at the operating level—information about what is happening, what is at stake, and what the alternatives may be. In some cases this information is not there because it is not available—because no one has yet asked the right questions. In other cases, and probably more frequently, the information is not available to the person who needs it when he needs it.

Another major area of inadequacy might be described as that of the lack of effective control systems: ways of determining that decisions once made are carried out, and that the sand that creeps into the machinery is removed with a minimum of time and trouble.

The next problem area is probably the least controllable: the time scale within which we must respond to the environmental challenges is so compressed that whatever information and control systems we can develop may still be unable to operate effectively. The rate of technological change will probably remain rapid, although it has been suggested that a leveling off is likely in some areas [J. Platt, *What We May Do*, 166 *Science* 1115 (28 November 1969)]. The objective then becomes to develop sufficiently responsive systems to permit society to react to new crises before these have acquired unstoppable momentum.

Still another problem is that our trouble-sensing procedures are inaccurate and inadequate. We do not seem to be able to react when problems are foreseen; we do not respond until they have become massive and therefore less easily managed. This in turn requires the exertion of far greater corrective force than would be necessary if we had reacted sooner and more adequately.

It also points up the failings of the more or less simplistic solutions that we often adopt as a means of correcting environmental problems, which are rarely if ever simple in origin, and are not usually curable by the simple solutions presented to and accepted by decision-makers who are not professionals in these complex areas. The Department of Health, Education and Welfare has con-

cerned itself strongly with the effects of carbon monoxide and sulfur dioxide in discharging its statutory responsibilities under the Clean Air Act. While it has not entirely ignored the interacting and cumulative effects of the many other pollutants that affect the quality of our air, it seems to have spent considerably less time and effort upon them, notwithstanding the fact that some may have a substantial effect upon our health and welfare.

A further problem is that we have never seriously set out to define what we mean when we talk about an "optimum" or "liveable" environment. True, we all tend to make these judgments on a subjective, nonanalytical basis, and we focus on issues with which we may personally and emotionally be involved. The tennis-shoed Little Old Lady may grieve for the Redwoods or a threatened brook without realizing that bigger and more serious problems may threaten much more basic values—perhaps life itself.

Subjective judgments on these questions are unavoidable, and may not be undesirable. But at the same time it would seem important to devote a portion of our energies to an informed effort to *define* the public interest, and to clarify some of the conflicts that are inevitably involved. If, for example, we continue to favor the internal combustion engine as an integral element of our transportation system, what will this mean in terms of projected levels of air pollution, climate and human health? Should we not, in other words, develop a base-line, from which we may then judge the consequences and costs of proposed new courses of action?

If we are in a position to relate the consequences of certain behavior to a better-defined concept of what we want as an environment, we can then measure one against the other, and take rational positions for or against a given proposal. If we first define the amount of permissible variations in salinity, heat, oxygen and other factors affecting the quality of our rivers, we can then judge how many dams and power plants those rivers can tolerate before they are damaged or destroyed as resources.

As indicated at the outset, these problems may be found in different forms at each level of man's organized activity—local to global. They tend to increase in intensity as the area of concern expands, and the larger groups may and often do frustrate the wishes of the smaller groups. This question requires separate treatment, but it is important. We have traditionally attempted to cope with the phenomenon by setting aside areas of sanctuary to protect the smaller units from the action of the larger, and this may not have been a happy choice. It might be wiser to concentrate upon building an automatic review procedure into the decision-making apparatus of the larger groups with appropriate sanctions, to ensure that the interests of their constituent members are not ignored while larger scale policy decisions are being thrashed out.

### III. NEW STRATEGIES—WHERE DO WE GO FROM HERE?

#### *A. Local and National Problems*

The first and basic corrective need is to construct a more authoritative and responsive information-gathering network, and to develop methods of distributing that information at minimum cost to those who need it. This need affects all institutions, at all levels, and is only superficially satisfied at present. How this should be done and who should do it are important questions yet to be resolved; strong arguments can be made for keeping the apparatus out of governmental hands, and the profit factor provides equally powerful reasons for keeping it out of the marketplace.

Emphasis in developing any such information network must necessarily be placed upon the excellence of the service—differences of opinion are no vice, when responsible and adequately documented, and unanimity of opinion ought properly to be a source of some concern.

The traditional approach to the development of social control systems has involved the creation of administrative regulatory bodies, acting as expert arbiters to protect the public interest. This approach has been spectacularly unsuccessful: the regulators have inevitably become captives of the industries that they were established to regulate. Whether consciously or not, the regulators have adopted roles as promoters and protectors of the theoretically regulated. There is little hope that improved environmental protection will result from the establishment of a new superregulatory environmental agency.

Another method suggested for controlling rampant environmental degradation involves the establishment of technical and technological monitoring systems—

putting scientists in the position of active maintenance, control and dissemination of environmental information and protective measures [B. Crowe, *The Tragedy of the Commons Revisited*, 166 *Science* 1103-1107 (28 November 1969) ; see also *Technology: Processes of Assessment and Choice* (July 1969, National Academy of Sciences), and *A Study of Technology Assessment* (July 1969, Committee on Public Engineering Policy, National Academy of Engineering), both submitted to the House Committee on Science and Astronautics]. This effort is hardly more likely to succeed, requiring a degree of political sensitivity and aggressiveness which is foreign and perhaps antithetical to the scientific method, and certainly inconsistent with past history and current tradition.

The most adequate solution to the problem of devising workable control mechanisms appears to lie in putting necessary information into the hands of the concerned public, which has the most direct interest, and by giving it better tools and ways of calling environmental miscreants to account. We cannot prevent the bureaucrat or the entrepreneur from making decisions which have short-term advantages for him but long-term disadvantages for society. What we can do is to require him to make his decisions and reasons public, and to provide a forum which can review those decisions with broad social interests in mind.

In effect, this would involve building into the decision-making structure of government the ability and directive to consider long-term and ecological consequences of activities within their areas of responsibility. This might be accomplished by taking a number of specific steps :

1. Long-term effects of programs and policies must be examined and detailed as a matter of public record.

2. Post-monitoring control systems must be established to determine whether the environmental effects were those anticipated, and if not, why not. Here again the public should be given easy access to the full record, and procedures should be established to permit citizens to put the appropriate agencies on notice that problems have arisen requiring attention.

3. Executive agencies should be required as a matter of regular procedure to obtain the views of other interested federal, state, or local groups, public and private, on questions related to their programs. Responsible issues raised should be answered on the record, and if not answer is forthcoming, or if the answer is unsatisfactory, procedures should be established to permit judicial review of the matter.

4. Public agencies adopting specific programs should also be required to document whether and how these programs are best adapted to the comprehensive needs of the situation. Where reasonable alternatives exist, these should be described, and an explanation should be given as to why they were not adopted.

5. Each agency taking action should be required as a matter of law to justify why any action at all was desirable. This is not so simple-minded as it sounds: the Corps of Engineers is hard put to defend itself when asked to develop the cost/benefit calculations of the virtues of *not* building a dam. The assembling of a group of technologists and/or engineers presupposes great pressure to do *something*—the option of not going forward at all is often obscured or ignored.

This latter requirements suggests itself for non-governmental areas of endeavor as well. Highway builders, land developers and others have a far easier job in proving their cases than do their opponents, and are much better equipped to deal with these problems. A heavy burden of proof is placed upon the people presuming to speak for the public interest. To get into court they must show that active harm will result, not balanced by the putative good to be achieved through the proposed activity. The burden is misplaced—those who wish to use environmental assets should be required to show that the balance *favours* their proposals.

We must also develop mechanisms for more rapid, extensive and convenient public review of major public and private agency decisions. This might best be done through the creation of a Public Defender for the Environment, with authority to review general governmental policies and to pass upon specific problems which are considered to have significant environmental consequences. In extraordinary cases, this Defender might be given the authority to issue temporary cease and desist orders as a means of preventing the otherwise inevitable destruction of importance resources. Control procedures must of course be set up to prevent such a Defender from acting irresponsibly or to force him to act in proper cases.

We must encourage the public to participate more effectively in the making of decisions with environmental implications, as to which it has no present measurable impact. This means citizen action programs, keyed to the issues of the day. Call them lobbies, pressure groups, or anything else; color them important. Their actions should be coordinated in such a way as to have a meaningful impact upon the legislative bodies whose decisions affect us all.

We also need to develop new ways of funding citizen organizations with environmental objectives. Where they act to protect common assets, they should be supported by the public treasury or by the organizations whose actions created the problem in the first place.

The first method might be accomplished by the enactment of a federal statute to the effect that any person or group winning or perhaps even instituting a court case based upon the violation of a federal pollution law should be entitled, in the discretion of the trial court, to recover reasonable attorneys' fees and costs. It would be necessary to spell out in detail the nature of the cases in which such relief would be appropriate, but the basic idea merits discussion.

In many ways it would appear more desirable to force the would-be polluter himself to underwrite the costs of protecting the resources that he has threatened. This could be done by requiring a public bond to be filed by agencies which propose to take actions with potentially undesirable environmental consequences. That bond would be subject to forfeit if an anti-pollution law were violated or if unforeseen environmental consequences should occur, and the funds might be applicable to legal fees or to cleaning up the resultant problems.

We should also step up our efforts to find more adequate technological solutions to the problems which technology has itself created. The most effective and least harmful method that we were able to develop to clean up the infamous Santa Barbara oil spill involved the massive use of straw, men and hand rakes—hardly a creative response. Transferring oil from Alaska's North Slope to world markets could create serious environmental problems: the use of gigantic ice-breaking tankers risks the Arctic Ocean, and the use of overland pipelines threatens a tundra that has remained substantially unchanged for many, many years. Both techniques menace a fragile ecology that might take centuries to recover when and if something unforeseen should happen.

It is almost inconceivable that more effective and less expensive techniques could not be found to meet these and other environmental hazards of the time. The civilization that could put men on the Moon ought to be able to do better. The solutions to these problems might be expensive, but the failure to find answers will certainly cost us more.

Some of the strategies described above have already been implemented in the United States, others are under consideration, and some may never have been publicly advocated.

In 1968, several Congressmen formed an unofficial Ad Hoc Committee on the Environment as a channel for communication on environmental issues between the Congress and interested scientists and informed citizens. The committee now numbers 120, and is in regular contact with 132 expert advisors. Membership on the committee is open to any interested legislator: Senator or Representative, Republican or Democrat. This step does not entirely satisfy the need for better information, but it seems to be a long step in the right direction. The information network available to members of that committee may soon be expanded to meet state and local demands for better environmental information, and it ought also to be useful to other groups with similar concerns.

Legislation has been considered in the Congress which could go far toward arming citizens' organizations with better information on what federal agencies are doing and why they are doing it. The National Environmental Policy Act of 1969, sponsored by Senator Henry Jackson and Representative John Dingell, contains language to this effect, as does the airport construction bill recently passed by the House. It remains to be seen, of course, to what extent the executive agencies will be successful in their inevitable efforts to weaken the impact of these measures. Their jobs will be made more difficult by the certain knowledge that interested legislators will be watching them carefully.

These steps and the ones that remain to be taken are hopeful signs in an area in which hopefulness is uncommon. If anything, these efforts should be accelerated; we may not be able to afford much more delay, and we should begin to exercise what talents we have for imaginative and bold departures from patterns of behavior that are no longer adequate to the needs of the time.

### *B. International Problems*

The factors that inhibit adequate response to local and national pollution problems are even more effective in preventing international action, and yet we now realize that many national environmental problems have supranational consequences. Thus control procedures to keep global pollution to a tolerable minimum assume critical importance.

Although attention has only recently been focused on international environmental problems, it is clear that this is an important area for concern. The proposed 1972 U.N. Conference evidences the acceptance of this concern, but few specific suggestions have been made to create mechanisms to meet today's problems, and those which are predictable in the near future.

The need for better information channels is as great here as it is on the smaller scale. If anything, political corrective steps can be even more easily blocked than are those acting at state and national levels, and we have not yet devised a workable system of sanctions to minimize those problems which all concede to exist.

If it is true, as argued above, that the interests of small groups are often at odds with those of the larger societies in which they exist, how much more true is this of separate nations, where antagonisms are more easily created and sustained, and where common concerns may be deliberately obscured? Downwind and downstream nations from those applying persistent pesticides may see their own problems clearly, but their apprehensions are likely to be viewed as quite unimportant to the nation creating the problem. That nation may well consider righteously that its first interest must be to protect the health and food supply of its own citizens, and that the undesirable side effects are simply someone else's problem. Unfortunately, they may be everyone else's problem.

The same conflict lies at the heart of many of the issues discussed earlier, but its impact is perhaps most clearly visible in international issues. The strongest peaceful sanction that we have been able to devise to influence international decisions appears to be the force of public opinion. More attention might profitably be devoted to the use of public disclosure as a force to produce more adequate decisions on international environmental issues. A weak reed it may be, but it must serve until we can find a stronger substitute.

If we narrow our focus to a specific topic, the ways in which such pressures might be brought to bear become clearer. One such suggests itself immediately as of current and significant interest: treaties for the use of the seas. The significance of this problem area has been perceived clearly by national interests which see the oceans as a vast potential source of food and mineral resources, and thus as critical to their survival.

We must pass over without further analysis the critical issue of sanctions as beyond the scope of this paper and as beyond the ability of the concerned parties to resolve at this time. We shall also assume, for the purpose of argument, that it will eventually become possible to develop working treaty relationships with the affected nations and that such a treaty will provide an operating structure as well as a policy-making body.

What suggestions may be made to provide some assurance that the vast assets of the ocean will be used for the common good, and not misused on behalf of narrow segments of humanity? Proposals have been made to provide a focus for scientific impact at the policy-making level, these disciplines will of necessity be represented at the operating levels as well. These proposals do not appear to be entirely adequate to current needs—they are lacking in the control aspects described above, and will be as inadequate to international issues as they are on the smaller and presumably more easily managed national scale.

We need an Ombudsman for the Seas.

The functions of such an organization would be simple: to review and to comment upon proposed actions by the operating arm of the treaty organization and others, to consult with the policy-making arm on matters which are or which ought to be under consideration, and to make recommendations to these and to all nations on ways to use, without misusing, the oceans.

This latter point is particularly important, since the seas can be significantly affected by the activities of nations which may not be treaty signatories—even by nations which are entirely land-locked. Inland rivers and estuaries play an important role in the life cycles of fish and other species important to man; these in turn may be highly vulnerable to actions affecting airsheds or watersheds with oceanic outlets. Few nations in the world remain entirely oblivious to the



opinions of others and the ability of the Ombudsmen to focus worldwide attention upon previously ignored problems could prove to be a highly valuable tool.

When and as sanctions are developed for the international treaty, consideration should also be given to making sanctions available to the Ombudsmen, under adequate control procedures. The Ombudsmen should not, however, be policemen: they will have enough problems without adding new ones. They should have and maintain a close working relationship with whatever organization handles the operations of the treaty organization.

The Ombudsmen should have direct access to current oceanographic and ecological information about the seas. Again it would be desirable to keep informational and experimental activities separated from their primary functions: it would also be important to keep them separate from the conventional channels of authority with the operating arm of the treaty organization.

History indicates that, in the seas as elsewhere, strong pressures will be brought to bear by those seeking to exploit these resources. It will be critically important to build into the treaty organization some form of countervailing pressures to ensure that the long-term productivity of the oceans is not endangered by man's effort to turn these assets to limited advantage. If we have learned nothing else from the ecologists, we know now that we exist within a closed system and that we must develop processes and procedures that will permit us to recycle those resources that we must use. To this end, the Ombudsmen can serve us well.

For a number of reasons it would seem desirable to create a three- or five-member organization of Ombudsmen with staggered, rotating memberships. They should have a semipermanent professional staff; continuity is important, but a constant access to fresh blood can provide a responsiveness to challenge that will be invaluable to the participating organizations and nations.

It may not be desirable to have a highly structured decision-making apparatus within the organization itself. No member should be given the power to *veto* the action of the group or of any other member; indeed, if any member perceives a particular problem as important, and if his colleagues do not share his views, he should be given latitude to study the problem and to report upon it to the appropriate bodies, supporting his report with whatever evidence is available.

The Ombudsmen should be required to submit an annual report on their operations to the treaty organization, and copies of this report should be given wide distribution to member nations as well as to the United Nations. Dissenting views should be made available in the same form. The incentive to review specific problems might come from within the organization itself, or it might come from any member nations. If review is declined, the reasons for disapproval ought to be spelled out in detail.

Funding is critical. As one of the important functions of the treaty, the Ombudsmen should be assured of a regular budget, subject to no diminution because of the concerns of any member nation for tender subjects. Unless the organization can be truly independent and free of budgetary apprehensions, its work must inevitably suffer.

Clearly the problems of protection of the global environment are not confined to the use of its oceans. Treaties for the oceans are only a beginning—but there is no good reason why this treaty should not be viewed as the first real step toward more comprehensive and adequate environmental protection. Men require a world that men can live in.

The oceans are important for a number of reasons. It has been shown that they are not as productive as they were once thought to be, in terms of long-term food sources for humanity. Nor can we develop the oceans as a safety valve for man's tendency to fill up all available living space with himself or with his waste products. We must instead concern ourselves with protecting a vital element in the ecosystem of Spaceship Earth; at the same time we may perhaps take a halting step toward developing techniques that may prove effective in other areas as well.

Antarctica has so far withstood the territorial instincts of man in reasonably good order. For this we cannot take much credit—there has been very little pressure to exploit these resources. This region of the world may now prove significant in other ways; oceanographers claim that some of the best fishing waters in the world are found off the coast of Antarctica, supported by the massive upwellings of nutrients resulting from convection currents created by the warm and cold water masses in the area. The treaty organization might well begin its charter by mounting an intensive review of Antarctic ecology, to deter-

mine how this resource may provide a sustained value for man. The Ombudsmen can play a significant role in this endeavor.

In international relations today, we need techniques to disperse and not to intensify international rivalries. The potentialities of a treaty for the use of the oceans, with built-in guarantees for their long-term protection, would appear to be a matter of high priority.

#### ACKNOWLEDGEMENTS

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Senator MUSKIE. We have received a statement from Representative Herbert Fineman, who is Speaker of the House of Representatives of our great Commonwealth of Pennsylvania. I believe it would be appropriate to include it in the record at this point.

#### STATEMENT BY HON. HERBERT FINEMAN, SPEAKER OF THE PENNSYLVANIA HOUSE OF REPRESENTATIVES

Mr. Chairman, my name is Herbert Fineman and I am Speaker of the Pennsylvania House of Representatives.

Pennsylvania has long known air pollution. You might say it was born there. The "Smokey City" of Pittsburgh was the first ecological nightmare. A visitor back in 1880, when most of the United States was still a bucolic dream, wrote:

"Around the city's edge, and on the sides of the hills which encircle it like a gloomy amphitheater, their outlines rising darkly against the sky, through numberless apertures fiery streams of light streak forth, looking angrily and fiercely toward the heavens while over these settles a heavy pall of smoke. It is as though one had reached the outer edge of the infernal regions, and saw before him the great furnace of pandemonium with all of its lids lifted."

Everyone knows of the disaster that was Donora.

My home city of Philadelphia is not as ecologically infamous as Donora or Pittsburgh—but its air pollution problem is no less serious.

Philadelphia and Pittsburgh have made repeated efforts to clean up air pollution within their confines. While I cannot speak for the Governor nor the State Senate, I can assure you that on the state-wide scene the Pennsylvania House of Representatives is ready to pass the stiffest and most stringent air pollution regulations in the country.

But the Congress of the United States must untie our hands. We are bound as tightly as Prometheus when we attempt to regulate in the field of automobile-created air pollution.

In the area of air pollution most experts on environmental law see only limited benefits from state air pollution laws, since state laws can only be concerned with stationary-source air pollution. State laws can not affect the prime source of air pollution in the cities of Pennsylvania—motor vehicle emissions.

The reason for this inability to act is that the State of Pennsylvania, along with all the other states, except California, has been precluded by Federal law from taking effective action against motor vehicle air pollution. Section 208 of the 1967 Federal Air Quality Act specifically prohibits any state from adopting or enforcing motor vehicle air pollution emission standards.

The Pennsylvania House of Representatives and the cities of Pittsburgh and Philadelphia have attempted, within their legal and financial limitations, to combat air pollution. I feel that motor vehicle air pollution is no longer a problem serious only to the State of California. Pennsylvania should be allowed the

same exemption as provided California in the 1967 Air Quality Act. I would urge the Congress of the United States to amend Section 208 of the 1967 Air Quality Act by either moving the date for State application for waiver of Section 208 to 1975, or by including an exemption provision for Pennsylvania.

I have introduced a resolution in the Pennsylvania House of Representatives, which memorializes the Congress of the United States to amend Section 208 of the 1967 Air Quality Act in either of the two manners suggested above. This resolution also will urge the Congress to amend the 1965 Clean Air Act in the following ways:

Authorize the Secretary of Health, Education, and Welfare to issue Federal motor vehicle emission standards for 1971, 1972, and 1974, based on the State of California's emission standards for these years.

Authorize the Secretary of Health, Education, and Welfare to issue Federal motor vehicle emission standards that are as stringent as the State of California's requirements for emissions from 1975 automobiles.

Authorize the Secretary of Health, Education, and Welfare to set motor vehicle emission standards based on the cleanest feasible propulsion system, instead of basing the standards on the internal combustion engine.

Authorize the Secretary of Health, Education, and Welfare to establish motor vehicle emission standards by 1972 for fleet owned trucks, buses, and taxis.

Given the tools, the past record of our cities of Pittsburgh and Philadelphia show that they have the will to do the job.

The citizens of Philadelphia and Pittsburgh have become increasingly aware of the hazards associated with motor vehicle exhaust emissions. Philadelphia's and Pittsburgh's air pollution problems are so severe that Federal officials have designated these cities as two of the ten worst air polluted cities in the nation. The commitments made by these two cities and by the Pennsylvania House of Representatives to combat stationary-source air pollution only begins to dent the surface of this problem, since upwards of 90 per cent of the air pollution within Philadelphia and Pittsburgh is caused by motor vehicle air pollution. For example, carbon monoxide from motor vehicles contributes 8,600 tons of daily pollutant to the air in Philadelphia. In Philadelphia, during normal business hours, the volume of carbon monoxide often rises to as much as 30 parts per million parts of air, which many doctors will tell you is an amount which may cause a shortage of oxygen to the brain.

The City of Pittsburgh has long been a leader in combating industrial and other stationary-source air pollution. Since the mid-1940's Pittsburgh began to recognize the problems associated with air pollution and began to take action to alleviate this situation. I'm sure many can remember the graphic pictures of the black skies during the middle of the day in Pittsburgh. These scenes are not seen today, because of the action taken by the Allegheny County Department of Health and the Allegheny County Commissioners to combat stationary-source air pollution. The air-pollution rules and regulations of Allegheny County, which includes the City of Pittsburgh, have long been recognized as some of the best and most effective in the nation. Despite these efforts, the City of Pittsburgh is recognized as one of the most air-polluted cities in this country. This fact can be attributed to the major source of air pollution in Pittsburgh—emissions from motor vehicles.

The City of Philadelphia has recently enacted and put into effect the new air management code, boosting penalties for persistent violations of antipollution regulations. The code also requires annual inspection and licensing of various pollution sources. The Philadelphia Metropolitan Interstate Quality Control Region's air quality standards for particulates and sulfur oxides were the first ones accepted by the Department of Health, Education, and Welfare under the provisions of the 1967 Federal Air Quality Act. I would like to emphasize that Philadelphia is attempting a legitimate effort to control stationary-source air pollution, but Philadelphia nonetheless remains one of the worst air-polluted cities because of motor vehicle emissions.

The Pennsylvania House of Representatives has been attempting to solve this air pollution crisis as well as many of the other ecological problems. Some of the measures are an attempt at immediate pollution-solving. They include:

The Conservation Bill of Rights, which would give Pennsylvania a basic environmental law upon which to base all other measures.

The first modernization of the State's Clean Streams Act in thirty years.

Measures to establish an automobile exhaust pollution inspection system.

An All-Surface Mining Act, to regulate strip mines.

A Solid Waste Disposal Act.

A bill requiring the construction of fishways around dams on the Susquehanna River.

The first "noise" pollution measure to be approved in the Commonwealth of Pennsylvania.

In the meantime, we have introduced other legislation that we hope to enact before the end of the current session of the General Assembly. Included among these measures are:

Bills to either strictly limit or ban, in some cases, DDT and other similar pesticides.

The creation of a Watershed Management system.

A bill to permit "class suits" to protect Pennsylvania's natural resources.

In addition, being prepared on a staff level and about to be introduced are bills that would strengthen Pennsylvania's air pollution law and establish a State Department of Conservation and Natural Resources.

I believe this shows that if Congress gives us the tools, we will do the job.

I would finally like to present my observation of the Administration's approach to the entire problem of air pollution, and particularly motor vehicle emission control. The Administration's budget request for air pollution control and the substantive amendments to the 1965 Clean Air Act are inadequate in view of the need for strong and immediate action by the Federal Government. If the American people are to have, as the President himself stated, motor vehicle emission levels brought much lower in future years, we must begin to attack this problem in a more financially and legally realistic manner.

Senator MUSKIE. Our next witness is Mr. Joseph Onek, coordinator of the campaign to make General Motors responsible.

**STATEMENT OF JOSEPH ONEK, COORDINATOR, CAMPAIGN TO MAKE GENERAL MOTORS RESPONSIBLE; ACCOMPANIED BY JOEL KRAMER, RESEARCH DIRECTOR**

Mr. ONEK. Mr. Chairman, my name is Joseph Onek, and I am coordinator of the campaign to make General Motors responsible. With me is Joel Kramer, our director of research. Both of us well know, Mr. Chairman, of your leadership in the field of air pollution and we welcome this opportunity to talk about the problem and about the legislation which is now pending before your subcommittee.

Campaign GM was launched on February 7 of this year as a new effort to make U.S. corporations, beginning with General Motors more responsive to social and public needs. We believe that the decisions of giant corporations, which affect the lives of all Americans, can no longer be made by a handful of executives working in secrecy and insulated from political and social pressures.

In the case of General Motors, we are concerned about many areas where corporate behavior has adversely affected the public welfare. We are concerned, for example, about the tragic and unnecessary slaughter of 50,000 Americans on our highways each year. We are concerned about the shoddy quality of many of our automobiles and the inadequacy of consumer warranties. We are concerned about the race problem, and about the fact that of General Motors' 13,000 automobile dealers, only seven—only seven—are black.

But we are here today because one of our foremost concerns is with air pollution. It has been estimated that the auto industry is responsible for 70 percent of the Nation's air pollution by tonnage. Motor vehicles pour into our air over 90 percent of all the carbon monoxide pollution,

60 percent of the hydrocarbons pollution, 50 percent of the nitrogen oxides pollution, and virtually all of the lead.

In recent months, and yesterday, before this subcommittee, the automobile manufacturers have proclaimed their willingness to meet this problem. But we think it is important to point out that for many years the auto industry refused to recognize that there even was a problem. For example, in 1953, General Motors wrote to Los Angeles County Supervisor, Kenneth Hahn, that "the information that is available to us does not indicate that carbon monoxide is present in harmful amounts in the Los Angeles atmosphere and so we have not been concerned about the imminence of a serious health problem from this source."

It is not unfair to say that the auto companies were dragged into the antipollution fight kicking and screaming, thanks largely to the stiff standards imposed by the State of California. And even today, Mr. Chairman, the expenditures of the industry leader, General Motors, on air pollution are only a small fraction of its expenditures on advertising.

In order to help meet the pollution problem, Campaign GM proposed two resolutions to be voted on by GM shareholders at the corporation's annual meeting in May. The first of these resolutions called for the creation of a Committee for Corporate Responsibility, made up of representatives from every segment of American life, which would, among other things, examine GM's efforts in the air pollution field. This resolution expressly provided that the Committee on Corporate Responsibility would have complete access to corporation books and records.

Our second resolution called upon General Motors to meet all of HEW's air pollution standards and to commit itself to spend substantial amounts to investigate the long-range effects on health of all the contaminants released into the air by automobiles which are not now regulated by Government—for example, asbestos and rubber particulate matter from tires.

At this point I request permission to place our resolutions in the record with a very brief description of Campaign GM.

(The material referred to follows:)

RESOLUTION SUBMITTED BY PROJECT ON CORPORATE RESPONSIBILITY—  
FEBRUARY 17, 1970

*Resolved*, That General Motors announce and act upon a commitment to a greatly increased role for public mass transportation—by rail, by bus, and by methods yet to be developed.

STATEMENT IN SUPPORT

General Motors is publicly opposed to diverting to public transportation any part of the more than thirteen billion dollars annually generated in automobile-related taxes. While GM lobbies with the government, our cities are being destroyed by too much pollution, pavement, and traffic. With imaginative mass transit, travel would be faster, more convenient, and less costly to society. As the nation's largest transportation corporation, GM should take the lead in helping to develop new modes of mass transit.

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*Resolved*, First, that General Motors support and commit whatever funds and manpower are necessary to comply with, the vehicle emission standards

recently recommended by the National Air Pollution Control Administration for the 1975 model year; and to comply with these standards before 1975 if in the course of developing the emission controls this is shown to be technologically feasible. Second, that General Motors commit itself to an extensive research program (with an annual budget as large as its present advertising budget of about a quarter billion dollars) on the long-range effects on health and the environment of all those contaminants released into the air by automobiles which are not now regulated by government. These would include, but not be limited to asbestos and particulate matter from tires. The results of this research would be periodically published.

STATEMENT IN SUPPORT

Experts in the National Air Pollution Control Administration consider its recommended standards technologically feasible by the 1975 model year; General Motors should do everything possible to develop the necessary devices, and to make sure they continue to control emissions after 50,000 miles, with one tune-up at 25,000, which their present cars often do not do. But the government's regulations cover only three pollutants—hydrocarbons, carbon monoxide, and oxides of nitrogen. General Motors is not known to have spent anything studying potentially serious pollutants not regulated by the government like asbestos, and tire particulate matter. GM should start regulating itself.

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*Resolved*, That first, the warranty for all General Motors cars and trucks produced after January 1, 1971, be written to incorporate the following:

(1) General Motors warrants that the vehicle is fit for normal and anticipated uses for a period of five years or 50,000 miles, whichever occurs first.

(2) General Motors will bear the cost of remedying any defects in manufacture or workmanship whenever or wherever they appear, for the life of the vehicle. Neither time nor mileage limitations nor exclusions of successive purchasers nor other limitations shall apply with respect to such defects.

(3) General Motors accepts responsibility for loss of use of vehicle, loss of time, and all other incidental and consequential personal injuries shown to have resulted from such defects.

Second, General Motors raise its reimbursement rates to dealers on warranty work, making them competitive with other repair work.

STATEMENT IN SUPPORT

Inevitably, some cars are so bad that replacing parts won't help. At present, GM bears no responsibility for such "lemons." Under (1) GM would replace these cars. (2) and (3) are revisions of present warranty provisions, aimed at relieving the heavy burden now imposed on car owners through no fault of their own. The second part, on raising reimbursement rates, would make dealers less reluctant to take on warranty work than a 1968 FTC staff report indicates they now are.

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*Resolved*, That, by January 1, 1974, all General Motors Vehicles be designed so as to be capable of being crash-tested—front, rear, and side—against a solid barrier at sixty miles per hour, without causing any harm to passengers wearing shoulder restraints.

STATEMENT IN SUPPORT

The National Highway Safety Bureau has already crash-tested domestically-manufactured vehicles with "marked modifications" at forty-seven miles per hour, without harming passengers, according to Robert Carter, chief of the Vehicle Structures Division. These cars, with much-strengthened frames, are not immediately marketable because of lead time required for design, Carter says. But the technology exists, and Carter expects successful tests at sixty miles per hour within one year. General Motors should have developed such a car itself. Now, it should at least make the necessary modifications on all its cars by 1974.

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*Resolved*, That General Motors undertake to monitor daily the in-plant air contaminants and other environmental hazards to which employees are exposed

in each plant owned or operated by General Motors; that the Corporation report weekly the results of its monitoring to a safety committee of employees in each plant; that if such monitoring discloses a danger to the health or safety of the workers in any plant, or in any part of a plant, the Corporation shall take immediate steps to eliminate such hazard, and that no employee shall be required to work in the affected area so long as the hazard exists.

## STATEMENT IN SUPPORT

For the most part, General Motors has been an industry leader in providing health and safety mechanisms to its employees. But often the need for safety improvements has been subordinated to the Corporation's concern for production and profit. To date, GM has given too little consideration to the affects of in-plant air contamination which may harm both workers and the immediate community near the plant. Employees must be informed of potential hazards in order to take effective action to help prevent or eliminate them. If adopted, this resolution will enable employees to participate directly in alleviating these health hazards.

*Resolved*, That General Motors take immediate and effective action to allot a fair proportion of its franchised new car dealerships to minority owners; furthermore, that General Motors act to increase significantly the proportion of minority employees of General Motors in managerial and other skilled positions.

## STATEMENT IN SUPPORT

As of January, 1970, GM had seven nonwhite dealers out of an estimated 13,000. GM would have to increase this number sixtyfold—to over 400—to achieve the ratio of nonwhite businesses to all U.S. businesses. A fair proportion would be larger still—perhaps approximating the percentage of nonwhites in the population. Also, while GM in recent years has hired many more nonwhites proportionately than before for unskilled and semiskilled positions, its record in skilled and managerial jobs remains poor. The most recent public study indicates that in 1966 GM trailed both Chrysler and Ford in these categories.

Senator DOLE. I wonder if we might have some information about the committee. You are coordinator of the campaign to make GM responsible? Is that a private profitmaking or nonprofit organization?

Mr. ONEK. It is a nonprofit group of four Washington lawyers who have banded together in this effort to place before the General Motors shareholders and the public all of these issues. Air pollution as I said is one of our foremost concerns.

We also want to raise the issues of traffic safety, occupational safety, minority hiring and mass transit and consumer warranties, and the quality of the American automobile.

Senator DOLE. There are four members of your committee?

Mr. ONEK. That is right.

Senator DOLE. Are they all white?

Mr. ONEK. The four members of the coordinating committee are white. I should point out we are running three candidates for the board of directors of GM.

Senator DOLE. So you have 100-percent white on your committee?

Mr. ONEK. May I please continue, Senator. We have three candidates for the board of directors of GM: Betty Furness, former Consumer Adviser to President Johnson; Rene DuBos, professor at Rockefeller University, and Channing Phillips, who is a black leader here in Washington, the first black person to be nominated by a major party for the Presidency of the United States.

I should like to point out that if Mr. Phillips, our candidate, were elected to the board of General Motors, he could be the first black

member of the board of directors on General Motors or any of the top 25 corporations in America. If Betty Furness were elected to the board of directors, I believe she would be the first woman member of the board of directors, on any of the top 25 corporations. So we are covering the women's liberation front also.

Senator DOLE. One thing you can do without any election is to include some minority representation on your committee before you damn someone else for their racial practices.

Mr. ONEK. Senator Dole, it would all—

Senator DOLE. You might look at yourself and look at your own organization.

Mr. ONEK. I will continue now.

We also have a project on corporate responsibility that has five members of its board of directors and one of those is black. I suggest that of our 12 leading figures in this campaign two are black. That is not the same as General Motors having seven black dealers out of 13,000, and I suggest that your analogy is very farfetched indeed.

Senator DOLE. You make analogies from time to time.

Mr. ONEK. I have not made such farfetched analogies, Senator, and I am not making them here today. I believe that two out of 12 is very different indeed than seven out of 13,000.

Senator DOLE. Percentagewise it is not quite as good.

Mr. ONEK. Not quite indeed.

If I may continue.

In light of the resolutions which we have presented to General Motors and the problems they are meant to deal with, we would now like to comment on the legislation now before this subcommittee. I want to say that we have not analyzed every aspect of the three bills. But instead have focused on two or three of the areas which we feel are of particular importance.

The first objection we have to the pending legislation is that it does not appear to cover all the pollutants which automobiles create and which may—and I emphasize the word may for clarity's sake—be dangerous to health. The three bills talk in terms of "emissions"; they seem to be dealing only with the pollution caused by automobile engines and automobile fuel. But automobiles may cause other forms of pollution. In fact, Dr. Rene DuBos of Rockefeller University has suggested that pollution from asbestos in brake linings and from rubber tire particulate matter may be more serious than the pollution we are now attempting to combat.

Now as we read the legislation, and we hope we are wrong on this, it does not seem to cover either of these pollutants and we think it is obvious that the automobile manufacturers and the tire manufacturers should be required to embark on a major research program in this area as soon as possible.

Senator MUSKIE. May I ask a question, Mr. Onek. Now, I am not familiar with Dr. DuBos' statement. When you refer to rubber tire particulate there as potentially harmful, was he speaking of it at the time that it is disposed of as waste or as it is used on the automobile?

Mr. ONEK. As I understand, I think as it spins around on the highway. Your tires wear down and that wearing down means that these bits of rubber are coming into the atmosphere. We are not sure where



they go, whether they are inhaled by human beings and to what extent it would be dangerous if they were involved.

Senator MUSKIE. I think it would be helpful if we had Dr. DuBois' statement.

Mr. ONEK. I will include that for the record.  
(The material follows:)

[From Universities, National Laboratories, and Man's Environment—Published by the U.S. Atomic Energy Commission, 1969]

#### SOCIAL PROBLEMS AND NATURAL SCIENCES

(By Rene DuBois, professor, Department of Environmental Biomedicine, Rockefeller University)

First, let me express my disappointment at seeing so very few women in this organization. This is a man-centered program, and I think that spells ill luck for it. I am convinced that the kind of problem I want to discuss with you will not be dealt with as a national commitment unless women impose on the public and on government the need of making it a nation commitment. I have noticed that of necessity men tend to become identified with the purely professional aspects of activities and most resent having to convert this professional activity into social concern. Please, if you have another such meeting, be sure to have a large representation of all the effective women's groups in this country.

The phrase "social problems" is ambiguous. It refers obviously to difficult situations experienced by many members of a given society at a given time. It is often also used to convey the view that these situations can be solved by economic and social measures. My thesis is that many important social problems cannot be solved by such measures because we lack the scientific and technological knowledge on which to base effective social action. I shall substantiate this statement by considering a few examples of concern to our society at the present time.

Statesmen, social planners, and technologists often state that financial cost is the major obstacle to air-pollution control. But, in fact, we could not formulate really effective control programs even if we had limitless resources because we know so little about the origin, nature, and effects of most air pollutants. We do not know which components of our urban environment are deleterious to man.

Soot, dust, and pollen were regarded for a long time as the most important factors of air pollution. Then, emphasis shifted to carbon monoxide and sulfur dioxide. A few years ago the Los Angeles smog drew attention to nitrogen oxides and photooxidants—the automobile internal combustion engine thus became the chief villain. But, important as all these agents are, they account for only a few aspects of air pollution—perhaps not the most dangerous. For example, asbestos particles originating largely from the brake linings of motor cars and from the insulation material used in the construction trade have been detected in significant amounts in the pulmonary alveoli of urban dwellers; there is no doubt that asbestos is a great health hazard. Several carcinogens have also been detected in urban air. Most important, and generally overlooked, is the disturbing fact that some 70% of the particulate contaminants in urban air are still unidentified, and thus their biological effects are unknown. Fairly recent experiments have shown that exposure of newborn animals to these ill-defined, or rather undefined, contaminants can bring about disastrous consequences in the life of the animals when they become adults.

In view of this ignorance, controlling the emission of soot, carbon monoxide, or sulfur dioxide probably would not go far toward controlling air pollution, nor would changing from internal combustion to electric automobiles diminish the release of asbestos from brake linings or the production of the immense amount of colloidal stuff generated by tires grinding on pavement. Any control measure is, of course, useful, however limited its scope. But a rational control policy will not be possible until we have made a systematic chemical survey of air contaminants and have determined their effects on human beings as well as on ecological systems. No one really knows at present which of the air pollutants are the most dangerous and where priority should be placed in the formulation and enforcement of control measures. We are formulating policies simply because we know

we can decrease sulfur dioxide fairly readily; we are not asking ourselves how much that will do toward controlling the nefarious effects of pollution.

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Mr. ONEK. Our second comment on the legislation is perhaps more basic. It relates to the whole question of how we are going to determine whether certain changes are technically feasible and whether the auto industry is really doing everything in its power to end pollution.

I think we can begin by looking at title II of S. 3229, the national Emissions Standards Act. This act states that the Secretary of HEW shall set standards for emissions by automobiles "giving appropriate consideration to technological feasibility and economic costs." This formulation, which is obviously proper, raises several questions. First, how is the Secretary going to determine the cost of a particular improvement and whether or not it is technologically feasible. We do not believe that the Secretary can rely on data handed to him by the automobile industry. The industry has a long history of saying that improvements are infeasible and too expensive when this is simply not the case.

For example, as late as 1963, a General Motors safety engineer wrote in GM's engineering journal that as a result of collision testing done at 30 m.p.h. shortly after World War II GM concluded that "it is impossible to provide secure protection during impacts of this nature by any amount of design modification, or by any restraining devices that the average driver would be willing to wear." Now, 7 years later, the National Highway Safety Bureau already has tested successfully a prototype vehicle that can withstand impacts at 47 m.p.h.—far higher than the level GM's engineer called impossible—without injury to a passenger wearing a normal shoulder belt.

The issue of steam provides another illustration of the difficulty of determining technological and commercial feasibility, when the industry is clearly hostile to the technical development in question.

Lawrence Hafstad, vice president of GM in charge of the research laboratories, testified before joint hearings of the Committee on Commerce and this subcommittee that "A significant safety hazard must be overcome" to market steam engines, and that external combustion engines—including steam—"are inherently more complex than internal combustion engines, and, therefore, more expensive to manufacturers.

But Robert Ayres, of Resources for the Future, Inc., said at the same hearing that the danger of boiler explosions had been solved as early as 1916. As to complexity and cost, Ayres said a steam engine's high torque at zero speeds makes it possible to eliminate the clutch and the transmission, render brakes virtually unnecessary, and eliminate the starter motor, carburetor, engine block cooling system, distributor, muffler, and antipollution gadgetry. Particularly misleading in GM's testimony was its failure to take into consideration the need for a transmission in the ICE when it compared the costs and fuel consumption per horsepower hour in steam and ICE's.

I notice today in the Washington Post there is a story on the modern Stanley Steamer, and includes a quote from Robert Ayres, whom we have quoted. I would like to insert that in the record, Mr. Chairman.

(The material follows:)

[From the Washington Post, Mar. 26, 1970]

### A MODERN STANLEY STEAMER

(By Gordon Pettey)

The "Williams Steamer" is driven by kerosene and water, has no clutch or transmission, can bowl along the road at 150 miles an hour and, most important of all, produces almost no obnoxious fumes.

It was brought to town this week by its creators, Calvin E. and Charles Williams, of Ambler, Pa., in an attempt to convince congressmen and local environmentalists that a steam driven car is a practical alternative to the internal combustion engine—the nation's leading air polluter.

Calvin Williams said the sleek red and white car is the result of three generations of work by the Williams family. It consumes about a gallon of kerosene every 25 or 30 miles, burning the kerosene externally at atmospheric pressure to heat the water.

The result is a flame that burns the fuel almost completely, producing 80 per cent less hydrocarbons, 70 per cent less carbon monoxide and 45 per cent less nitrogen oxide than the regular car engine, Williams said.

The engine recycles its water to be used over and over again. Some water evaporates, however, and Williams said he has to top up the 10-gallon supply every 500 miles or so.

Apart from the engine, the other components of the car are wheels, brakes and body bought as stock items from automobile suppliers.

There is one hitch. The prototype demonstrated here cost \$50,000 to build. Williams said. He added his family had already invested nearly \$2 million over the years in developing the engine. The money came from their construction firm.

But Williams estimated that if mass produced, the cost could be between \$2,800 and \$3,000. He said he and his brother are trying to raise the \$5 million needed to begin modest production.

The "Williams Steamer" was shown to about 150 persons in Georgetown University's Healy quadrangle, where it was put through its paces.

"A historic piece of technology," Dr. Robert Ayers of the Institute for Research and Technology told the gathering.

But other speakers warned that it would be only a "partial" solution to the automobile problem. They noted that the steam engine would do nothing to solve the problems of ever expanding highway systems encroaching on open space, traffic snarls and the daily battle for parking places.

Mr. ONEK. In order to insure that the Secretary does not have to rely on industry handouts, we must first have adequate independent research and development by the Government. The Government is not doing enough now. In fiscal year 1970 the National Air Pollution Control Administration spent only \$4 million for research into control of motor vehicle emissions. In fiscal year 1971, the requested appropriation is up to \$12.8 million. But this figure does not seem adequate to the task of encouraging the development of a pollution-free engine. We would just like to point out by way of comparison that this figure is about one-twentieth of what General Motors alone spends on advertising each year.

Senator DOLE. Would you yield?

Yesterday I questioned the witnesses of Ford Motor Co. on that point: How much does the automobile industry spend for research on alternate sources of power and the prevention of air pollution? I didn't receive a satisfactory answer; in fact, I didn't receive a dollar figure at all.

My point is, Government does have some responsibility for research but certainly not all the responsibility. Industry must share some of the cost. I feel than can be done without relying on industry handouts. But why should the general taxpayer assume all the burden for research when it is a profitmaking corporation?

Mr. ONEK. Senator Dole, we wholeheartedly agree with that statement and we think it is a disgrace that according to our estimates General Motors is spending \$15 million, roughly, a year in research and development—\$15 million. That sounds like a lot until you realize it spends \$250 million on advertising and its annual gross is \$24 billion a year.

So I think obviously that GM could be spending more and we agree with you wholeheartedly. We agree with you that industry has to play a role, but Government has to do more; \$12.8 million is less than one-third of what the Department of Defense spends on public relations. There is a question of national priorities here.

Senator MUSKIE. The industry research is important and it ought to be expanded. There is one question, though, that is raised. In what direction should the research effort be made? Now, Government can influence that question, I suppose, by imposing requirements in terms of performance that it can to push industry research in a particular direction, but that is the only way that Government can influence the direction that industry research takes with respect to this problem.

I think you are absolutely right. From the 6 or 7 years of my exposure to the industry sense of urgency on alternative sources of motive power, that there has been no sense of urgency with respect to the question of developing alternatives to the internal combustion engine.

We held hearings in Detroit, we visited the laboratories of the major automobile companies and it was clear then and it is clear now that industry's major emphasis is upon cleaning up the internal combustion engine. I am all for that because, as we use it we want it to be as clean as possible, but there has been no real feeling of urgency about the air. Since we cannot, you know, shape industry's research program except in this indirect way, then we felt for a long time on this committee that we need this Government research not to duplicate industry research but to supplement it, perhaps open up directions of technological possibilities that are not now opened up by industry research.

That is why we enacted into law section 104. Now this administration has indicated very little interest in section 104 research and I think we might just as well surface that question because it is going to have to be answered. This is not a partisan comment. That section 104 research was supported 100 percent by the members of this subcommittee and by members of the full committee, and it was not challenged on the floor of the Senate, it was not challenged in the Congress, so the Congress is committed to the concept of section 104 research.

The authorization is broad enough to cover any research that the agencies can mount. The whole question is whether we funded adequately.

Now granted that when we are talking about technology that is as complex as automotive technology, the Government is not in a good position to compete with the potential of private industry. It would be better if we could somehow more effectively direct industry research,

but until we are sure that we can direct industry research in the directions that public interest requires, then it seems to me that supplementary governmental research is very good. I add that gratuitously.

Senator DOLE. Would you yield?

Senator MUSKIE. Your statement had said that those responses raised the question and I wanted to open it up and explore it.

Mr. ONEK. I don't think it is gratuitous at all. The National Safety Bureau construction of a prototype car that is safe at collision speeds of 47 miles an hour show the importance of Government research, because if Government can produce a prototype even with the limited funds that Government agencies unfortunately have available for this kind of work, then obviously they can cut down the argument of the industry that such and such improvement, such and such an engine, such and such a safety device is technologically unfeasible. I think that the Government research that you are supporting in S. 3329 and the increases in the budget which you are supporting now are absolutely vital. We make this point because that is the only way to make clear what is technologically feasible and what is not.

Senator DOLE. Would the Chairman yield?

Senator MUSKIE. In just a moment.

I just want to insert in the record section 211 of S. 3229 which encourages low emission vehicles. This I think is very relevant to the discussion underway.

(Section referred to follows:)

#### DEVELOPMENT OF LOW-EMISSION VEHICLES

SEC. 211. In order to encourage research and promote the development of low-emission vehicles the Secretary is authorized to—

(1) prescribe special low-emission standards for any class or classes of vehicles or engines and such standards shall permit an emission of not more than 50 per centum of the amount of pollutants permitted by standards established pursuant to section 202 for the same class of vehicle or engine;

(2) provide testing procedures to determine if vehicles and engines meet such standards; and

(3) certify vehicles or engines meeting such standards as low-emission vehicles or engines for the purpose of this section.

Senator DOLE. I want to comment on the chairman's statement. I don't quarrel with it, but my point is that yesterday we heard from industry witnesses that they are spending the great bulk of their funds for research on improving the internal combustion engine. We were unable to extract any dollar figures on what they are spending on the steam engine or battery-operated vehicle, if anything.

The point I made yesterday and make again today is that industry is all in favor of the provision which requires the Government to spend huge sums of money for research.

Now I believe in the free enterprise system and I assume that they do as long as it is free, but I just don't feel the Government has the whole responsibility.

Senator MUSKIE. I think that this is why I opened up the question, to make sure what our positions are.

Incidentally, the staff tells me—I was not here—that Mr. Misch of Ford said that \$25 to \$30 million was being spent on research and development of the alternative to internal combustion engine and the

great bulk of the development of it was on the research and development of the turbine.

Mr. ONEK. I would like to now carry on with the point that you raise, Senator Dole, about the difficulty of getting an accurate figure.

We think that any statute in this area must provide that the Secretary of HEW should be able to go behind the technological and cost estimates which are provided to him by the management of the automobile companies. He and his staff should be able to visit the facilities or the manufacturers and talk directly and freely with lower level corporate employees—engineers, scientists, and systems analysts. We believe further that the Secretary and his staff should have full access to all corporate records and documents relating to the pollution issue, including the costs of improvements.

Third, we think some provisions must be made in the statute to insure that at a maximum consumers pay no more for antipollution improvement than the actual cost of that improvement. We are very worried that the auto companies may charge the American consumer \$100 for a \$25 improvement. Unfortunately, we think this has happened before.

In the fall of 1967, the automobile manufacturers announced a \$25 price increase that they attributed totally to the cost of complying with the safety standard requiring shoulder harnesses. In Senate testimony in 1968, Senator Mondale of Minnesota said, "Our private investigations following this increase indicated that the cost of complying with this standard is less than \$5 per car." Senator Mondale's figures were based on communications with a firm that actually supplied the harnesses to manufacturers. In order to prevent this sort of shenanigans, Mr. Chairman, we think the subcommittee should consider giving consumers treble-damage actions against companies which overcharge for antipollution improvements.

There is one final problem we would like to raise. We do not think that the proposed legislation does enough to insure that cars which meet air pollution standards when first manufactured continue to meet those standards after they have been driven 25,000 or 50,000 miles. At yesterday's hearings both Ford and General Motors conceded that this was a problem and that a fouled spark plug, or an improper carburetor setting could vastly increase the emission level of an engine.

The scope of the problem has been demonstrated by several studies. Most dramatically, Dr. John Middleton, head of the National Air Pollution Control Administration admitted in testimony before a House subcommittee earlier this month that fully 80 percent of cars out on the road in normal use "failed to be in compliance with the standards for which the prototype met the standards and were issued a certificate of compliance."

In this misleading fashion, manufacturers ignore this fact—which has been known to them for some time—when they announce, as President Cole of GM did in January, and as both Ford and General Motors did in these hearings yesterday—that cars have reduced their hydrocarbon emission 80 percent over the past decade, and carbon monoxide 65 percent. They are talking about prototype cars, finely tuned by well-paid engineers, not cars in normal use on our highways and creating pollution in our cities.

At your hearings yesterday, neither Ford nor General Motors dealt satisfactorily with the issue. They said it was strictly a problem for the car owners. We don't think this is a responsible attitude. We believe that to end pollution the law must demand that every time a car goes into an authorized dealer, the dealer should be required to provide an antipollution checkup at the manufacturer's expense. The reason for making the manufacturer pay is obvious. Unless the manufacturers bear the cost of insuring that engines remain pollution free throughout the life of the car, they will have no incentive to build improved engines which remain pollution free even without frequent checkups. Furthermore, if the car owner himself must pay for the antipollution checkup he may neglect to bring his car into the shop altogether, to the detriment of all of us. In fact, the problem of owner reluctance to obtain even a free antipollution checkup may be so great that the subcommittee should consider imposing mandatory checkups. Certainly, all Federal grants to States for antipollution purposes should be conditioned on the State establishing mandatory pollution inspection programs.

This, Mr. Chairman, gets back to the point you made earlier that we can influence industry research by the legislation we pass. If legislation is passed which forces industry to pay for antipollution checkups again and again and again on this internal combustion engine, which as they say fouls up very easily, I think instead of paying for all these checkups they will begin to pour more money into research for a new type of engine which remains free without checkups.

Senator DOLE. At that point, I don't quarrel with part of his statement but I don't believe they left the impression yesterday that the matter should be strictly up to the car owners. I was here and I questioned him on that very area of their statement. I think the point they made is that somewhere down the line after the product leaves the assembly line if it meets the standards and has affected equipment that somewhere along the line if because of the owner's neglect the system breaks down, then the company should not be held responsible. I agree with that. I mean if the owner runs out of gas, you cannot blame the manufacturer.

By the same token, if it is through negligence or abuse that something happens to the control equipment with reference to emissions or anything else, then there must be some place along the line where their responsibility stops.

Mr. ONEK. I am not suggesting that necessarily automobile manufacturers should be held responsible in the sense that they could be sued on this. What I am saying is they should be held responsible for paying for the antipollution checkups. Hopefully, that will encourage owners to have these checkups but I must say that the problem of the owner's reluctance to obtain even a free antipollution checkup may be so great I think the subcommittee should consider imposing mandatory antipollution checkups.

I think that grants to a State for antipollution purposes should be conditioned on that State establishing a mandatory pollution inspection program. I note that at the present time 31 States, Puerto Rico, and the District of Columbia have inspection standards for safety; I don't have the figures for pollution. I imagine that it is quite a bit

lower. In fact I think only California has a rigid pollution inspection and I think that is a disgrace.

If we place the cost on the manufacturers of repairing the defects or fixing those spark plugs, we would find new, cleaner and better engines very, very feasible, very, very quickly.

Mr. Chairman, as I think I have made clear, Campaign GM is committed to strong Federal legislation. But we believe that the efforts of Government officials alone are not sufficient to insure that corporations meet our social and public needs. The corporations themselves must show a heightened sense of responsibility. In the past, the automobile companies have fought pollution and safety regulation at every stage. They have lobbied at the legislative level; they have lobbied at the agency level.

We think the time for this corporate irresponsibility is past. That is why we are asking the owners of General Motors—universities, pension funds, insurance companies, churches, mutual funds, banks, as well as individual shareholders—to help turn that corporation around at the next annual meeting. And we would like to take this opportunity to invite the members of the subcommittee to attend the May 22 meeting in Detroit. We think your presence at that meeting, to confront GM management on such problems as air pollution, traffic safety, and minority hiring, would greatly advance the cause of corporate responsibility in this country.

I welcome any further questions.

Senator DOLE. What time is that meeting, in the afternoon or evening?

Mr. ONEK. It starts I believe at 2 o'clock on May 22.

Senator MUSKIE. Thank you very much, Mr. Onek.

I would like to ask just one or two questions.

Incidentally, one favorable fallout from the excellent performance of the prototypes is that NASA reduced the emission from 285 to 183 parts per million.

Mr. ONEK. I think that well illustrates the point you made, Senator.

Senator MUSKIE. Let me raise this question. It is my feeling, my belief, when we wrote the law authorizing the setting of emission standards, that it was brought about to permit testing by any method that the Secretary thought feasible or appropriate by prototype or by production model and that the authority goes beyond that to encompass some of the suggestions that you made. Is that your feeling?

Mr. ONEK. I would hope that is the case. I am not an expert in legislative interpretation, but I would hope that is the case. If there is any doubt in the Secretary's mind, then I think proper amendments should be made so that the Secretary knows perfectly clearly he has this responsibility and this obligation.

Senator MUSKIE. We will, of course, amend it in any way the Secretary thinks should give authority, but I had that feeling about it.

Second, on the question of meeting the standards after the automobile is in use, have you given any attention at all to page 3 of their statement?

Mr. ONEK. Yes. I recognize, Senator, that section 202(A) does say: "Any such standards shall include requirements with respect to the manufacturers' warranty of such systems or devices necessary for the purposes of this act."



It may well be that that language is broad enough to cover virtually all the points we made, I am just not clear on that. I am sure that that is the import of that paragraph, and I am sure that is what you meant to do.

But I am not sure whether it does cover all the points we made.

Senator MUSKIE. But that is the thrust of the language.

Mr. ONEK. It, of course, does not include anything about the inspection system as far as I can tell.

Senator MUSKIE. I would like to ask one final question for clarification.

In your statement you mentioned technological feasibility, economic costs. Now, is it your point that those should not be taken into consideration at all?

Mr. ONEK. No.

Senator MUSKIE. Your criticism of the language was that you don't have an adequate way of measuring technological feasibility.

Mr. ONEK. That is correct. Obviously, there comes some point at which none of us is willing to pay any more and there probably is such a thing as a device which is technologically feasible. I would suggest that ABM is technologically infeasible, at the risk of getting into another issue.

Senator MUSKIE. So the challenge you raise by your testimony is to find a more effective way to measure?

Mr. ONEK. That is right and to provide the greatest incentive to Government and industry to really let us know what is and what is not infeasible or too expensive.

Senator MUSKIE. I think you were in the room when I brought to the attention of Dr. Sterner and Mr. Daly the carbon monoxide criteria which has just been issued. The impact of that criteria from my point of view is that it proposes a very serious challenge of what we do about the automobiles powered by internal combustion engines, especially used cars that have no technology at all; what we do about their use in the period that we are developing new technology, we replace used cars with newer cars. What we do in the metropolitan areas. Your statement does not address itself to that point.

Mr. ONEK. Our resolutions which we have filed for the shareholders' consideration did deal, I think, in part with this issue and we urge General Motors to commit itself and act upon a greater commitment for mass transit. We think that there is no question that, given the problems of pollution and just the problems of overcrowding, and the whole problem of highways, displacing urban populations, the so-called white man's roads through black man's homes, that we have to give new consideration to mass transit.

Now, it has been our feeling that in the past General Motors and the other automobile companies have not been in the forefront of the fight for mass transit.

If anything, I think they have been leaders in the so-called highway lobby, which for years has prevented transfer of funds from highway building to mass transit. Many Senators, many Congressmen, felt this transfer was necessary, and I think it is time for a change there.

We would ask the shareholders who get the opportunity to do so, to vote on that proposition, and require that General Motors make a greater effort in mass transit.

We would like to point out from the point of view of shareholders or workers that there is nothing to stop General Motors from making an outstanding contribution in the mass transit field. It already manufactures buses. There is some question about the quality of some of the buses it manufactures, but presumably that can be taken care of.

General Motors also manufactures diesel engines and other things. There is no reason why that company can't make a major contribution to this Nation's effort to achieve a better mass transit system, and I do urge that upon the corporation.

Senator MUSKIE. You know, as I travel the campuses, I am always asked this question every time: Whether I think we have reached the point of the population problem where the number of children per family ought to be limited. Well, my reply up to this point has been that as the father of five, I think any such provision ought to carry a grandfather clause.

Mr. ONEK. I am only the father of one, but I can't guarantee I am stopping there.

Senator MUSKIE. So now I am asking if we ought to be considering in the eyes of some people a limit to the number of children that you ought to have, whether we ought to be mentioning about limiting the number of cars that a family ought to have.

Mr. ONEK. Frankly, I have not given much thought to either of those propositions. Certainly the first one about birth control is not an issue for which we think we can hold General Motors responsible.

We hold General Motors responsible for a great many things, and perhaps they would suggest too many, but we do not see any relationship there, and we are not raising the issue of birth control before the shareholders at the meeting.

On the number of cars, I think that is related to the mass transit issue. If you live out in the suburbs, there is no bus, there is no subway, there is no train, and the husband goes off to work and the wife has to do some shopping. I suppose that is going to have to be a two-car family if they can afford it.

It is possible through mass transit to eliminate the need for a two-car family. The husband could take a bus or train to work, while the wife has the car for shopping or taking the kids to school. I don't think most Americans love the idea of traveling in to work on crowded highways, paying huge fees for parking, getting tickets—the whole mess that you are familiar with.

I think if mass transit is given to them, they will change their patterns. I don't think there is a love affair between Americans and their cars when they don't need them.

The fact of the matter is that today automobiles are necessary, and often two-car families are absolutely necessary. What we have to do is change that reliance.

Senator MUSKIE. Thank you, Mr. Onek.

Senator Boggs?

Senator Boggs. I have no questions. It was necessary that I attend an executive session of the Post Office Committee, and I apologize for not being here during your complete testimony. I shall read it very carefully. We appreciate your being here.

Mr. ONEK. Thank you very much, Senator.

Senator MUSKIE. Senator Dole?

Senator DOLE. Basically I find much good in your statement, although I cannot agree with some of your comments. In addition to

attacking the corporate structure in America and showing sincere concern about pollution, I suggest you might also look into the area of safety with reference to enforcement of our laws and keeping certain people off highways.

I feel enforcement is directly related to the overall problem of highway safety, whether or not there is a malfunction in the car. Of course, this may not be your area of interest now, but perhaps it will be later.

Mr. ONEK. We are certainly interested in anything that will improve car safety.

We just would like to make one point. It is often said that car accidents are caused by the driver, and it may well be true that the accident itself, the collision, is caused by the driver. But the injury—the injury, not the accident—is probably caused by the manufacturer of the car.

If you have a noncollapsible steering wheel, or if you have a car that folds up like an accordion the minute it touches something, then, of course, a minor accident is going to cause damage.

I approve licensing drivers and making sure they are adequate to the task of driving, but I also feel that we have to allow for human error. I don't think a human error on the highway should mean death.

I think in the last 20 or 30 years accidents have meant death because the manufacturers will not construct cars which will withstand minor collisions. That is what we are concerned about.

Senator DOLE. It is my opinion that there are ingredients of each in the problem.

Does Mr. Kramer have any comments?

Mr. KRAMER. I just would like to repeat what Mr. Onek said earlier about the fact that the National Highway Safety Bureau has already designed a car which they admit is not marketable today but is buildable today that can withstand accidents at 47 miles an hour.

Robert Carter told me that by next year they hope to have that up to 60 miles an hour. So, for accidents under 60 miles an hour, for a person who is wearing a shoulder belt, poor driving should not be an element of whether the person is dying on the road. He is dying because a car that could have been built has not been built.

Senator DOLE. Do either one of you fellows operate a General Motors product?

Mr. KRAMER. I do; I cannot afford to buy anything else at the moment. I got mine from my father.

Mr. ONEK. I do not.

Senator DOLE. That is 50–50, so you have a little more balance in that area.

Senator MUSKIE. Thank you, Mr. Onek and Mr. Kramer.

Mr. ONEK. Thank you, Mr. Chairman.

(Subsequent to the hearing the following letter was received by Senator Dole from Paul F. Chenea, of General Motors:)

RESEARCH LABORATORIES, GENERAL MOTORS CORP.

Warren, Mich., April 20, 1970.

HON. ROBERT J. DOLE,  
U.S. Senate, Washington, D.C.

DEAR SENATOR DOLE: I was much interested in your comments at the March 26 hearing of the Subcommittee on Air and Water Pollution concerning expenditures by the various car companies to reduce air polluting exhaust emissions from autos. Both you and Senator Muskie commented on this general subject during a colloquy with one of the witnesses that day, Mr. Onek.

I want the record of your proceedings to reflect accurately what General Motors is doing to reduce emissions from our car engines. As you know, I testified at the March 25 hearing of the Subcommittee. Because of scheduling problems, I was asked to summarize my statement and was questioned only briefly. The discussion during Mr. Onek's appearance the following day may have created the impression that there was an unwillingness on the part of auto industry representatives to reveal our expenditures to reduce automotive emissions.

It is most regrettable that this impression developed, as I was prepared to discuss this information with the Subcommittee had I been asked. We have readily made information available on four recent occasions—including two Congressional appearances—as to our expenditures to find means to reduce emissions from present automobile engines and develop alternate power plants. A copy of the statement on our expenditures on one of those occasions, namely before the House Public Health and Welfare Subcommittee, is attached.

To clarify the record of your hearings insofar as General Motors is concerned, we had expenditures of more than \$125,000,000 over the years 1967, 1968, and 1969 to control emissions from our cars. They were for the following types of activities: research, engineering, various types of testing, the capital equipment required to do this work, and the tooling and equipment needed to translate laboratory concepts into hardware.

As to expenditures for various alternate power plant concepts, I agree with the Ford representative that specific figures would be of competitive value. However, a meaningful comparison can be achieved in the information we gave on the four recent occasions referred to. We reported on those occasions that we spent in 1969 half again as much of our basic research funds on alternate power plants as we had for further improvement of the internal combustion engine.

A survey of personnel at the end of 1969 showed that the number of people working full time at GM on automotive emission control was 1,400.

General Motors Chairman James M. Roche has publicly stated that GM is committed to seeking improvements in automotive power plants, regardless of what type, in order to solve the vehicle's part of the problem of air pollution in the shortest possible time.

If it is possible, we would deeply appreciate it if you would place this letter into the record of the proceedings of the Subcommittee on Air and Water Pollution.

Sincerely,

PAUL F. CHENEA, *Vice President.*

Senator MUSKIE. Senator Goodell was scheduled to testify, and I gather he is still trying to get down here from New York. At the moment he is still up in the air.

(Senator Goodell was unable to appear and his prepared statement follows:)

PREPARED STATEMENT OF HON. CHARLES E. GOODELL, A U.S. SENATOR FROM THE STATE OF NEW YORK

Mr. Chairman, 19 centuries ago the philosopher Seneca, recognizing the problem of air pollution in urban areas as a threat to public health, complained of "the heavy air of Rome" caused by the "stink of the smoky chimneys" with their "pestilent vapors and soot."

Man has, in nearly 2,000 years, changed little. Scientists have recently concluded, after a fruitless search of the remotest corners of this country, that the United States ran out of clean air six years ago when pollution from California finally reached Flagstaff, Arizona. It would seem that man has retrogressed beyond the nightmares of his ancestors.

I. THE UTILITY OF NATIONAL AIR QUALITY STANDARDS

Mr. Chairman, I have cosponsored the Administration's amendments to the Clean Air Act, S. 3466, and I endorse the emphasis of that proposal—the national ambient air quality standards which are to be imposed by the Secretary of Health, Education and Welfare. I disagree, therefore, with the regionally-based structure of the Air Quality Act of 1967 and of S. 3546, Senator Muskie's proposed National Air Quality Standards Act of 1970.

There is a fundamental difference in philosophy between the nationally-based approach of the Administration bill and the regionally-based approach of the existing legislation and of S. 3546. The first report of the Secretary of Health, Education and Welfare on the Air Quality Act of 1967, made to this Congress in June 1968, describes the present structure of air quality control regions, and argues that "Because air pollution is essentially a regional problem, the most effective way to attack it is on a regional basis."

I take issue with that approach. According to the Secretary's report, air quality control regions are to be set up not only upon the basis of geographic meteorological variances, but also in light of the location and quantity of pollution emissions, social and governmental factors, projected patterns of urban growth, and various political considerations. It is my belief that the latter factors should not be determinative in measuring the danger to human health from pollutants in the air.

No matter what the social and governmental factors, human beings in different parts of the country will be equally endangered by equal concentrations of any given pollutant under similar atmospheric conditions. That is why I believe that the Federal government ought to set maximum levels for each pollutant and enforce those levels nationally.

Regional standards would impose unequal production costs upon competitive firms in the same industry who happen, though they discharge exactly the same pollutants with exactly the same atmospheric effects, to be on different sides of a regional boundary. This is inequitable.

To account for regional atmospheric variations, it is not necessary to establish defined atmospheric areas within which different standards will be applied. Rather, the Department of Health, Education, and Welfare should, as part of the process of establishing national standards of maximal pollutant levels, calculate a discounting scale which will correct for atmospheric divergences.

The advantage of a discounting procedure over the present regional structure lies in the elimination of unequal treatment of competitive industries presently on different sides of a regional boundary. Moreover, chronological changes in atmospheric conditions may be far more flexibly corrected by the application of a changed discount ratio than by the changing of regional boundaries.

As I support the national air quality standards, so also do I support the national emission standards suggested by Senator Muskie's Air Quality Improvement Act, S. 3229. As enforcement of national ambient air quality standards would be far easier and less delayed than enforcement of state and regionally-based standards, so also would enforcement of national emission standards be less cumbersome than that of any state-based plan. Consequently, I will introduce an amendment to the Administration's bill which will have the effect of imposing national emission standards. It will do so by mandating that each State or interstate agency shall include in its air quality implementation plan emission standards prescribed by the Secretary of Health, Education and Welfare. The standards would be applicable to emissions from all types of vehicles, vessels, aircraft, and engines.

## II. THE PROTAGONISTS OF ENFORCEMENT

Enforcement of regulatory standards has too often been undermined because enforcement responsibility has been given to the wrong agency.

Federal noise abatement legislation enacted in 1968, for example, empowers the Federal Aviation Agency to set noise and sonic boom requirements as part of its authority to certify aircraft. The FAA is essentially an aviation development agency, with close ties to the aircraft industry, which is not likely to impose truly effective noise or air pollutant emission standards.

I will, therefore, introduce legislation which will transfer from the FAA to the Department of Health, Education and Welfare the authority to set noise and air pollutant emission standards for aircraft.

Similarly, placement of responsibility upon the Atomic Energy Commission for enforcement of radiation safety and particulate and gaseous emission standards appears to have been an error. The AEC, too, is an agency which shares the developmental goals of its associated industry, and those goals are in conflict with rigorous enforcement of emission standards.

I will, therefore, introduce legislation, similar to that proposed in the House by Congressmen Bingham and Dingell, which will transfer from the AEC to the Department of Health, Education and Welfare the responsibility for enforcement of safety and pollution standards in nuclear development.

## III. THE PROCESS OF ENFORCEMENT

It is crucial that we focus not only upon the rigor of standards, not only upon the agency responsible for enforcement, but also upon maximizing the efficacy of the process of enforcement itself.

That is why I support the provisions of Mr. Muskie's National Air Quality Standards Act of 1970 that public hearings, at which any interested parties—including environmental protection groups—may speak, should become part of the enforcement process of emission standards. So too should public hearings be part of the standard-setting process of the Department of Health, Education and Welfare. I will introduce amendments to that effect to the Administration bill.

In order that speedy enforcement may be achieved, it is imperative that the Air Pollution Control Administration have the power to issue cease and desist orders to emission standards violators, as provided in Senator Muskie's legislation.

We must reduce the built-in delays in present enforcement and standard-setting structures—which provide for endless conferences, hearings, and other enforcement delays of up to 5 years. Federal standards and cease and desist orders should, presuming public hearings and fact-finding before their issuance, become effective immediately upon their promulgation. Court appeals to stay the promulgation of standards or the enforcement of cease-and-desist orders should be allowed. The standards or orders should, however, remain in effect—as Senator Muskie's proposal provides—unless and until the court issues a stay order.

Moreover, interested private parties should be given, by legislation, the authority to go to court in order to seek enforcement of pollution standards.

The customary argument against private suits is that the lack of decisional jurisdictions will lead to a lack of uniformity in enforcement as courts in different jurisdictions adopt different tests of reasonability.

That argument is not applicable here, since the legislation which I support would establish national air quality standards and national emission standards, as well as providing for explicit state implementation plans. Courts could, thus, measure pollution levels in any particular area against fixed statistical standards publicized by the Department of Health, Education and Welfare. They could measure municipal and state efforts to implement standards against the explicit implementation plans which each state will have proposed and the Department will have approved.

Given the existence of explicit standards and implementation plans upon the basis of which courts will be able to make determinations, it would be beneficial to allow private interested parties to (1) intervene as parties plaintiff in Federal and other governmental suits for equitable relief, such as injunction, to enforce emission standards, (2) file *amicus curiae* briefs in such suits and in governmental damage suits against polluters, and (3) have standing to seek equitable relief against any state, municipal, or interstate body which fails to act in accordance with its own implementation plan which had been approved by the Department of Health, Education and Welfare.

Federal legislation should provide that the full litigation costs—including particularly the costs of providing expert scientific testimony—of such private parties will, upon their winning any suit, be assumed by the unsuccessful defendants. That provision would remove what is probably the largest financial impediment to the litigative effectiveness of private conservation groups.

## CONCLUSION

Studies and research, as in the field of solid waste disposal, must continue, but the time for studies and research alone is past. It is the responsibility of Congress to pass, now, effective legislation which will provide for the establishment of rigorous national standards and effective enforcement procedures.

Senator MUSKIE. The views of the Federal Bar Association on S. 3229, S. 3466, and S. 3546, are included in the materials I have received from Paul E. Treusch, who is presented of that group. It will be included in the record at this point.

THE FEDERAL BAR ASSOCIATION,  
Washington, D.C., March 25, 1970.

HON. EDMUND S. MUSKIE,  
Chairman, Subcommittee on Air and Water Pollution, Public Works Committee,  
U.S. Senate, Washington, D.C.

MY DEAR SENATOR MUSKIE: Thank you for inviting me to present the views of the Federal Bar Association on the three air pollution control measures now pending before your Subcommittee, S. 3229, S. 3466 and S. 3546.

The Federal Bar Association is composed of almost 14,000 attorneys, all of whom either now serve or at one time served the Federal Government in a civilian or military capacity. We now have 96 chapters located in each of the fifty states and overseas, and have nearly 80 substantive committees, several of which have a deep and continuing interest in air pollution.

Examples of our continuing interest include such programs as a well-attended briefing conference on air and water pollution control on March 14 and 15, 1968, for which we were privileged to have you as our principal speaker. In addition, the effect of air pollution regulations on electric power and natural gas utilities was considered in two briefing conferences organized by the Association's Committee on Federal Utility and Power Law on February 17 and 18, 1970, as well as part of its conference on National Electric Power Policy on October 16, 1967. The Association's Council on Science and Technology is presently planning a briefing conference in the critical area of waste disposal management, to be held in Washington, D.C. this coming fall.

The Association's Council on Natural Resources and its component committees are also planning educational programs for lawyers in the area of protection of the environment.

The relatively short time available for analyzing the three Bills now before your Subcommittee have afforded us an opportunity only of consulting with a few of our members in the Councils and Committees which have an interest in this important legislation. Accordingly, if I were to testify on March 26, 1970, as you propose, it would not be possible to present to you the views of our Association as a whole or any of our Councils or Committees.

The proposed legislation, along with the suggested amendments, have been referred to each Council and Committee involved, with instructions to give it their prompt consideration, and to poll their membership on the more important features of this proposed legislation, preliminary to preparing proposed recommendations.

I have asked our Executive Director, Mr. J. Thomas Rouland, to assure that the handling of this matter will be given a top priority so that it will be possible to present any comments or recommendations of the Association or its component committees to your Subcommittee prior to any final action on this proposed legislation.

Your interest in asking the views of the Federal Bar Association is greatly appreciated, and we hope we can be of continuing assistance in this important area, which is of vital concern to us all.

Sincerely yours,

PAUL E. TREUSCH, *President.*

(Subsequent to the hearing the following letter and statement were received from Mr. Treusch:)

THE FEDERAL BAR ASSOCIATION,  
Washington, D.C., April 28, 1970.

HON. EDMUND S. MUSKIE,  
Chairman, Subcommittee on Air and Water Pollution, Committee on Public Works, U.S. Senate, Washington, D.C.

MY DEAR SENATOR MUSKIE: I am pleased to send you my statement, as President of the Federal Bar Association, on three Bills pending before your Subcommittee, S. 3229, S. 3466, S. 3546. In the time available, the Association has not been able to poll its total membership on the position presented. However, the statement does represent the position adopted by our Committee on Environmental Affairs and approved by the Executive Committee of the Association.

Thank you very much for the opportunity to present this statement and best wishes for the continuing success of your Subcommittee.

Sincerely yours,

PAUL E. TREUSCH, *President.*

## STATEMENT BY PAUL E. TREUSCH, PRESIDENT OF THE FEDERAL BAR ASSOCIATION

I welcome this opportunity to present to the Subcommittee on Air and Water Pollution some consideration and comments on S. 3229, S. 3466, and S. 3546.

The Federal Bar Association is composed of some 14,000 attorneys, all of whom either now serve or formerly served the Federal Government in a civilian or military capacity. Our membership includes public servants in the legislative, executive and judicial branches of our Federal Government. We have 96 chapters located throughout the fifty states and overseas.

The Association's Council on Science, Technology and the Law has had a continuing interest in air pollution. On March 14 and 15, 1968, the Council (then called the Council on Select Substantive Fields) sponsored a well attended briefing conference on air and water pollution control. One of the featured speakers was Senator Muskie. In addition, the effect of air pollution regulation on electric power and natural gas utilities was considered in two briefing conferences, organized by that Council's Committee on Federal Utility and Power Law on February 16 and 17, 1967, and February 17 and 18, 1970, and briefly during its National Electric Power Policy Conference on October 16, 1967. That Council is presently planning a briefing conference devoted to industrial environmental systems to be held in Washington, D.C., this coming fall.

The FBA Council on National Resources and Lands, recently reorganized to include a Committee on Environmental Affairs, is planning a briefing conference on pollution of the environment, including air pollution, this coming December in Miami. Its plans include continuing education of members of the legal profession on problems of environmental quality, symposia on environmental problems, periodic speaking programs, and gathering of information on developments at the administrative, judicial and legislative levels of government, ranging from state, to national, and to the international arenas.

In your telegram of March 6, you asked me to discuss the three bills presently pending before you, with particular emphasis on their enforcement provisions. However, to constructively criticize the three bills, I had first to review the past experience of air pollution control by federal, state and local agencies. Of particular interest was a comparison of the actual enforcement of emission restrictions on polluters as between the National Air Pollution Control Administration and some of the state and local control agencies.

I think it fair to equate successful enforcement with the rapidity and the reach of the imposition of emission restrictions on uncooperating polluters.

The Clean Air Act as amended, and as it would be further amended by the proposed legislation, places a great many unnecessary hurdles in the way of successful pollution control enforcement. I say hurdles, because they delay such enforcement, but some are so great that perhaps they may constitute a barrier, rather than just a delaying hurdle.

I refer particularly to the entire approach of the Air Quality Act of 1967, which starts the enforcement program by going through the following steps:

- (1) Establishment of "criteria" and "control technology documents."
- (2) Establishment of "air quality control regions."
- (3) Monitoring of air quality.
- (4) Establishment of "air quality standards" by the states.
- (5) Development of an implementation plan.
- (6) Enforcement of an implementation plan.

I am going to discuss, in a few minutes, the lengthy time it takes to go from (1) through step (4), but here I would like briefly to mention the great difficulty of going from step (4) to step (5).

## PROOF OF FACT

One problem is that of proof-of-fact. The present law requires the enforcement agency to start with the monitoring and study of "ambient air quality" (Section 107 and 108 of Public Law 90-148). After "proof-of-fact" of poor ambient air quality, which is difficult, but feasible, it requires that the cause of specific concentrations of pollutants in the atmosphere be traced to one or more specific sources apparently as a prologue to the establishment of a plan to maintain a particular level of ambient air quality. Where emission sources are many, and meteorological phenomena are complex and undefined, whether such "proof-of-fact" is feasible by any lawyer or engineer is a doubtful question which can only be answered after the expenditure of considerable sums and the passing of a good deal of time. And yet this presumption of feasibility is carried forward



in the proposed amendments, which do not change the statutory scheme based on this presumption.

I would like to note that some bills introduced in the House have adopted a direct emissions control approach, for example, H.R. 14867, H.R. 15070, and H.R. 15577, although I cannot endorse all the specific provisions of those bills.

#### PROCEDURE

The procedure of the present "Clean Air Act," Sections 107 and 108, which we summarize as steps (1) through (4) above, is an overelaborate ritual.

Before anything remotely resembling enforcement can commence, the present act requires the development of "criteria" and "control technology documentation" which takes quite a long time. You can simultaneously start creating air quality control regions during this period, but you cannot go any further. At present five criteria and control technology documentation publications have been issued. We urge that this process be accelerated to the extent possible, and that additional appropriations be made available to do so. However we do not believe that the remainder of the procedures should be held in abeyance pending issuance of these documents.

After both the criteria and the control technology documentation are developed, sent to, and received by the governors of the several states, and the air quality control regions have been created, the governor has 90 days in which to file a "letter of intent" (Section 108 (c) (1)). S. 3546 would reduce that period from 90 days to 30 days.

Then the state has still another 180 days to adopt, after public hearings, ambient air quality standards for the designated air quality control regions, and then still another 180 days to adopt a plan for the implementation, maintenance and enforcement of such air quality standards. Then it takes the Secretary of Health, Education and Welfare some time to determine whether or not to approve the state adopted standards.

Not considering time necessary to develop the criteria and control documentation, and time to establish air quality control regions, and time for the Secretary of Health, Education and Welfare to determine the adequacy of the state adopted standards, there has still been a total allowed time of over one year and three months to get this far.

Then if the standards are not acceptable, or are not even created, additional time starts to run as follows:

The Secretary has first to give notice, and call a conference and then prepare his own air quality standards. This could take a considerable period of time. After the Secretary publishes these regulations, the state has six months within which either to adopt its own standards or to petition for a public hearing. During this six months, the Secretary's regulations are not yet effective (Section 108(c) (2)). Then in another 30 days the governor can petition the Secretary for a hearing.

I will not burden you with the great number of succeeding steps that must be taken before enforceable orders to restrict emissions can be issued. But in trying to trace through this maze of procedure, I begin to wonder whether the end will ever come.

We suggest that after criteria are published, the State be required within thirty days to give public notice and information of public hearings, to be held within another 45 days, for the purpose of establishing State ambient air quality standards. Within 180 days the Secretary should compare the State ambient air quality standards established to a minimum national standard to be established, and approve it if equal to or more stringent than the national standard. If the State ambient air quality standard falls below the national standard, the national standard should be substituted in its place.

#### INTERIM BURDEN

A third defect in the present Clean Air Act, as amended, and continued in the proposed amendments, is also related to the problem of proof-of-fact, and to the problem of timing. Under the present Act, the burden of proof of need for control for particular emissions is upon those who are the victims of emissions and they do not get a chance to try to prove their facts until sometime late in the game—after damage has occurred.

Senator Muskie, in his talk to our FBA Council, citing testimony of former Surgeon General William Stewart, quoted Dr. Stewart:

The air pollution incidents are obvious, dramatic, tragic and thus far, fortunately rare. They receive widespread publicity which tends to create the false impression that air pollution is a hazard only when unusually severe weather conditions conspire to produce localized disasters. As a result, people tend to evaluate the hazards of air pollution as roughly equivalent to the likelihood of being struck by lightning.

And then Senator Muskie said: "But, as Dr. Stewart pointed out, the facts are quite different. The subtler, less dramatic long-range effects of air pollution are of much more serious consequence to the population as a whole—a point that should not be obscured by major tragedies."

Accordingly, another problem built into the present legislation, and continued by the proposed amendments, is the presumption that it is fair and equitable to continue to introduce foreign substances into the atmosphere which create or are likely to create injury to the public health and welfare, until the victims, or their representatives, have had an opportunity to, and succeed in satisfying their burden of proof.

I question the presumption that emission control should await the development, over long time spans, of proof that past emissions have been harmful, all the while such emissions continue to be inflicted upon the public. We recommend as a goal of the legislation that the burden of proof be on the person who wishes to emit foreign substances into the air to prove that those substances will not be harmful to human life, other animal life, or to vegetation.

S. 3466, Section 8, would add a new section to the Clean Air Act, purporting to deal more directly with emissions from types of stationary sources which contribute substantially to the endangerment of the public health but only *if they can be prevented or substantially reduced*. This limitation on the control of dangerous emissions is predicated on the assumption that emissions, not clean air, are the norm. Such standards can only be established after notice and hearing, and even though they deal with endangerment to the public health and welfare, existing technology "must be considered." whatever that means.

In addition to the three major problems of the existing law, it is further our judgment that adequate and responsive formation and enforcement of air pollution control requirements demand full and meaningful public participation including the right to participate as a "party" with standing to contest action taken by "representatives of the public."

Now, I would like to turn to specific provisions of the three bills pending before you.

#### S. 3229

I comment here on some specifics of S. 3229 which deals with vehicular emission standards, fuels and solvents, and noise abatement.

Title I of S. 3229 as it amends Title II of the Clean Air Act goes directly to emissions standards without the long prologue of developing criteria, monitoring ambient air quality and finally controlling emissions as required under present law. However, this Title does not deal with stationary sources and further continues the present requirements of Title II of the Clean Air Act of a prior finding that these sources would "cause or contribute to, or are likely to cause or to contribute to, air pollution which endangers the health or welfare of any persons." We adverted above to the difficulty of proof-of-fact of causation. We would shift the burden to the manufacturers to prove that an emission does not endanger the public health or welfare.

As in the present Act, S. 3229 (Sec. 105 as it amends sec. 208) preempts the setting of vehicular emissions standards except for the State of California (Sec. 208(b)). Should other states such as New Jersey desire to control vehicular emissions, they would be prevented from doing so. We would let the states set standards stricter than the national standard if they so desire.

Sec. 206 amended by S. 3229 continues the certification scheme of Title II of the Clean Air Act in which a small number of vehicles is tested for compliance with emission standards and it is assumed that other vehicles of the same model will not have materially greater emissions than those of the vehicles tested. Sec. 3 of S. 3466 addresses itself to this problem. I will deal with it below.

Section 210(a) of the present Clean Air Act requires registration of fuel additives. To register an additive, the fuel manufacturer or processor must advise the Secretary of the trade name of the additive, and its concentration in the fuel.

and its proposed use. The manufacturer of the additive must tell the Secretary the chemical composition<sup>1</sup> of the additive, the recommended range of concentration, and the recommended use.

He is not required to tell the Secretary what the combustion products will be, or what will be their effect on the environment. S. 3229 continues this present deficiency.

A solvent is a chemical not used as a fuel, but rather used to dissolve other substances. I am advised that some solvents are regarded as particularly serious pollution problems.<sup>2</sup>

S. 3229, for the first time, attempts to impose some federal regulation of solvents, coating materials, and similar substances which may contribute to pollution. It is to be commended as a first attempt to meet this serious problem.

However, proposed Section 212 in S. 3229<sup>3</sup> may not be able to provide adequate regulation of the solvent problem.

Under Section 212, the Secretary must designate in advance the substances which "when used in uncontrolled situations" (meaning unclear) must be registered. He may do so by naming solvents or substances singly or by class, but he must first make a judgment that such substance "when used in uncontrolled situations may cause or contribute to air pollution, adversely affecting health and welfare."

The Secretary may only require the same information on these substances as he requires of fuel additive and accordingly, may not require information on the danger to the environment of such escaping substances.

If a person fails to register, the Secretary must first litigate the failure to register (possibly for a long time) before he can set any emission standards or enforce them.

We would require that for fuels and solvents and similar substances, manufacturers and processors advise the Secretary of the physical structure of the additive or solvent, for fuel additives advise the Secretary of the combustion products, and for both fuels and solvents, of the possible dangers to the environment.

Under Sec. 212(e), S. 3229<sup>4</sup> the Secretary may set standards for solvents and similar substances when two or more governmental agencies set differing standards.

Accordingly, that Section would preempt state or local agencies from setting stricter standards when they feel that such standards are required for their particular situation. We would ensure that states be allowed to set stricter standards if they desire and that the Secretary's resolution of conflicts be limited to situations where one state imposes a requirement on solvents which makes it impossible to meet the requirements of another state.

#### S. 3466

S. 3466 has a number of desirable features. Section 3 of the bill, amending Sec. 206 of the Clean Air Act, as amended, concerning the testing of motor vehicles, recognizes the need to monitor or sample vehicles from the production run to ensure that the desired goals are actually being met. It provides for revoking certificates if the goals and standards are not met.

On page 3 of S. 3466 (of the print as referred to the Committee), line 5, we would change the phrase "are in fact constructed" to the phrase "do in fact perform" so that the monitoring of vehicles is based on their performance, since changes in tuning of identically constructed vehicles can materially affect performance. Sec. 5 of S. 3466, amending Sec. 210 of the Clean Air Act as amended, deals with fuels for moving sources and any fuel additives.

The Secretary under this Section may require a manufacturer to furnish him with information which would allow him to determine the emissions resulting from the use of the fuel or the fuel additive or the effect of such use on motor vehicle emissions control systems.

In a few instances, when the Secretary can show that the emission may be toxic, further information may be required by the Secretary showing the environmental effect of the emission.

<sup>1</sup> He may also tell him the physical structure of the chemical, but only if he knows it or happens to find out.

<sup>2</sup> Such as carbon tetrachloride.

<sup>3</sup> Amending Section 212 of the Clean Air Act, as amended.

<sup>4</sup> The reference is to the Clean Air Act, as amended, as proposed by Sec. 105 of S. 3229.

We must permit the Secretary to obtain this second class of information even though he cannot meet the burden of showing that here may be a question of toxicity.

We particularly commend the approach of subsection 5(d) which provides for public dissemination of the information gained by the Secretary under Sec. 210 of the Clean Air Act as amended. However, we would insert a period after the word "Code", and delete the remainder of the sentence, which appears now to limit the free dissemination of information.

S. 3466 (Section 6 and 7) remove the need for the Secretary to issue "criteria," discussed above, and call for the states to designate "air quality control regions." Under S. 3466, Section 6, the Secretary establishes "ambient air quality" standards instead of waiting for individual states to do so. After establishing "ambient air quality" standards under Section 6, the Secretary issues information on ways to achieve the ambient air quality determined under proposed new subsection 107(a). This feature may be an improvement over the present Act in saving time by not waiting for the states to take the initiative, only to find they will not do so.

We are concerned that this bill continues the presumption of innocent emissions of the present Act because it contains the language that prior to the issuance of standards of ambient air quality there must be a determination that there is or may be a danger to the public health or welfare (Section 6, amending Section 107(a) of the Clean Air Act as amended). We would encourage attempts to move away from that presumption.

Section 6 of S. 3466, amending Sec. 107(b) of the Clean Air Act as amended, provides that the Secretary shall issue information on recommended pollution control techniques "to appropriate air pollution control agencies" (page 10, lines 17 and 18 of the bill as referred to Committee). We would delete the words "to appropriate air pollution control agencies" to ensure that such information would be made public.

We commend the proposed changes in Section 7 of S. 3466 of Section 108(c) (4) (B) that clarifies who may be enjoined from polluting; also the clarification found in Section 7(e) on the type of information the Secretary may require in connection with abatement conferences.

Section 8 of S. 3466 creates two spheres of federal enforcement: (a) where a state or interstate agency fails to carry out its plan to enforce ambient air quality standards and (b) where a person is violating stationary source emission standards which may be established directly by the Secretary if he can find that the source "contributes substantially to endangerment of the public health or welfare, and (2) can be prevented or substantially reduced."

While we approve of the Secretary's directly setting emissions standards (so long as state authority is not preempted), the limitations on his authority to do so are very great. We would suggest deleting the words "which can be prevented or substantially reduced" (p. 17, line 4 of the bill as referred to Committee) in the light of the paramount need to protect the public health.

Section 112(b) (2) as proposed in Section 8 of S. 3466 limits emission control to existing technology. We believe that the legislation should press the development of new control technology by providing incentives for and require the development of the technology and incorporation of that technology practice.

S. 3466 fails to provide for public participation in the establishment of enforcement plans to enforce standards set under Section 112(c) (2). In our judgment adequate and responsive formation of air quality standards in the implementation plan demands full and meaningful public participation. Experience has demonstrated that where the public participates in the air quality standard setting, the standards promulgated are as much as 50 percent more stringent than when the public does not participate.

We are concerned that adequate notice is not given prior to State proceedings on air quality standards and implementation plans, nor is such notice accompanied by sufficient technical material to permit public and private interests to participate in a meaningful manner. While we grant that all elements of this problem cannot be solved by Federal legislation alone, we recommend that notice and time requirements in proposed Federal legislation be strengthened to overcome some of these deficiencies.

S. 3546

I turn now to S. 3546. As in S. 3466, this bill provides that the states will establish the air quality control regions (Sec. 3). It reduces the time that a governor has to file a letter of intent to 30 days from the present 90 days (Sec. 4),

and clarifies the necessary elements of an implementation plan (Sec. 4), all of which we endorse.

Section 4 would change Sec. 108 of the Clean Air Act as amended, to add a new subsection allowing the Secretary's representative to issue abatement orders in certain instances. However, in the case of a violation of an emissions standard, where also the abatement order is not obeyed, the Secretary's representative has to go through an unnecessary waiting period while the order is not complied with before he can go to court and get his order enforced.

It is our contention that questions of general economic and technical feasibility can and should be accounted for during the administrative procedures leading to establishment of implementation plans. Once such plans are established they represent an objective measure of violation which should require no further consideration of technical or economic feasibility, either by administrative or judicial procedures, and variances can take care of individual cases of undue hardship. Therefore, the procedure in S. 3546 authorizing the Secretary to issue an abatement order requiring compliance with the emission requirements, within 72 hours, followed by court enforcement, is extremely worthwhile.

We are pleased that S. 3546 recognizes in Section 4 the need for subpoena powers (amending Sec. 108(c)(8)(C) of the Clean Air Act as amended).

We recommend additional provisions for discovery, such as depositions and interrogatories.

Section 4, by adding Section 108(c)(13), authorizes suits for private enforcement of air quality standards, implementation plans, and emission standards established under this section. We are very much in favor of this provision. Not only will this provision help establish a distinct public attitude of participation in the quality of our environment, it will give the public a problem-resolving tool to protect and enhance air quality.

Section 4(c) adds a new subsection 108(i) to the Clean Air Act as amended which requires that new emissions sources utilize the latest available pollution control techniques. As stated above, we believe that incentives for development of control technology should be put in the legislation, together with provision for use of new control technology as it is proved feasible and becomes available.

Thank you for allowing me to present these comments which have been adopted by the Association's Committee on the Environment and have been approved by the Executive Committee of the Federal Bar Association.

Senator MUSKIE. We welcome now our next witness, a representative of the Airport Operators Council, Mr. Donald Reilly, executive vice president of the Airport Operators Council International.

Senator BOGGS (presiding). Mr. Reilly, we are glad to have you and Mr. Wright here. Please proceed with your testimony.

**STATEMENT OF J. DONALD REILLY, EXECUTIVE VICE PRESIDENT  
OF THE AIRPORT OPERATORS COUNCIL INTERNATIONAL, ACCOMPANIED BY JAMES R. WRIGHT, DIRECTOR OF ENVIRONMENTAL PROGRAMS**

Mr. REILLY. Thank you.

Mr. Chairman, members of the subcommittee, I am J. Donald Reilly, executive vice president of the Airport Operators Council International (AOCI). With me is James R. Wright, AOCI's director of environmental programs.

The Airport Operators Council International is the association of the governmental bodies which own and operate the principal airports in the 50 States, Puerto Rico, and the Virgin Islands, as well as in many countries abroad. In 1969, U.S. member airports enplaned over 90 percent of the domestic and international scheduled airline passenger traffic. In addition, our members operate many reliever and other general aviation facilities which supplement the larger airports in their communities and regions.

We are here today to testify on behalf of our U.S. members in support of S. 3229 which in title I would give the Department of Health, Education, and Welfare the statutory authority to set aircraft emission standards and in title II would create an Office of Noise Abatement within HEW. We are testifying in support of this legislation because we feel that this bill is necessary to guarantee that the viewpoint of an agency—such as the Department of Health, Education, and Welfare—which does not share the Federal Aviation Administration's responsibility to promote and develop civil aviation must be a part of the regulatory process when environmental problems and the public interest are involved.

The aviation industry has contributed enormously to the economy of this Nation. Today it is the principal component of the Nation's transportation resources. But it is also directly involved in the environmental problems now being so prominently focused upon in our Nation. Most evident of these problems is that of aircraft noise.

More than 50 large, medium, and small major metropolitan airports in 30 States and the Washington, D.C., metropolitan area, handling almost two-thirds of the Nation's airline passenger traffic, have experienced aircraft noise problems in the last 10 years in the form of complaints, litigation, the formation of local political action groups, and demands for regulation of aircraft noise levels. Nor is the problem limited to the United States. There are, for example, aircraft noise restrictions in effect at more than 80 international airports in 43 countries around the world.

Indeed, aircraft noise is a nonsolid form of air pollution and has become the single most serious constraint on aviation system capacity. Inability to build new airport complexes and to expand existing airport facilities is the result of community opposition to aircraft noise. Environmental problems threaten to strangle the growth of aviation in such key cities as Miami, Los Angeles, New York, New Orleans, and San Francisco, as well as in the major cities abroad including London, Tokyo, Dusseldorf, Frankfurt, and Stuttgart, et cetera.

Community opposition to expansion of airport capacity causes serious threats to a viable national and international air transportation system. But even more important is the public hardship created by aircraft noise. Projecting demographic data recently released by the Department of Transportation on the aircraft noise situation at three major U.S. airports, it can be estimated that by 1975 some 15 million people will live within FAA-designated noise-sensitive areas near major airports across the United States. These aircraft-noise-sensitive areas will also include thousands of schools, parks, and hospitals and will represent a total land area of hundreds of square miles.

Today, almost 4 years after the report of the special White House Panel on Aircraft Noise and almost 2 years after the enactment of Public Law 90-411, which gave the FAA authority to regulate aircraft noise and sonic boom, this problem has not been significantly diminished and we are not appreciably closer to the desired "quiet environment."

We believe that one of the reasons for this current situation is that the Federal Aviation Administration, which by law is charged with the promotion of air commerce, is the primary Federal agency active in attacking the aircraft noise problem.

The FAA with its total responsibilities understandably recognizes that the solution of the environmental problem facing the aviation industry may well require substantial sacrifice, financial hardship, and slowing of technological progress within the aviation industry.

We, public airport operators, share in the dedication to, and enthusiasm for, aviation. But as airport operators, we are not only part of the aviation industry, we are, as well, integral parts of the communities our airports serve.

We have, to a great extent, been the pivotal point at which the problems of technological progress in aviation and community resistance to environmental degradation come together. Because of our close relationships to the aviation industry we can understand how the solution of environmental problems can be subordinated to considerations of economy and technological progress. As attractive as these considerations are to the aviation industry, they are not considerations that satisfy community needs for acceptable environment.

We necessarily conclude that the involvement of a Federal agency having primary allegiance to environmental protection would aid in balancing the total Federal effort in these matters. Certainly, the recent acceleration of the schedule by which smoke suppressors will be installed on commercial aircraft illustrates what is possible when a balanced and coordinated concern is focused on such problems.

We believe that other aspects of the environmental problem of aviation require equally urgent treatment. Foremost among these is the implementation of a program to retrofit existing jet aircraft so that maximum reasonable noise reductions can be achieved. Similarly, the expansion of Federal noise regulatory standards to cover the Boeing 747 and the SST require urgent attention so that current problems of aircraft noise are not compounded by these new aircraft.

The solutions of the aviation industry's environmental problems will benefit not only the communities surrounding the airports, but the aviation industry itself. It is only through the integration of aviation into our environment on a thoroughly acceptable basis that the aviation industry can continue to grow, to prosper, and to serve the needs of the people of the United States. The participation of a Federal agency such as the Department of Health, Education, and Welfare would be of great assistance in providing a balanced and forceful drive to achieve these goals. Thus, we urge favorable action on title II of S. 3229.

Thank you, Mr. Chairman.

Senator Boggs. Thank you, Mr. Reilly.

Does Mr. Wright have anything to add?

Mr. WRIGHT. I have no comments.

Senator Boggs. Thank you very much. We appreciate your testimony.

You referred to the 747. I have not yet had the opportunity to travel aboard a 747, but I have heard that it is quieter than the 707 and some of the other jets. Is this true, or is the 747 noisier?

Mr. REILLY. No; the 747 was constructed after a long leadtime of notice on the part of the civil aviation parties, the Federal Government and local civic groups, that aircraft are going to have to be reduced in noise. They have made some small progress on the 747, but we feel that it is certainly nowhere near what they are advertising it at.

We feel that an awful lot has to be done with the 747 as well as other current aircraft to really have them integrated into the environment in a compatible way.

Senator BOGGS. It would seem to me that the great technological progress being made should include noise abatement as part of that progress.

Mr. REILLY. Unfortunately it is not enough, Senator Boggs. The technological progress has related primarily to the economics of building a more compatible aircraft for increased profits. We are all for this, we certainly don't want to stop this, but we feel that much more is going to have to go into the research for quieter engines.

Senator BOGGS. Is there a standard for noise levels that technological progress can build into new engines?

Mr. REILLY. Absolutely, Senator. As long ago as 1966, out of the Federal Aviation Agency came some directions for consideration by everyone in the industry that we should start shooting for 106 PndB noise level in aircraft. These have not yet been achieved.

Senator BOGGS. Thank you. If our committee staff does not have those directives, I suggest we get them and make them part of the record.

Mr. REILLY. Not only have those been diluted in subsequent FAA action, but the aircraft which they were intended to apply to, primarily the 747 has thus far been exempted because that aircraft could not achieve the technical requirements for noise quietness.

The FAA has exempted about 80 percent of the first 747's off the line from any regulations as far as noise levels go.

Eventually the tail end of the production of this only major new type of aircraft may be caught. We are not even sure of that, sir.

Senator BOGGS. Excuse me?

Mr. REILLY. The later 747 production aircraft may be caught with some future noise level regulations, but we are not sure at this time.

Senator BOGGS. I see.

Senator DOLE.

Senator DOLE. Thank you.

There is another area where we can restrict or control noise, that is by restricting access to the airport, such as National Airport where no jets are permitted to land after 11 o'clock at night. Is this an area of concern to you or are you concerned more with mechanics?

Mr. REILLY. It should be an area of concern to everyone, sir, because we rightfully believe that the way to develop a compatible and truly useful form of transportation is not to start off by restrictions on when you can use it.

Obviously, if we have an environment in which the aircraft itself cannot operate, you are putting yourself behind at the very start. Why should you have to close down airports after 11 o'clock when primarily most of your cargo is flying at night? This is not the way to go about it.

Airports have been forced to take this and other types of restrictive actions which limit the full benefit of aviation to the public as well as to the airlines.

Senator DOLE. But it is some interim relief for those who live in the area?



Mr. REILLY. Yes, it is. It can very well be, sir.

Senator DOLE. But the noise is not restricted to aircraft, of course. Trains, what few there are, make noise as do other modes of transportation—automobiles and particularly motorcycles. I believe the chairman mentioned that motor vehicles are probably the most noisy mode of transportation he knows of.

In regard to your discussion of title II of S. 3229.

I recall that John Veneman, the Undersecretary of HEW, recognized the importance of this problem and pointed out that when the Environmental Quality Council, now the Cabinet committee, was established, a Committee on Noise chaired by the Secretary of Commerce with the Secretaries of HUD and Transportation and HEW as members was created.

That committee discussed an attack on the problem, and under the reorganization is presently undertaking a comprehensive review of the problem.

Do you know anything about what this committee has done or what has been proposed?

Mr. REILLY. Unfortunately, Senator, there have been studies going on since 1960 with the introduction of the first 707 into scheduled service. The studies got very serious in the era of 1965-66.

We continuously go from one study to the next, primarily within the confines of the aviation industry itself, and the FAA, DOT.

We have gotten to the point now that in the public interest we really feel that an outside group representing more of the public interest must be brought into bear some of the responsibility in pushing ahead in areas where we know we can make progress technically. There just have not been the impetus to go forward yet.

It costs money, yes; we recognize this. The funding can be generated, but the public interest now demands prompt introduction of engine retrofit, to quiet current aircraft as well as developing quiet engines for future aircraft.

Senator DOLE. I share your concern, but I am not convinced that establishing another governmental bureau would solve the problem. In my opinion one of our greatest difficulties is the widespread duplication and fragmentation at the Federal level.

I firmly believe this is the reason we have so many committees, everybody wants to appoint a committee. I assume you have a committee on noise in your association. What we need to do is streamline the process and consider noise as one of the environmental and health problems we have in the seventies and then do something about it.

I assume you share the view that we must tackle the problem whether by a separate bureau or the existing structure.

Mr. REILLY. Sometimes you have to streamline a committee to get it to act, but other times you need a firm lever to come in and push.

One prime example is the recent situation where the 727's and the 737's were emitting an awful lot of smoke. The industry got together with FAA, DOT, and determined that there might be some long period of study involved before burner cans could be put on.

Secretary Finch got himself involved and immediately there was a push to get these cans on within a very short time, much sooner than the industry wanted. This is what I mean by saying that now we need a lever on these committees to act as the streamliner.

Secretary Finch met with Secretary Volpe and Mr. Shaffer and 21 airline presidents.

Senator DOLE. And there was a satisfactory voluntary agreement without legislation; at least we hope it is satisfactory.

Mr. REILLY. Yes. At this point it is voluntary. The airlines dragged their feet somewhat, but with some strong Government influence from outside of FAA-DOT they did accept this 2-year maximum voluntary commitment.

Senator DOLE. In order for the committee to understand your association, do you represent the airport operators in principal cities in the 50 States?

Mr. REILLY. That is correct, sir. Our members own and operate primarily public airports that serve commercial traffic.

Senator DOLE. Who do you represent in Kansas City, Mo.? Is there some one person there?

Mr. REILLY. Wichita, the owner and operator of the city of Wichita Airport. The park commission, I believe, owns and operates it.

Senator DOLE. In other words, they are a member of your association?

Mr. REILLY. That is correct, yes, sir.

Senator DOLE. Is that the only one in Kansas, for example?

Mr. REILLY. It is the first one that comes to mind. Yes.

Senator DOLE. I assume that Kansas City, Mo., is also a member.

Mr. REILLY. Yes, sir; it is a major airport. The Bostons, the New Yorks, the Miamis, the LA's, and Wichita and Wilmington, Del.

Senator BOGGS. I was going to ask you about Wilmington. How about the Everglades airport?

Mr. REILLY. Yes.

Senator DOLE. There is no problem of noise there?

Mr. REILLY. No; none at all.

Senator BOGGS. Mr. Reilly, is it the thrust of your testimony that the technology is available, but not being used?

Mr. REILLY. This is correct.

NASA has done some wonderful studies on the quiet engine. They have put out contracts to Boeing and Douglas Aircraft Cos. to determine what is feasible with retrofit of current aircraft to reduce noise.

Boeing has developed retrofit kits that will cut the noise of current aircraft in half, if and when we can finally get the airlines to install them.

The airlines, obviously, are very concerned about the cost, and the cost is significant. Considering the millions and millions of people that are disturbed by aircraft noise I am sure these costs can be capitalized within the industry when we finally make a firm conviction to go with them.

Senator BOGGS. Thank you very much.

Mr. REILLY. Thank you.

Senator BOGGS. We appreciate you and Mr. Wright being here, and we value your testimony. Thank you.

Mr. REILLY. Thank you, sir.

Senator BOGGS. The committee now has the honor to hear the very able representative from West Virginia, Representative Hechler. We are honored and happy to have you with us, Congressman.

STATEMENT OF HON. KEN HECHLER, A REPRESENTATIVE IN  
CONGRESS FROM THE STATE OF WEST VIRGINIA

Representative HECHLER. Thank you, Mr. Chairman.

Senator DOLE. May I make a brief commercial?

Senator BOGGS. Surely.

Senator DOLE. I want to say for the record we do appreciate your appearing here. Having served with Congressman Hechler for 8 years in the House, I can state that he is an outstanding member of that body. We are all aware of his efforts not only in this field, but others.

We are pleased to have you here.

Representative HECHLER. Thank you, Senator Dole.

Senator BOGGS. Thank you.

Representative HECHLER. I will be brief.

I will ask unanimous consent, Mr. Chairman, to submit certain concrete recommendations.

Senator BOGGS. It is so ordered.

Representative HECHLER. Mr. Chairman, there has been a vast amount of buck-passing and public frustration as a result of the way our present air pollution laws are phrased and the manner in which they are enforced and administered. The major contribution which this committee could make would be to bring positive action up to at least 50 percent of the beautiful rhetoric in this area. Everybody is against air pollution and for clean air, but when the chips are down very little seems to be accomplished. Industry keeps harping on the amount it spends on air pollution control, both industry and others argue endlessly over whether pollution is caused more by industry or private automobiles or aircraft or trash-burning, government agencies claim they aren't well enough funded, and the public demands to know why the air is getting dirtier and dirtier. Meanwhile, air pollution control conferences are called with much hoopla, Federal and State authorities set standards, more speeches are made, but still the public rightfully is angered by the fact that in most areas air pollution is worse. There is a seemingly endless series of conferences, notices, appeals, delays, queries, and then more buck-passing at the expense of the public which is demanding clean air.

As you know, West Virginia has suffered in the past from a degree of unemployment which has exceeded the national average. West Virginia's 1960 annual average unemployment was 11.9 percent against a national annual rate of 5.5 percent. Although the gap has been narrowed in recent years and West Virginia's unemployment rate has been greatly reduced (West Virginia's 1969 rate was 5.5 percent against the national rate of 3.5 percent), the State has experienced a decline in population since 1950. Our efforts are centered on reversing the trend of out-migrating young people, educated in West Virginia, who are leaving the State for better jobs elsewhere. The employment picture having improved to a great extent, many West Virginia officials seem reluctant to wage an aggressive war on air pollution because of apprehension that existing industry may leave or new industry might be inhibited from establishing in West Virginia because of strict pollution controls. These views are not voiced openly, but they have conditioned the thinking and timidity toward an all-out war against air pollution with tough enforcement of controls.

The Union Carbide Corp. furnishes a good case study in attempts to control air pollution. Union Carbide is the largest employer in the State of West Virginia, and is a prestigious power in State politics. This corporation has met its civic obligations in countless ways, from fund drives to intellectual and scientific leadership, but Union Carbide's record on controlling air pollution is a miserable one, fraught with evasion, obfuscation, and delay. In 1969, Union Carbide chalked up an 18.6 percent jump in profits—to over \$186 million—and a 9.2 percent sales increase to a record \$2.9 billion in 1969. I find it difficult to believe it would be economically disastrous for this wealthy, expanding corporation to impose strict controls on the tons of filth which it spews into the air of the Ohio and Kanawha Valleys every day.

Senator BOGGS. Excuse me. Is that \$2.9 billion from its operations in West Virginia?

Representative HECHLER. No; that is a nationwide figure.

Senator BOGGS. I see.

Representative HECHLER. Now I want to get down to specifics on what Union Carbide has been doing and has failed to do. Listen to this statement by Mrs. Val Milsark, a housewife in Vienna, W.Va., a beautiful residential community on the Ohio River located adjacent to and just north of Parkersburg: "Vienna's first experience with air pollution was in 1952, at which time the Union Carbide's electrometallurgical plant, about 2 or 3 miles to the north of Vienna—in Ohio—was placed in operation. I shall never forget the first morning when I saw our clean Ohio Valley enshrouded with a plume of reddish and grey smoke or smog that brought visibility almost to zero. We were all deeply disturbed and began immediately to trace its origin. . . . (A) committee traced the dark smoke and fly-ash to the Union Carbide plant and its accompanying power station."

From the time I began my service in the House of Representatives in 1959, I began to receive complaints concerning this air pollution affecting Vienna—the fastest growing residential community in West Virginia. Invariably, when the company was approached concerning the air pollution, their responses were evasive and accompanied by statements on how much was being spent. Many individuals living in the Vienna area became increasingly disturbed about the pollution generated at the Carbide plant and blown across the river. The public alarm was expressed so vehemently that frequently there would be a lessening of the pollution during sunlight hours. A worker at the Union Carbide plant telephoned me one day in 1966 and said he had some confidential information he could only give me in the privacy of his home. When I arrived at his home, he closed the door of the living room and whispered that he worked in the furnace room and was being ordered to withhold emissions from the smoke stacks on some bright, sunny days, and then after dark to "pull the plug and give her full blast after dark when people couldn't see the amount of filth being gushed out."

This situation got so bad that a local committee of doctors and leading citizens of Vienna asked Senator Jennings Randolph and myself to meet with them on Labor Day, 1965. In the following month, October 1965, the Public Health Service began its investigation of air pollution in the Marietta-Parkersburg area of the mid-Ohio Valley.

Under the authority of the Clean Air Act, an Air Pollution Abatement Conference was held in Parkersburg, W. Va., on March 22-23, 1967.

Senator BOGGS. Was that a conference involving the two-State area?

Representative HECHLER. That is correct. It was an Interstate Air Pollution Abatement Conference, called under the authority of the Clean Air Act by the National Air Pollution Control Administration, Public Health Service. The preliminary information developed by the Federal air pollution control officials established clearly and incontrovertibly that the primary source of air pollution in the area was the Marietta, Ohio, metallurgical plant of Union Carbide Corp. Three years ago, on March 22, 1967, I made this statement publicly to the conference: "The Union Carbide Corp. dumps tons of filth on the people of the Ohio Valley to such an extent that the people are demanding action and action now. It's time to stop pussyfooting with industry about air pollution. It's time to get tough on behalf of people who have the divine right to breathe. . . . I hope that this conference will produce hard-hitting recommendations. Whatever legal mechanism results from this conference, I hope that air quality standards are strict, that the enforcement authority is strong, that the penalties are sure, and that the budgetary support is sufficient to do the job. The times cry out for fearless men and women who will enforce the air pollution regulations to protect people, and not knuckle under to those who think they gain economically by continuing to pollute God's atmosphere."

(Statement referred to follows:)

STATEMENT BY CONGRESSMAN KEN HECHLER (D-W.VA.). BEFORE THE FEDERAL AIR POLLUTION ABATEMENT CONFERENCE, VIENNA, WEST VIRGINIA, MARCH 22, 1967

The Union Carbide Corporation dumps tons of filth on the people of the Ohio Valley to such an extent that the people are demanding action and action now.

It's time to stop pussyfooting with industry about air pollution. It's time to get tough on behalf of people who have the divine right to breathe.

We in the Ohio Valley are proud of the economic development in this region, and the employment it has provided. But the people are not going to be intimidated any longer by threats that great industrial giants will move out when confronted with strict air pollution control measures.

We have heard many cries that the technology has not advanced sufficiently, or that industry cannot afford the solutions economically. If we can put a man on the moon within this decade, I have faith we can develop the technology to stay alive and breathe clean air here on earth. Furthermore, I do not believe we should be frightened when an industry threatens it will pull up stakes rather than comply with good, tough and effective regulations.

There were 5,900 industrial establishments in Los Angeles in 1940—seven years before an air pollution control agency was formed. Los Angeles cannot brag about pure air, but it does have one of the most stringent air pollution control programs in the Nation. Without strict regulation, 6,000 tons of non-automobile pollutants a day would have spewed out into the air, and now this amount has been cut down to 1,300 tons a day. Still, the number of industrial establishments in Los Angeles has increased from 5,900 in 1950 to 18,500 in 1966. So we who want to breathe clean air are not afraid of these threats. Enlightened industrial leaders recognize the value and necessity of strong air pollution control measures. It's simply good business.

The proposed Ohio-West Virginia Interstate Compact on Air Pollution is weak and ineffective. The provisions of that compact are framed so narrowly as to require that injury actually result before action is taken to impose air pollution controls. These provisions should be designed to reach conditions which tend to threaten or endanger public health or welfare *before* actual injury occurs. I think too that the enforcement procedures set up in the compact are too

cumbersome and involved. The enforcement and penalties should be made quick and sure.

The State of West Virginia is attempting to come to grips with the ever-worsening problem of air pollution, and the 1967 State Legislature enacted a stronger air pollution law. In the Kanawha Valley, it was announced that industry had agreed with the West Virginia Air Pollution Control Commission on October 1, 1966 to take specific remedial steps at a cost of several millions of dollars to the companies involved, over a period of years. However, there have been no visible results from these commitments.

According to the findings of the State Commission, pollution from industrial sources in the Kanawha Valley has increased almost three-fold in the last two years. The Union Carbide Corporation, which contributes substantially to the pollution of the Kanawha Valley, is also polluting the Ohio Valley and the very area here in Vienna where we are holding this hearing.

The pollution is emanating from the State of Ohio, beyond the reach of West Virginia enforcement authorities. This is why early and effective Federal regulation of interstate pollution in the Ohio Valley is imperative.

I hope that this conference will produce hard-hitting recommendations. Whatever legal mechanism results from this conference, I hope that air quality standards are strict, that the enforcement authority is strong, that the penalties are sure, and that the budgetary support is sufficient to do the job. The times cry out for fearless men and women who will enforce the air pollution regulations to protect people, and not knuckle under to those who think they gain economically by continuing to pollute God's atmosphere.

Representative HECHLER. For many years both before, during, and following the 1967 conference, Union Carbide has been carrying on a very grim form of two-step, or sidestep, of the central issue. John T. Middleton, Commissioner of the National Air Pollution Control Administration, reported to me in a letter dated July 23, 1968:

During the course of the field investigative work prior to the conference, information was received from the Union Carbide Corporation relating to the emissions of air pollution from their facilities; our engineers also estimated the emissions from the same source. The company reported estimated emissions of 17,000 pounds per day of particulate matter from process sources. Our staff estimated emissions from the same processes to be 44,000 pounds per day—more than 2½ times as much. This difference never was resolved. Initially, it had been anticipated that we might be able to settle the question with respect to these emissions during the course of the conference. Unfortunately, this did not come about.

Subsequently, efforts have been made to obtain more specific information from the company in order that emission quantities could be calculated in as accurate a manner as possible. Meetings were held among members of our staff, the staff of the Ohio Department of Health, officials from West Virginia, and representatives of the company to obtain more definitive information on the processes, fuel composition, raw materials, emissions and configurations of the Union Carbide Corporation in Marietta, Ohio. These meetings were essentially fruitless.

The frustrating, drawnout attempt of the responsible air pollution officials to obtain some slight degree of cooperation from Union Carbide is starkly revealed in the following correspondence.

On August 28, 1967, the Federal air pollution officials requested certain specific information from the plant manager of the Marietta, Ohio, Union Carbide plant, as well as permission to inspect their operations to obtain a better understanding of their air pollution problems. I will read the text of the August 28, 1967, letter:

WASHINGTON, D.C., August 28, 1967.

Mr. GEORGE G. BORDEN,  
*Manager, Union Carbide Corp.,  
 Mining and Metals Division, Marietta, Ohio.*

DEAR MR. BORDEN: Due to recent inquiries concerning the recommendations of the Federal Air Pollution Abatement Proceedings held in Vienna, West Vir-

ginia on March 22-23, 1967, we would like to obtain, or have confirmed, the following described data relating to the Union Carbide Company's Metal Division operations in Marietta, Ohio.

1. Were there large variations in coal consumption, sulfur content, or ash content either on a daily basis or seasonal basis during the period of October, 1965 through August, 1966? If so, what were the variations? We are particularly interested in dates and quantities of higher than average emissions of sulfur dioxide and particulates during this period.

2. What are the sources of the coal? Please include the names and locations of the mines, if possible, and the percentage of coal received from each mine.

3. What are the diameters and heights of the power plant stacks? What are the average exit gas velocities and temperatures?

4. What are the approximate dimensions and plot layout of the buildings which house the electric arc furnaces?

5. Are operations at this plant now scheduled for expansion? If so, by how much, and will this require an expansion of the power plant?

6. What basis was used to estimate the particulate emissions from the electric arc furnaces?

In addition, members of our engineering staff would like to inspect the metal manufacturing operations at your plant in order to better understand the nature of the air pollution problems. Can you arrange a visit for them?

Your cooperation in this matter is greatly appreciated.

Respectfully,

S. SMITH GRISWOLD,  
*Associate Director for Abatement and Control,  
National Air Pollution Control Administration.*

Representative HECHLER. The response, or lack of it, came back on September 7, 1967, as follows:

UNION CARBIDE CORP.,  
MINING AND METALS DIVISION, MARIETTA WORKS,  
*Marietta, Ohio, September 7, 1967.*

Mr. S. SMITH GRISWOLD,  
*Associate Director for Abatement and Control,  
Department of Health, Education, and Welfare, Washington, D.C.*

DEAR MR. GRISWOLD: I wish to inform you that I am giving careful attention to your letter of August 28 concerning the additional information you requested and I would hope within the very near future that I will be able to make a reply. As you may understand, vacations and other problems have resulted in my being unable to answer you at this time.

Very truly yours,

G. G. BORDEN, *Manager.*

Representative HECHLER. Several months elapsed. Still no answer. Believing that the vacations may have been completed after Thanksgiving and Christmas, a further letter was directed to Union Carbide on January 11, 1968, reiterating the requests made the previous August and asking for "prompt attention," as follows:

WASHINGTON, D.C., *January 11, 1968.*

Mr. C. G. BORDEN,  
*Manager, Union Carbide Corp.,  
Marietta, Ohio.*

DEAR MR. BORDEN: Reference is made to my August 28, 1967, letter requesting certain information relating to Union Carbide's Metal Division operations in Marietta, Ohio, and asking that arrangements be made whereby our technical staff may inspect the plant.

Your letter of September 7, 1967, said you were giving careful attention to my letter and you hoped within the very near future to be able to make a reply. We have received no such reply, and I would like to reiterate the requests in my August 28 letter.

Complaints still are received from the Vienna, West Virginia, area and we are anxious to resolve the interstate air pollution problem existing there. I would appreciate your prompt attention to this matter.

Respectfully,

S. SMITH GRISWOLD,  
*Associate Director for Abatement and Control.*

Representative HECHLER. On January 31, 1968, Union Carbide's plant manager answered in a very indirect fashion, calling attention to the investment of large sums of money and to unspecified continuing efforts. In a masterpiece of understatement, the Federal air pollution control commissioner, Mr. John T. Middleton, characterized this letter as "an essentially nonresponsive reply." The text of the January 31, 1968, letter follows:

UNION CARBIDE CORP.,  
MINING AND METALS DIVISION, MARIETTA WORKS,  
*Marietta, Ohio, January 31, 1968.*

Mr. SMITH S. GRISWOLD,  
*Assistant Director of Abatement and Control,  
Department of Health, Education, and Welfare, Washington, D.C.*

DEAR MR. GRISWOLD: This is in response to your letter of January 11, 1968.

I am sure you appreciate that over the years we have invested large sums in capital equipment and operating expense to control and reduce emissions at our Metals plant near Marietta, Ohio, and that this is a continuing effort from which we confidently expect very substantial further reduction of emissions. We are currently working diligently, and under close surveillance of the Air Pollution Officials of the State of Ohio.

We fully recognize the basic facts which were so ably collected by your engineers in their report for the Parkersburg-Marietta Conference, and these facts are being given consideration in the current work.

Very truly yours,

G. G. BORDEN, *Manager.*

Representative HECHLER. Now opened a new chapter in the efforts to obtain the cooperation of the Union Carbide Corporation. The Federal air pollution officials decided to take the bull by the horns and seek the information at the central office of the Union Carbide Corporation at 270 Park Avenue in New York. On April 25, 1968 Dr. J. S. Whitaker, Coordinator for Environmental Health of Union Carbide came to Washington, D.C. to meet with the Federal officials. Commissioner Middleton described to me the meeting with Dr. Whitaker as follows:

"We were informed that the requested information already had been supplied to the Ohio State Department of Health, and it was suggested it might be more appropriate to obtain it from them."

The extent of cooperation received from the Ohio State Department of Health up to that point was, to say the least, somewhat less than "all-out." For example, on April 17, 1967, Dr. Emmett W. Arnold, Director of Health, Ohio State Department of Health, requested of the Secretary of Health, Education and Welfare that issuance of final recommendations coming out of the March 22-23, 1967 conference be delayed "until investigative examination, inquisitive research and evaluative study can be conducted to form the basis for such recommendations." Dr. Arnold was informed that such additional information would be welcomed, Dr. Arnold on May 23, 1967, according to Commissioner Middleton's report to me, "informed this office that further studies were being made by his department and would be submitted to the Secretary in the near future." What was predicted as the "near future" almost three years ago apparently has never arrived.

However, always trusting, the Federal air pollution officials returned from their pleasant visit at the 270 Park Ave. headquarters of Union Carbide Corporation and dutifully directed another letter to Dr. Arnold, as follows:



WASHINGTON, D.C., May 17, 1968.

EMMETT W. ARNOLD, M.D.,  
*Director of Health,*  
*Department of Health, State of Ohio, Columbus, Ohio.*

DEAR DR. ARNOLD: AS you know, we have asked Union Carbide Company, Metals Division, Marietta, Ohio, for additional information on their operations. We have never received specific answers to our inquiries.

Recently Dr. Middleton and I met here with Dr. Whittaker of Union Carbide Company to discuss the status of our request for additional information. Dr. Whittaker stated that his Company feels that their obligation to supply information is to the State of Ohio, with whom they reportedly have been working closely on air pollution matters, and that the Department of Health, Education, and Welfare should get such information from the State of Ohio. He assured us that the requested information had been supplied to your Department and that you would supply it to use if we requested.

Therefore, we would like to obtain information from your Department concerning Union Carbide's plans to control emissions from their furnace operations in Marietta, Ohio. We understand from Dr. Wittaker that you have such information, including specific control plans as well as time tables for implementing these plans.

In addition, it would be most helpful in considering the reconvening of the Parkersburg-Marietta Interstate Air Pollution Abatement Conference, if the State of Ohio, on the basis of information which we understand has been furnished to you by the company, were to supply the answers to the following questions concerning the Union Carbide plant:

1. Were there large variations in coal consumption, sulfur content, or ash content, either on a daily or seasonal basis, during the period from October 1965 through August 1966? If so, what were the variations? We are particularly interested in dates and quantities of higher than average emissions of sulfur dioxide and particulates during this period.

2. What are the sources of the coal? Please include the names and locations of the mines, if possible, and the percentage of coal received from each mine.

3. What are the diameters and heights of the power plant stacks? What are the average exit gas velocities and temperatures?

4. What are the approximate dimensions and plot layout of the buildings which house the electric arc furnaces?

5. Are operations at this plant now scheduled for expansion? If so, by how much, and will this require an expansion of the power plant?

6. What basis was used to estimate the particulate emissions from the electric arc furnaces?

Any additional information on the other industrial processes in the Ohio portion of the abatement area also would be most useful in reviewing the impact of major point sources of the study area and in determining the efficacy of alternate control plans. Your assistance in this matter is deeply appreciated.

Sincerely,

WILLIAM H. MEGONNELL,  
*Acting Associate Director for Abatement and Control.*

Representative HECHLER. The response was most revealing. The State of Ohio wrote on June 10, 1968 that there must be some mistake, that the needed information had not, in fact, been transmitted to them by the Union Carbide Corporation. The June 10, 1968 letter from Ohio follows:

STATE OF OHIO,  
 DEPARTMENT OF HEALTH,  
 June 10, 1968.

Mr. WILLIAM H. MEGONNELL,  
*Acting Associate Director for Abatement and Control, Department of Health,*  
*Education, and Welfare, NCAPC-USPHS, Washington, D.C.*

DEAR MR. MEGONNELL. Please refer to your letter dated May 17, 1968 addressed to Dr. E. W. Arnold, Director—Ohio Department of Health, in which request was made for additional information (see page 2) relative to Union Carbide operations at their Marietta plant. Your letter states "He (Dr. Whit-

aker of Union Carbide) assured us (HEW) that the requested information had been supplied to your Department (Ohio Health Department) and that you (we) would supply it to us if we requested." There apparently is some misunderstanding in regard to the type of information given us by Union Carbide vs. the type information sought by your office. The data given us by Union Carbide does not answer the questions posed on page 2 of your May 17, 1968 letter.

A letter to this office, dated July 20, 1967 and authored by G. G. Borden, metals plant manager of the Marietta Union Carbide operations, related to (1) SO<sub>2</sub> Abatement-Power Station; (2) Low Sulphur Coal and (3) Control of Melt Furnace Operations. This is the sum total of formal information given this office by Union Carbide and a copy of this letter is enclosed for your informational use. You will note in reading this letter that it does not answer the questions posed in your letter.

If I can be of further service in this regard, please feel free to contact this office at any time.

Very truly yours,

JACK A. WUNDERLE,

*Engineer in Charge, Air Pollution Unit, Division of Engineering.*

Representative HECHLER. Oh, well, back to Dr. Whitaker again. Now for the first time the National Air Pollution Control Administration, those very, very patient people, started to appreciate fully the fact that perhaps they should call attention to the fact that they had the clear terms of the law on their side. In a somewhat tougher letter of June 28, 1968, Dr. Whitaker was again approached as follows:

JUNE 28, 1968.

Dr. J. S. WHITAKER,  
*Coordinator, Environmental Health,  
Union Carbide Corp., New York, N.Y.*

DEAR DR. WHITAKER: As you suggested when we met in Dr. Middleton's office on April 25, 1966, I directed a letter to the Ohio Department of Health on May 17, 1966, to request information relative to air pollution omissions from your plant in Marietta, Ohio. A copy of my letter to Dr. E. W. Arnold is enclosed supplying the requested information.

Despite your assurance that the Ohio Department of Health had been furnished the information we requested in our May 17 letter to you, and further, would supply such information to us if we requested it, Mr. Jack Wunderle, Engineer in Charge of the Air Pollution Unit of the Ohio Department of Health, informed me in a June 10 letter (a copy of which, with enclosure, is enclosed) that he has not been furnished such information by your Company and he cannot, therefore, answer the questions we asked.

I ask that you attend to this matter at hand promptly to forestall invocation of the provisions of section 100(j) of the Clean Air Act which action would thwart your hoped for voluntary compliance to provide the information.

Sincerely yours,

WILLIAM H. MEGONNELL,

*Acting Associate Director for Abatement and Control.*

Representative HECHLER. Unruffled, Dr. Whitaker handled the matter very adroitly by denying that he had claimed he had given the information to Ohio—but still not lifting even a little finger to answer the simple request made now almost a year before. Here is how Dr. Whitaker answered and evaded the main issue in a letter dated July 12, 1968:

UNION CARBIDE CORP.,  
*New York, N.Y., July 12, 1968.*

Mr. WILLIAM H. MEGONNELL,

*Acting Associate Director for Abatement Control, National Center for Air Pollution Control, Department of Health, Education, and Welfare, Arlington, Va.*

DEAR MR. MEGONNELL: At our meeting in Dr. Middleton's office on April 25, 1968 I suggested that you get together with the Control Officials in the states of

Ohio and West Virginia and make a serious effort to develop a plan for controlling air pollution in the Marietta-Parkersburg area—including air quality objectives and pollution control responsibilities. I also reassured you that we did not question either the emissions or the air quality data in the March 1967 Public Health Service Parkersburg-Marietta Technical Report and that these data could well serve as a basis on which the control plan is developed.

We are, of course, continuing our abatement program at the Marietta plant in order to achieve a higher level of emissions control, as well as compliance with any regulations that are developed under the orderly procedures provided for in the Clean Air Act and other laws. We are always ready to work cooperatively with the designated control authority at Marietta and at each of our other plants.

I have your letter of June 28 with the attached copies of your letter to Dr. Arnold and Mr. Wunderle's reply. Since I was familiar with the information that has been given to the Ohio Department of Health and knew that we have not given it answers to your questions, it is difficult for me to understand how you could have gotten the impression that Dr. Arnold had the specific information you requested. It is obvious that I could not have committed the Ohio Department of Health to give you anything.

Sincerely yours,

J. S. WHITAKER,  
*Coordinator, Environmental Health.*

Representative HECHLER. Now on July 30, 1969, the Federal air pollution control officials concluded that Union Carbide simply was going to continue to refuse to cooperate. "Your actions to date leave little recourse to ways of obtaining the required information other than reconvening the Parkersburg-Marietta abatement conference and requiring that a report from your company be provided in accordance with the provisions of section 106(j) of the Clean Air Act, as amended." The full text of the July 30 letter follows:

PUBLIC HEALTH SERVICE,  
NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,  
*Arlington, Va., July 30, 1968.*

Mr. J. S. WHITAKER,  
*Coordinator—Environmental Health,  
Union Carbide Corp., New York, N.Y.*

DEAR MR. WHITAKER: It is unfortunate that Dr. Middleton, Mr. Walters and I all misinterpreted your statements at our May 25 meeting. Although we did not reduce the discussions to writing, it is our recollection that you said the State of Ohio had been furnished the information we desire regarding air pollution emissions and controls at your Marietta plant and that, if we requested such data from the State of Ohio, I would be furnished to us.

I regret that you have not seen fit to cooperate with us in the matter of providing data at our request, disclosing your control plans and time schedules, nor permitting access to your plant by our technical personnel for inspection and testing. Your actions to date leave little recourse to ways of obtaining the required information other than reconvening the Parkersburg-Marietta abatement conference and requiring that a report from your Company be provided in accordance with the provisions of section 106(j) of the Clean Air Act, as amended.

If you have an alternative way through which we can acquire the information in question, I would appreciate your prompt reply before firm plans are made to schedule the conference.

Sincerely yours,

WILLIAM H. MEGONNELL,  
*Acting Associate Commissioner for Abatement and Control.*

Representative HECHLER. The conference was reconvened in October 1969 in Vienna, W. Va.

Senator BOGGS. What date was that, Congressman?

Representative HECHLER. October 30 and 31, 1969.

At the opening of the October 1969 conference, I remarked that "each day that passes the air in our beautiful valley gets dirtier and dirtier." Reviewing the frustrating efforts to clean up the air pollution, I stated: "Instead of fearless men and women, those in charge of air pollution control in Ohio and West Virginia have been mousy and timid. Instead of trying to cooperate to protect the people's divine right to breathe clean air, some industries like Union Carbide have brazenly thumbed their nose at every effort to prevent air pollution. State's rights have proven inadequate. The Federal action has been thwarted by both industry and the States. The Federal laws need more teeth, and the loopholes must be closed." I have included herein my statement to the October 31, 1969, conference.

(Statement follows:)

STATEMENT OF REPRESENTATIVE KEN HECHLER, DEMOCRAT OF WEST VIRGINIA,  
AT AIR POLLUTION CONFERENCE, VIENNA, W. VA., OCTOBER 30, 1969

Each day that passes the air in our beautiful valley gets dirtier and dirtier. We held a Federal Air Pollution Abatement Conference here on March 22, 1967, and the conditions brought out at the Conference were appalling. The recommendations made at that Conference provided some hope for the people of this Valley. I share the feeling of the people here today that our patience has been exhausted. Today, I plan to call a spade a spade, step on some toes, try to assess why we haven't made any more progress, and what we ought to do in the future to guarantee clean air.

What has happened here in this valley, and in the Kanawha Valley, and in many other sections of our beautiful state? We have heard a great deal lately about how the Federal Government is spending more money on chemical warfare than on library books. In effect, we have unleashed chemical warfare on ourselves. Los Angeles may have problems with auto exhausts, other areas may have problems as a result of burning leaves and trash, but here in West Virginia over 90 percent of the air pollution is caused by our own industry which is waging chemical warfare on the people.

Ladies and gentlemen, we need a cease-fire on this chemical warfare. We have been at the negotiating table too long, without any results whatsoever. We have held endless conferences, pleaded with industry to rise to its responsibilities, urged the Federal Government to take action, impertuned the state governments to take action, appealed to the patriotism and civic decency of those polluting the air—all without any results. It is bad enough to try and negotiate with the Reds at Hanoi, but when you can't get anywhere with our own people who should be cleaning up this mess, then it's time to stand up and scream: "This air pollution must stop because every human being has the divine right to breathe fresh air."

To paraphrase the naval hero of the War of 1812, Oliver Hazard Perry, and POGO, "We have met the enemy and he is us."

When we assembled here on March 22, 1967, the opening sentence of my statement to the Federal Air Pollution Abatement Conference included these blunt words: "The Union Carbide Corporation dumps tons of filth on the people of the Ohio Valley to such an extent that the people are demanding action and action now."

Out of the March, 1967 conference here in Vienna came a very explicit finding of fact which by no stretch of the imagination can be misinterpreted: "That in the Parkersburg, West Virginia-Marietta, Ohio area air pollution originating in either the State of West Virginia or the State of Ohio endangers the health and welfare of persons in both states." Among the recommendations coming out of the conference was that the Ohio-West Virginia Interstate Air Pollution Compact be ratified. There was a great deal of industry pressure and strong pressure from the Ohio and West Virginia state air pollution control officials to support this interstate compact and leave air pollution control to the states. I stated at the March, 1967 conference: "The proposed Ohio-West Virginia Interstate Compact on Air Pollution is weak and ineffective . . . the enforcement procedures set up in the compact are too cumbersome and involved." I also added

that "the enforcement and penalties should be made quick and sure." They put a few band-aids on the proposed interstate compact, but it still is neither operative nor will it do anything significant to clean up air pollution.

All of us who have talked about how state's rights are the best protection of the people, because the state government is closer to the people, find that the interstate compact isn't even in operation. Its terms are too weak, and the air pollution control officers at the state level are timid and toothless. They don't even bark, much less bite.

Since the March, 1967 conference, at every opportunity I have pushed, prodded, needed, pleaded, implored and admonished the Federal air pollution control authorities to get busy and get some action to clean up the air.

In great exasperation, on July 16, 1968, I asked for a report on why nothing had been done since the March, 1967 conference. The July 23rd reply by the Federal Air Pollution Control Administration spells out an incredible record of state negligence and Union Carbide's adamant refusal to cooperate.

On April 17, 1967, Dr. Emmett W. Arnold, Director of Health, Ohio State Department of Health, requested of the Secretary of Health, Education and Welfare that issuance of final recommendations be delayed "until investigative examination, inquisitive research and evaluative study can be conducted to form the basis for such recommendations."

May 16, 1967—H.E.W. informed Dr. Arnold that H.E.W. "would welcome such additional information."

May 23, 1967—Dr. Arnold informed H.E.W. "that further studies were being made by his department and would be submitted to the Secretary in the near future. So far the results of such further studies have not been transmitted to this Department."

I have checked and the "near future" of nineteen months ago hasn't arrived yet.

Even more serious is the chain of frustrating circumstances involving the refusal of the Union Carbide Corporation to cooperate in the public interest.

On August 21, 1969, it was officially reported to me by the Assistant Surgeon General, William H. Megonnell: "Despite several requests, Union Carbide adamantly has refused to supply additional data or allow National Air Pollution Control Administration personnel to inspect or conduct tests of its facilities; as a matter of principle, they maintain they will only work with and through the State of Ohio, and the State of Ohio has told us they do not have the information we desire regarding the Company's plant."

At the 1967 Vienna conference, I concluded my statement with these words: "The times cry out for fearless men and women who will enforce the air pollution regulations to protect people, and not knuckle under to those who think they gain economically by continuing to pollute God's atmosphere."

Instead of fearless men and women, those in charge of air pollution control in Ohio and West Virginia have been mousy and timid. Instead of trying to cooperate to protect the people's divine right to breathe clean air, some industries like Union Carbide have brazenly thumbed their nose at every effort to prevent air pollution. State's rights have proven inadequate. The Federal action has been thwarted by both industry and the states. The Federal laws need more teeth, and the loopholes must be closed.

We must stop talking in terms of economics, or state's rights, and insist that the people's right to breathe clean air is paramount.

The technology is available to control air pollution. The tools are at hand to do the job. If it costs money for industry to do what they ought to be doing, I am confident that every consumer, and every businessman, is willing to pay the extra cost of the product which is turned out in such a way to preserve clean air rather than dirty air.

So let's get on with the job and keep our priorities straight: We demand clean air as the first priority.

Representative HECHLER. It was extremely disturbing to me that the Union Carbide Corporation boycotted the October 30-31 Conference. They refused to have one or more of their officials testify, and although they may have sent officials to attend incognito, they were not in any way identified with the Conference. I consider this action to be reprehensible, deliberately following out the "public-be-

damned" attitude which had characterized their actions throughout the years of patient effort to obtain their cooperation.

Immediately prior to the October 30-31, 1969 Conference, the Federal air pollution control authorities issued a supplemental technical report indicating that the pollution caused by the Union Carbide's Marietta, Ohio plant had increased in the period since the prior conference of March 22-23, 1967. In a very direct letter to Birney Mason, Jr., Chairman of the Board of Directors of Union Carbide Corporation, dated December 31, 1969, Commissioner Middleton noted concerning the supplemental report: "It also states that your plant is the largest contributor of both oxides of sulfur and particulate matter in the conference area. Statements about your plant's emissions were based upon the best information available, since your Marietta plant manager repeatedly has refused to cooperate with us by providing the information necessary to make a full assessment of your plant's emissions." I have included the full text of the December 31, 1969, letter.

(Letter follows:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
PUBLIC HEALTH SERVICE, CONSUMER PROTECTION  
AND ENVIRONMENTAL HEALTH SERVICE,  
*Arlington, Va., December 31, 1969.*

MR. BIRNEY MASON, JR.  
*Chairman, Board of Directors,  
Chief Executive Officer, Union Carbide Corp., New York, N.Y.*

DEAR MR. MASON: On October 30 and 31 of this year, the Parkersburg, West Virginia—Marietta, Ohio Interstate Air Pollution Abatement Conference was reconvened at Vienna, West Virginia, for the purpose of receiving new data and information concerning air pollution in the area. The conference originally was called by the Secretary of Health, Education, and Welfare on November 17, 1966, after numerous citizens complained of air pollution in the area. The initial public sessions of the Conference were held on March 22 and 23, 1967.

At that time, Union Carbide incurred significant criticism because of air pollution created by emissions from your Marietta, Ohio plant. This public criticism bore out the facts about your plant's contribution to air pollution in the area, as presented in a publication prepared by this Administration entitled, "Parkersburg, West Virginia—Marietta, Ohio Air Pollution Abatement Activity" (copy enclosed).

In preparing for reconvening the conference, we issued a second publication, "Parkersburg, West Virginia—Marietta, Ohio Air Pollution Abatement Activity Supplemental Technical Report," (copy enclosed), which indicates that your plant's emissions have increased since the prior report. It also states that your plant is the largest contributor of both oxides of sulfur and particulate matter in the conference area. Statements about your plant's emissions were based upon the best information available, since your Marietta plant manager repeatedly has refused to cooperate with us by providing the information necessary to make a full assessment of your plant's emissions. Frustration of our efforts to secure the necessary information is illustrated by the enclosed correspondence. Notwithstanding his concerted effort to prevent such assessment, we feel that our report accurately estimates your plant's emissions and describes the air pollution problem created by Union Carbide's Plant. Nevertheless, additional information is required to make specific recommendations to abate the air pollution from your plant.

Union Carbide was not the only plant cited in our report. In fact, eight other plants were reported as contributing in some way to the problem in the conference area. The Union Carbide plant differs from the others in several respects. First, as we reported, Union Carbide is the largest contributor of emission of sulfur oxides and particulates in the conference area. Second, Union Carbide was the *only* plant which refused to provide us with emission inventory information. Third, Union Carbide was conspicuous in its failure to appear and state

its position regarding the allegations made concerning its operations. Other plants in the area also were severely criticized by their neighbors; nevertheless, management of those plants came forward and detailed the measures they were taking to prevent and control air pollutants emanating from their plants.

You may be interested to read some of the testimony presented at our latest conference which was directed at the Union Carbide plant. The official record is available for your inspection at our Arlington office. In addition, copies of the transcript may be purchased from the recorder, Ace-Federal Reporters, Inc., 415 Second Street, N.E., Washington, D.C. 20002. The following are excerpts from the official record:

(A housewife). Vienna's first experience with air pollution was in 1952, at which time the Union Carbide's electrometallurgical plant, about two or three miles to the north of Vienna—in Ohio—was placed in operation. I shall never forget the first morning when I saw our clean Ohio Valley enshrouded with a plume of reddish and grey smoke or smog that brought visibility almost to zero. We were all deeply disturbed and began immediately to trace its origin. . . .

(A committee traced the dark smoke and fly-ash to the Union Carbide plant and its accompanying power station. . . . It is indeed disheartening and a great hardship on our citizens with the extra burden of work to keep our homes even half-way clean, and the great worry of trying to keep the children and the family clean and healthy, to say nothing of the tremendous extra expense. I would venture to say if we took this expense proportionately per capita, the citizens are paying much more than the plant will spend for air pollution correction, even as expensive as it is.

(A doctor). First of all, we have seen a marked increase over the past fifteen or eighteen years in respiratory diseases in this valley. I am talking about asthma, emphysema, acute bronchitis, all the allergies that pertain to people. . . . We have to attribute this, I think, to air pollutants and to external influences far beyond the ordinary causes of these problems.

(A State Legislator). Now those of us who saw this excellent film this morning can certainly take great hope and comfort in the words of Dr. J. S. Whitaker, his timeless remarks. He is a representative of Carbide, and he said "Our As you get rid of the filth in your yards and on your person please remember modernization program is continuing. We are doing everything we can to fight this pollution problem." Doctor, you've got to be kidding.

(A minister). My wife and I figured last week that we had spent more on doctor bills in five months on our children while living in Vienna than we had in the last five years. . . . And this has all been due to allergies, sinus troubles, hives, and various mouth infections and things that we feel are at least related in some way to the pollution.

(A housewife). I cannot go out and sweep my porch every day. And yet if it is to be used my porch and patio must be hosed daily. We used our patio twice this year. It faces the river.

(A school principal). During 1969 I have seen so much over night fallout that the children coming into the school of which I am principal made tracks in the black dust on the sidewalk as they entered the school although the sidewalks were swept the night before. . . . When this kind of thing transpires, how about the unseen pollution which we all know is more damaging?

(A home owner). One of the reasons for our choice of our home location would be the view that we have of the river valley and can believe me when I say that in many cases there are times when we cannot even see the hills on the other side of the river due to the extreme amount of smoke and dirt that is now contaminating the lower atmosphere. We are also experiencing a very serious discoloration on the painted area of our home and despite the fact that we have just recently painted, we are already experiencing (sic) yellow discoloration which paint engineers from a local paint company have indicated to me is a direct result of pollutants.

(A housewife). Our windows and doors are kept closed as much as possible even in the summertime as a health precaution against this deadly pollution as well as to keep our homes as clean as possible.

(A housewife). I live on a hill at Summit across the river from Union Carbide. The prevailing winds are up and down the river and I can, on any given day, tell what vicinity is receiving the dirt that is being emitted by the furnaces. Sometimes, when there is a cross-wind, my property is coated with this insufferable waste.

These are merely representative of the statements regarding damage to the health and welfare of the citizens of Vienna, West Virginia, which damage is a direct result of the operation of the Union Carbide plant in Marietta, Ohio.

As a large, prestigious national corporation, we would hope Union Carbide would take a personal interest in a matter which adversely affects the public health and welfare with the area. We would hope that you would exercise corporate civic responsibility and take measures necessary to alleviate that part of the air pollution you inflict upon your neighbors. We would hope that you would cooperate with this Administration in developing a schedule of measure you would take to control the emissions of air pollutants from the Union Carbide operation. In this regard, we require that you provide us with certain information regarding coal usage and control equipment at your Marietta plant. This report is required by the enclosed notice.

Pursuant to provisions of the Act, the Secretary of Health, Education, and Welfare will issue findings and recommendations based on the testimony presented at the several sessions of the Conference held in Vienna. In order that the recommendations may take into account Union Carbide's plans, we request that you provide us a detailed schedule of your proposals for abating pollutant emissions from your Marietta plant.

With your cooperation, we can undertake a program which will restore the air quality in the Mid-Ohio River Valley.

Sincerely yours,

JOHN T. MIDDLETON, *Commissioner*.

Representative HECHLER. The first glimmer of cooperation on the part of Union Carbide came on January 29, 1970—two days before the penalties would have been invoked under the Clean Air Act for failure to supply requested information. At this time, Dr. Whitaker wrote to Commissioner Middleton. I present his letter for the record.

(Letter follows:)

UNION CARBIDE CORP.,  
New York, N.Y., January 29, 1970.

Dr. JOHN T. MIDDLETON,  
*Commissioner, National Air Pollution Control Administration,*  
*Arlington, Va.*

DEAR DR. MIDDLETON: Mr. Mason has asked me to make this response to your December 31 letter. The information you requested under Section 108(J) (1) of the Air Quality Act has been collected and sent to you this week from the Ferroalloys Division which operates the Marietta, Ohio steam station and alloy plant.

You also asked for a schedule of our proposals for abating pollution emissions from the Marietta plants. At this time we believe we can submit a schedule for particulate abatement within six months after the Conference recommendations are published by the Secretary. Details of this schedule will depend largely on whether we can continue to burn Dexter City coal and, if not, whether alternate fuels are available to us. Certainly we will endeavor to develop a program and a schedule acceptable to the conferees, and will be glad to confer with you after the report is issued. In the interim period we will continue to reduce pollutant emissions by upgrading existing collection facilities.

In the absence of ambient air quality objectives, it is not clear what course we should take with respect to sulfur oxide emissions. Will, for example, a tall stack be acceptable? If realistic recommendations on sulfur oxide emissions from fuel burning, based on reasonable ambient air quality standards are made by the Conference, we believe we can, with those recommendations, prepare an acceptable schedule within six months after the recommendations are published.

In your letter you have also quoted statements made at the Conference by residents of Vienna, West Virginia. I am sure your Department is familiar with the geography and the wind movements of this area, and knows that Vienna is south of our plant, and that the prevailing winds are from the south to the north. Directional air sampling in Vienna over extended periods of time have indicated that substantially more particulate is coming into Vienna from the south than from the north. The Conferences have failed to recognize the very large impact of particulates from the south on the air quality in Vienna and Parkersburg. Unless these are included in the abatement program, these towns will not get the relief they have been led to expect from the two Vienna Conferences.



I believe the implications of these and other Conference omissions are important enough to the people of Parkersburg and Vienna that we should discuss them in more detail, and I shall try again to make an appointment with you at an early date. We will cooperate with your administration in organizing and implementing an effective air pollution abatement program for the Parkersburg-Marietta area.

Sincerely yours,

J. S. WHITAKER,  
*Coordinator, Environmental Health.*

Representative HECHLER. Union Carbide's board chairman, Birney Mason, Jr., followed this up with further letters dated February 17 and March 3, 1970, pledging partial cooperation. With your permission, Mr. Chairman, I include them for the record.

Senator Boggs. All the materials you offer, Congressman Hechler, will be made part of the printed record.

Representative HECHLER. Thank you, Mr. Chairman.  
(Letters follow:)

UNION CARBIDE CORP.,  
*New York, N.Y., February 17, 1970.*

Dr. JOHN T. MIDDLETON,  
*Commissioner, National Air Pollution Control Administration,  
Arlington, Va.*

DEAR DR. MIDDLETON: I appreciate very much your letter of December 31, 1969 calling my attention to the problems of air pollution in the Parkersburg, W. Va.-Marietta, Ohio area. Contrary to the conclusions which you have logically reached from our failure to participate in your conference at Vienna, W. Va., this Corporation is deeply concerned with environmental health and has had an active program for several years to control pollutant emissions from its numerous plants. Many control measures have been installed, others are being installed and substantial sums have been budgeted for pollution control for this and following years.

The specific information requested in the attachment to your letter was supplied by Mr. William M. Kelly on January 27, 1970. Dr. J. S. Whitaker also submitted general comments in his letter to you of January 29, and indicated our intention to cooperate fully in implementing an air pollution abatement program for the Parkersburg-Marietta area.

In recognition of the extreme importance of environmental protection to the future of the Nation as well as to our Corporation, I have recently reorganized our Corporate attack on pollution abatement. Responsibility has been assigned to our Vice President for Technology, Dr. John A. Swartout. Dr. Swartout has had long experience in the Government's nuclear energy program as Deputy Director of the Oak Ridge National Laboratory and as Assistant General Manager of the U.S. Atomic Energy Commission. For the last four years he has been responsible for our Corporate research and development and for administration of our operation of laboratories and production plants for the AEC.

We have not yet responded to the request in your letter for a detailed schedule of our proposals for abating pollutant emissions for our Marietta plant. Our Ferro-alloys Division has proposed to us a schedule for installing additional control systems in the next several years and has requested capital funds to effect it. The timing of the Corporation's capital budget approval procedure is such that commitments for the requested expenditures have not yet been given. In addition, I wish to give Dr. Swartout time to review critically these and the plans of our other divisions.

Dr. Swartout and his staff will be in touch with your office and will keep you advised of our specific abatement plans.

I am certain that communications and relationships between Union Carbide and your office will improve appreciably.

Sincerely yours,

BIRNY MASON, Jr.

UNION CARBIDE CORP.,  
New York, N.Y., March 3, 1970.

Dr. JOHN T. MIDDLETON,  
Commissioner, National Air Pollution Control Administration,  
Arlington, Va.

DEAR DR. MIDDLETON: As Mr. Megonnell has undoubtedly notified you, Mr. Morse Dial, Jr., Regional Vice President in charge of our Washington Office, and I met with several members of your staff on Thursday, February 12. Since Mr. Megonnell stated that he would brief you on the subjects of our discussion, I will only remark that we found the session to be most profitable in establishing a basis for further collaboration and cooperation.

During our meeting several questions were asked by members of your staff which we either answered or indicated that answers would be provided. Answers to the latter are given below:

1. Does Union Carbide have a policy regarding admittance of members of your staff to our plants to observe operations, specifically of pollutant generating operations?

Members of your staff and of any comparable regulatory agency are welcome to visit our plants. We request that reasonable prior notice be given and that the purpose of the visit, including intended use of the information so obtained, and the identity of the proposed visitors be provided to the plant manager. Assurance will be required that any proprietary information about our processes, which the visitor might acquire, will not be disclosed.

2. May the data for the Marietta power plant, submitted to you by Mr. W. M. Kelly in his letter of January 27, 1970, be given to the state (i.e. Ohio and West Virginia) pollution abatement agencies?

In confirmation of my reply on February 12, the answer is yes. The information may be treated by you as through it had been voluntarily submitted and as you have handled information provided by other companies in the area.

I would appreciate your transmitting these replies to Mr. Megonnell and other individuals present at the meeting.

Sincerely yours,

JOHN A. SWARTOUT.

Representative HECHLER. Finally, on March 19, 1970—over four years after the Federal officials began their tests of air pollution in the Vienna, W.Va. area—recommendations were published. But even these recommendations could not cover control of sulfur oxide emissions, because of the long delaying tactics by the Union Carbide Corporation in making data available on this subject. At last, the Union Carbide Corp. consented to supply the data, after much public and private pressure, and on March 31, 1970 the Conference was reconvened in executive session for the discussion of the supplementary recommendations concerning control of sulfur oxide emissions.

I present the letter to me from Commissioner Middleton, plus the recommendations, which bring the situation up to date.

(Letter and recommendations follow:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
PUBLIC HEALTH SERVICE, ENVIRONMENTAL HEALTH SERVICE,  
Rockville, Md., March 19, 1970.

HON. KEN HECHLER,  
House of Representatives,  
Washington, D.C.

DEAR MR. HECHLER: The summary and recommendations for remedial action required by the Clean Air Act, as amended, in connection with the Parkersburg, West Virginia—Marietta, Ohio Interstate Air Pollution Abatement Conference have been completed. In accordance with the requirements of the Act, copies of these materials are being transmitted to the appropriate air pollution control agencies.

Because of your concern with air pollution control, we believe that you will be interested in receiving the enclosed copies of the summary and recommendations.

Recommendations concerning control of sulfur oxide emissions from fuel burning sources were deferred until a report from Union Carbide Corporation was procured under authority of Section 108(j) of the Clean Air Act. The required report has been received and is being reviewed by the Conference participants. At the earliest date possible, the Conference will be reconvened to consider recommendations to abate and control emissions of sulfur oxides from fuel burning sources in the Conference area.

We appreciate your continued cooperation concerning this matter and, of course, we will keep you informed of details as plans for reconvening the Conference develops.

Sincerely yours,

JOHN T. MIDDLETON, *Commissioner.*

RECOMMENDATIONS AND SUMMARY OF PARKERSBURG, W. VA.-MARIETTA, OHIO,  
INTERSTATE AIR POLLUTION ABATEMENT CONFERENCE

INTRODUCTION

Pursuant to section 108(d) (1) (C) of the Clean Air Act, as amended (42 U.S.C. 1857, *et seq.*), the Secretary of Health, Education, and Welfare on November 17, 1966, called an Interstate Air Pollution Abatement Conference in the Parkersburg, West Virginia-Marietta, Ohio Area, comprising Clay, Lubeck, Parkersburg, Slate, Tygart, Union and Williams Magisterial Districts of Wood County in the State of West Virginia; Belpre, Dunham, Fearing, Marietta, Muskingum, and Warren Townships in Washington County in the State of Ohio. This Conference was related to air pollution originating in each of the States and alleged to endanger the health and welfare of persons in the other State. Prior to calling the conference, consultation with State officials was held August 24, 1966, in the Federal Building in Parkersburg, West Virginia.

In accordance with section 108(d) (2) of the Clean Air Act, a Federal report with respect to the matters before the Conference was delivered to the participating agencies in March 1967, and was at that time made available to other interested parties.

The Department of Health, Education, and Welfare, convened the Conference at the Vienna Community Building, Vienna, West Virginia on March 22, 1967, and continued in session through March 23, 1967, concluding with announcement of findings and recommendations reached by the official participants to the Conference. The Conference then adjourned, subject to the call of the Presiding Officer.

Following the conference, participants from the States of West Virginia and Ohio communicated additional views and information to the Department of Health, Education, and Welfare concerning the discussions at the conference and related to the findings and conclusions reached by the conference participants.

Accordingly, in order to assure that the record of the conference accurately reflected the discussions, views, and information available to the participants and to afford opportunity for interested persons to be heard, notice that the conference would be reconvened was given to the official participants on September 26, 1969. An updating addendum supplementing the March 1967 technical report was delivered to the participants on September 26, 1969, and was made available to interested persons on September 27, 1969. Notice was given in the *Federal Register* on September 27, 1969, and by publication in a newspaper of general circulation in the conference area.

The conference reconvened at the Vienna Community Building on October 30, 1969, and continued in session through October 31, 1969, at which time the Presiding Officer recessed the Conference until November 20, 1969, when it was reconvened for announcement of findings and recommendations of the Conference participants. The Conference then recessed, subject to the call of the Presiding Officer.

Mr. William H. Megonnell of the Department of Health, Education, and Welfare served as Presiding Officer at the reconvened Conference, and the following were official participants for their respective jurisdictions during the Conference:

Mr. Carl G. Beard, II, West Virginia Air Pollution Control Commission.

Hon. Glen B. Gainer, Jr., City of Parkersburg, West Virginia.

Hon. Curtis M. Uhl, City of Vienna, West Virginia.

Mr. Jack A. Wunderle, Ohio Air Pollution Control Board.

Hon. John T. Burnworth, City of Marietta, Ohio.

Mr. Donald F. Walters, U.S. Department of Health, Education, and Welfare. Some 80 persons participated in the Conference proceedings, either at their own request or as participants, staff, or invitees of the official agencies. Appendix A is a list of persons who participated in the Conference.

#### FINDINGS AND RECOMMENDATIONS

Following presentations of data and information by the Conference Participants and others who had requested the opportunity to appear, the Participants set forth certain general conclusions and findings and a series of recommendations pertinent to the air pollution abatement needs of the Conference area.

The findings and recommendations which are set forth in the following pages together with a more extensive summary of conference discussions are based on data showing that the Conference area has a common air mass and that emissions of pollutants cause or contribute to excessive levels of air pollution which endangers the health and welfare of persons in the Conference area.

All available scientific evidence on the detrimental effects from two of these pollutants were thoroughly reviewed and evaluated in *Air Quality Criteria for Particulate Matter and Air Quality Criteria for Sulfur Oxides*, which were published by the National Air Pollution Control Administration in February 1969. Among the adverse health effects observed in the Conference area are: marked increases in respiratory diseases, including asthma, emphysema, acute bronchitis, and pneumonia; skin disorders; pulmonary fibrosis; sinusitis; allergies; headaches, eye irritation; and psychological depression. In addition, the adverse welfare effects are: damage to vegetation; soiling and deterioration of property; interference with outdoor recreation and family life; and general interference with comfortable enjoyment of property.

While each of the two States involved is served by an agency authorized to prevent, control and abate conditions of air pollution, the jurisdiction of each is confined within the respective State's boundaries. Therefore, the Conference Participants, giving appropriate consideration to technological feasibility, the economic benefit to be gained from the installation of pollution controls, and time required to secure abatement agreed on specific emission standards for the area other than for the emissions of sulfur oxides, and recommended that the States develop enforcement procedures to implement them. Full implementation of the recommendations should result in an acceptable level of air quality in the conference area for all pollutants except sulfur oxides.

To fulfill these recommendations, it was agreed that State air pollution control agencies would send semi-annual reports to the Presiding Officer and to each other until such time as the recommendations have been met.

It was agreed that the Participants would continue air monitoring throughout the area. Provision was made also for requiring reports from polluters.

Specific recommendations regarding sulfur oxides emissions in the conference area were deferred until reports from Union Carbide Corporation were procured under the authority of Section 108(j) of the Clean Air Act. The required information has been received and is now being reviewed by the conference participants. At the earliest possible date, the executive session of the Conference will be reconvened to consider recommendations to abate and control sulfur oxide emissions in the conference area.

This Department accepts and adopts the following findings and recommendations, and hereby transmits them to the respective agencies, in accordance with the provisions of Section 108(e) of the Clean Air Act, as amended.

#### RECOMMENDATION I—STATE COOPERATION, REPORTING AND SURVEILLANCE

##### A. Findings

1. The Parkersburg-Marietta interstate area has a common air mass. Pollutants which are being discharged into that air mass, from various sources, are carried indiscriminately throughout the area without regard to State boundaries and subject only to wind and weather.

2. Such air pollutants cause or contribute to air pollution levels which endanger the health and welfare of persons in the area.

3. Each of the two States involved is served by a duly constituted agency authorized by their respective State statutes to pursue air pollution programs designed to prevent, control and abate conditions of air pollution.

4. The jurisdiction of the State agencies—the Ohio Air Pollution Control Board and the West Virginia Air Pollution Control Commission—is confined within the respective State's boundaries.

5. Sources outside the abatement area contribute to the overall pollution burden of the area.

#### *B. Recommendations*

1. The air pollution control agencies of the two States should cooperate closely in the development of air quality objectives, air pollution control regulations and enforcement procedures consistent with recommendations of this Conference.

2. The air pollution control agencies of the two States should report to the Presiding Officer and to each other, at intervals of not more than six months, beginning six months from the date hereof, concerning any source emitting to the atmosphere contaminants in excess of those recommended by this Conference, except that such reports dealing with on-site burning of domestic refuse may be made on a composite basis, rather than for an individual household. Such reports shall include the nature and quantity of emissions, progress toward abatement of contaminant emissions, a description of plans with time schedules for instituting the additional control measures necessary to satisfy the recommendations of this Conference and, where applicable, a narrative description of the nature of any delays or difficulties being encountered in achieving such control. Reports for each source will continue to be submitted at the recommended interval until the State agency concerned advises the Presiding Officer that recommendations of this Conference have been met by the source.

3. The States of Ohio and West Virginia should maintain surveillance over the sources located outside the abatement area and institute control measures, as necessary, to protect air quality in the abatement area.

### RECOMMENDATION II—REFUSE DISPOSAL

#### *A. Findings*

1. Salvage operations and municipal, domestic, commercial and industrial burning of refuse contribute to both the overall air pollution burden in the Parkersburg—Marietta interstate area and to localized problems.

2. Conversion of open-burning dumps in Washington County, Ohio, into sanitary landfills has eliminated particulates and other obnoxious pollutants previously emitted to the atmosphere from such sources. Open burning during salvage operations still occurs in Ohio.

3. Recently enacted solid waste regulations in West Virginia have reduced open burning of municipal, commercial, and industrial waste and salvage operations. Backyard burning still is permitted.

4. Methods for salvage operations and refuse disposal which eliminate or minimize air pollutant emissions are available and successfully utilized elsewhere. These include utilization of non-combustion salvage techniques; incinerators which are properly designed, operated and controlled; and properly operated and maintained sanitary landfills.

5. Open burning of organic chemical and other industrial wastes, whether or not the training of fire-fighters is involved, creates copious quantities of dense black smoke.

#### *B. Recommendations*

1. Prohibitions against open burning of all wastes should be strictly enforced.

2. No later than one year from the date hereof, disposal of refuse or conduct of salvage operations by burning should be permitted only in incinerators from which emissions do not exceed 0.3 grains of particulate matter per standard dry cubic foot of exhaust gas corrected to 12 percent carbon dioxide, or equivalent emission limits, and from which visible emissions of air contaminants to the atmosphere do not exceed that designated No. 1 on the Ringelmann Chart or an opacity which obscures an observer's view to the same degree.

3. Open burning of organic chemical or other industrial wastes for the purpose of training fire-fighters should be conducted in areas outside the valley floor and in accordance with official permits issued by the air pollution control agency having jurisdiction, such permits to specify time, location and duration of burning.

## RECOMMENDATION III—CONTROL OF EMISSIONS FROM FUEL-BURNING

*A. Findings*

1. Combustion of fuel, primarily coal by industrial sources produces approximately 66 percent of the particulate matter and 96 percent of the sulfur oxides emitted in the abatement area.

2. Based on available data, it is determined that particulate emissions have increased approximately one-third and sulfur dioxide emissions have remained substantially the same since the 1965 emission inventory. This evaluation had been hampered by the refusal of Union Carbide Corporation, the largest emitter of both pollutants, to provide the participants with actual data concerning its contribution; however, such data has now been procured under authority of Section 108(j) of the Clean Air Act, thereby permitting a complete inventory of emissions in the area.

3. Measures currently being taken to abate air pollution from such sources are inadequate, although some industries burning coal in the abatement area have installed particulate control systems and have been able to procure and utilize lower sulfur fuels.

*B. Recommendations*

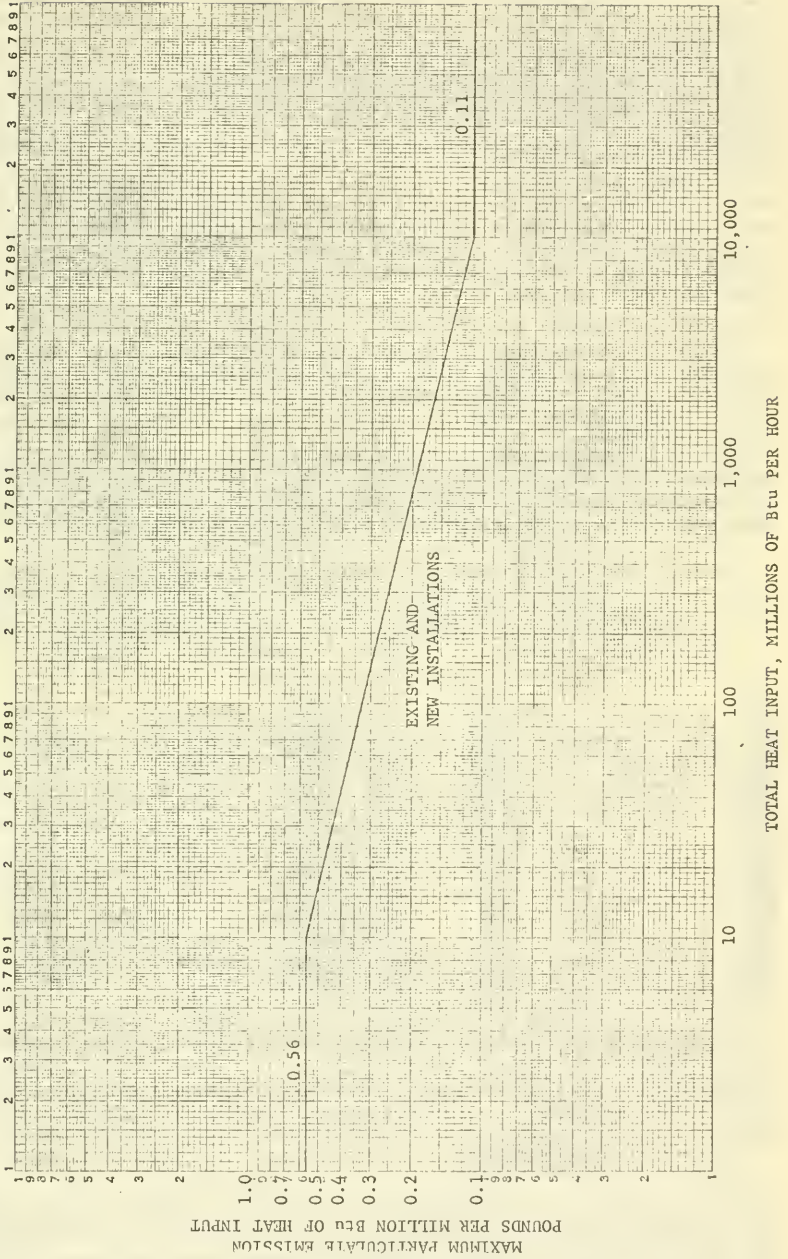
1. Emissions of particulate matter from all fuel-burning equipment whose energy input exceeds one million BTU's per hour should be limited in accordance with Figure 1, or equivalent, and that visible emissions to the atmosphere from such sources should be limited to a shade or density less than that designated No. 2 on the Ringelmann Chart or an opacity which obscures an observer's view to the same degree, according to the following schedule:

(a) New facilities should conform at the time of construction.

(b) Existing plants should be required to reduce particulate emissions in excess of those provided in Figure 1 by at least 50% of the excess within 18 months from the date thereof, and that full conformity with this recommendation should be achieved within 36 months from the date hereof.

2. Specific recommendations on sulfur oxide emissions from fuel burning sources shall be deferred until the conference participants have reviewed the mandatory report which Union Carbide Corporation has provided pursuant to Section 108(j) of the Clean Air Act. Upon completion of this review, the executive session of the conference will be reconvened for the purpose of making recommendations on sulfur oxides.

FIGURE 1.  
 MAXIMUM EMISSION OF PARTICULATE MATTER  
 FOR FUEL BURNING INSTALLATIONS



## RECOMMENDATION IV.—CONTROL OF PROCESS EMISSIONS

*A. Findings*

1. Industrial processes contribute approximately 30 percent of all particulate matter emitted to the atmosphere in the abatement area.

2. Particulate emissions from processes at the Union Carbide Corporation in Ohio constitute approximately 80 percent of all process particulate emissions in the abatement area and approximately one-fourth of particulate emissions from all sources in the abatement area.

3. Certain industrial process emissions produce objectionable odors and lachrymators within the abatement area and other process losses are highly reactive, either singularly or in combination with other pollutants.

4. Although technology is available to abate pollutant emissions from industrial processes in the abatement area, adequate control measures have not yet been universally employed.

*B. Recommendations*

1. Emissions of particulate matter into the atmosphere from new industrial processes should be subject to the limitations set forth in Table 1, and visible emissions should be limited to a shade or density less than that designated No. 2 on the Ringelmann Chart or an opacity which obscures an observer's view to the same degree.

2. Existing industrial sources should be required to reduce particulate emissions in excess of those provided in Table 1 by at least 50% of the excess within 18 months from the date hereof, and that full conformity with this recommendation should be achieved within 36 months from the date hereof.

TABLE 1.—RESTRICTION OF EMISSION OF PARTICULATE MATTER FROM INDUSTRIAL PROCESSES

Process weight rate		Rate of emission, pounds per hour	Process weight rate		Rate of emission, pounds per hour	
Pounds per hour	Tons per hour		Pounds per hour	Tons per hour		
100		0.05	0.557	16,000	8	16.5
200		.10	.87	18,000	9	17.9
400		.20	1.40	20,000	10	19.2
600		.30	1.83	30,000	15	25.2
800		.40	2.22	40,000	20	30.5
1,000		.50	2.58	50,000	25	35.4
1,500		.75	3.38	60,000	30	40.0
2,000	1.00	1.00	4.10	70,000	35	41.3
2,500	1.25	1.25	4.76	80,000	40	42.5
3,000	1.50	1.50	5.38	90,000	45	43.6
3,500	1.75	1.75	5.96	100,000	50	44.6
4,000	2.00	2.00	6.52	120,000	60	46.3
5,000	2.50	2.50	7.58	140,000	70	47.8
6,000	3.00	3.00	8.56	160,000	80	49.0
7,000	3.50	3.50	9.49	200,000	100	51.2
8,000	4.00	4.00	10.4	1,000,000	500	69.0
9,000	4.50	4.50	11.2	2,000,000	1,000	77.6
10,000	5.00	5.00	12.0	6,000,000	3,000	92.7
12,000	6.00	6.00	13.6			

(a) Interpolation of the data in this table for process weight rates up to 60,000 pounds per hour shall be accomplished by use of the equation:

$$E = 4.10P^{0.67}$$

(b) Interpolation and extrapolation of the data for process weight rates in excess of 60,000 pounds per hour shall be accomplished by use of the equation:

$$E = 55.0P^{0.11} - 40$$

Where:

E = Rate of emission in pounds per hour.

P = Process weight rate in tons per hour.

3. No later than six months from the date hereof, emissions of chlorine from any one plant premise should be limited to a total of no more than three pounds per hour, and because of the proximity of plants which emit gases that when combined with chlorine, are believed to produce lachrymators, the concentration of any such discharge not exceed 1.5 part per million by volume.

4. No later than one year from the date hereof, the emissions of odorous and irritant materials from sources in the Southwest portion of the abatement conference area, known locally as Washington Bottom, should be abated.



### A. Findings

1. There has been protracted delay in abating air pollution in the study area.

2. It is necessary for the air pollution control agencies of the two States and the National Air Pollution Control Administration to be informed in detail as to plans of the principal polluters for abating their respective air pollution so that these agencies may judge the adequacy and timeliness of the measures proposed for this purpose.

3. Significant air pollution in the abatement area originates from the operations of the following companies:

Union Carbide Corporation.

B. F. Goodrich Company.

Shell Chemical Company.

American Cyanamid Company.

E. I. duPont de Nemours Company.

FMC Corporation, American Viscose Division.

Johns-Manville Fiber Glass, Inc.

Amax Specialty Metals Corporation.

Ashland Chemical Company.

Marbon Chemical Division of Borg-Warner Corporation.

### B. Recommendations

1. Those companies named in Finding 4 above should report in writing, at six-month intervals from the date hereof, to their respective State air pollution control agency, with a copy to the Presiding Officer, such reports to include: (a) any changes in the nature and quantity of emissions; (b) a description of plans, with time schedules, for controlling emissions; (c) progress toward abatement of pollution; and (d) where applicable, a narrative description of the nature of any delays or difficulties being encountered in achieving control.

2. This reporting requirement may be terminated by the Presiding Officer when, it is determined that abatement recommendations have been achieved.

## CONFERENCE SUMMARY

### A. Occurrence of Air Pollution Subject to Abatement Under the Clean Air Act

Meteorologic records and data demonstrate that there is substantial interstate transport of pollutants discharged into the atmosphere of the Conference area. It was shown further that the meteorologic features of the region, i.e., light summer winds, and frequent nighttime temperature inversions create conditions favorable for poor dispersion and rapid accumulation of air pollutants.

The dominating topographic feature of the area is the Ohio River Valley, featuring a narrow valley floor with surrounding hills rising 200 to 400 feet above the river. In the Conference areas, the valley is deep enough to influence the transport and diffusion of air pollution.

The evaluation of air quality included measurement of ambient concentrations of sulfur dioxide and suspended particulate matter, and observation of odors and irritants. Average daily concentrations of suspended particulates exceeded 150 micrograms per cubic meter with maximum daily averages exceeding 500 micrograms per cubic meter. A daily average of 0.10 parts per million sulfur dioxide was exceeded 3.4 percent of the year at one station. Particulates and sulfur dioxide levels, such as these, and combinations of the two, have been associated with increased incidence of certain adverse health effects, damage to vegetation, reduction of sunlight, reduced visibility, and corrosion of steel and zinc. Odor and irritant observations found short-term concentrations of chlorine in the range of 70–100 parts chlorine per million parts of air.

Chlorine alone in smaller concentrations was found to cause eye irritation. However, much smaller concentrations of chlorine mixed with styrene (another gaseous pollutant in the area) have been demonstrated to cause intense eye irritation.

Adverse health and welfare effects, caused by the interstate transport of substantial amounts of air pollutants, were described by a number of experts in many disciplines.

Fluoride pollution, noted in one location in the Conference area, caused severe vegetation damage.

Several physicians described the high incidence of respiratory diseases in the area. These diseases included: asthma, emphysema, chronic bronchitis and pneumonia. Other health effects noted were: pulmonary fibrosis, sinusitis, headaches, and allergies.

A number of residents of the Conference area discussed the impact air pollution had on their daily lives. They reported deterioration and soiling of their property, destruction of their plants, damage to livestock, hazards to boat traffic, damage to community pride, discomfort of living amidst unpleasant odors, and interference with outdoor recreation, social events and family life. In addition, Vienna residents were especially critical of the all-pervasive dust from which they suffered.

#### *B. Adequacy of Measures Taken Toward Abatement of the Pollution*

Some individual industrial sources in the Conference area have undertaken voluntary action and some pollution sources cooperated by proposing voluntary control measures.

There is no effective regional interstate mechanism with adequate authority to establish uniform air pollution control regulations and to assure coordinated enforcement against all pollution sources within the area.

#### *C. Nature of Delays Being Encountered in Abating the Pollution*

Since neither the State of West Virginia nor the State of Ohio has air pollution regulations which deal with industrial fuel-burning and process emissions control in the Conference area, no effective legal basis presently exists to abate the air pollution in the area.

Recently enacted regulations in West Virginia prohibit open burning of municipal, commercial, and industrial waste and salvage operations. However, backyard burning still is permitted.

The State of Ohio does not have point-source abatement powers other than through the authority to establish ambient air quality standards, and emission standards for achieving compliance with such air quality standards, for various defined areas of the State. Areas defined to date do not include Ohio's portion of the Conference area.

#### APPENDIX A

Alpiser, Francis M., Chemical Engineer, Engineer Branch, Division of Abatement, National Air Pollution Control Administration.

Baum, Robert L., Esquire, Office of the General Counsel, Department of Health, Education, and Welfare.

Bayley, Mrs. Thomas, Resident, Vienna, West Virginia.

Bayley, Thomas W., Esquire, Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Beard, Carl G., II, Director, West Virginia Air Pollution Control Commission.

Blackburn, R. A., Exec. Secy., Ohio Electric Utility Institute (Statement presented by Mr. Theodore T. Frankenberg).

Brannon, Mrs. Ocie, President, Vienna Women's Club, Vienna, West Virginia.

Buff, I. E., M.D., Member, West Virginia Air Pollution Control Commission.

Burk, Honorable Robert W., Jr., State Senator, Third District, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Burnworth, Honorable John A., Mayor, Marietta, Ohio.

Carter, James M., M.D., Radiologist, Camden-Clark Memorial Hospital, Vienna, West Virginia.

Cochran, Mrs. Leva, Principal, Washington, West Virginia, Elementary School.

Colvin, Robert, Resident, Washington, West Virginia.

Cotterman, Honorable Richard S., Member, House of Delegates, West Virginia, State Legislature.

Daniel, John E., Esquire, Administrative Assistant, Office of Standards and Compliance, National Air Pollution Control Administration.

Dils, Mrs. Grace, President Dils Motor Company, Parkersburg, West Virginia.

Dowd, A. Joseph, Esquire, Legal Staff, American Electric Power Service Corporation. (Presented Statement of Maynard E. Smith).

Dyer, Mrs. Nigel S., Resident, Parkersburg, West Virginia (Statement presented by Mrs. Joel Stern).

Ellis, David H., Engineer, West Virginia Air Pollution Control Commission.

Ettling, Henry C., Secy-Treas., Ohio Coal Industry Air Quality Committee.

Florence, Honorable Paul, President, Wood County Court, West Virginia.

- Flowers, Honorable Edwin F., Commissioner of Welfare, State of West Virginia (Presented statement of Governor Arch A. Moore, Jr., West Virginia).
- Foreman, David, Engineer, Air Pollution Unit, Ohio Department of Health.
- Foreman, J. H., General Manager, American Metal Climax, Washington, West Virginia.
- Poster, Kirk E., Deputy Chief, Field Operations Branch, Division of Abatement, National Air Pollution Control Administration.
- Frankenberg, Theodore T., Consulting Mechanical Engineer, American Electric Power Service Corporation.
- Fito, James, District Representative of Congressman Ken Hechler.
- Gainer, Honorable Glen B. Jr., Mayor of Parkersburg, West Virginia.
- Haislip, Mrs. Richard, Resident, Vienna, West Virginia.
- Harper, Ray P., Sanitarian, Marietta City Board of Health, Marietta, Ohio.
- Hechler, Honorable Ken, United States Representative, Second District, West Virginia.
- Helmick, Carl W., Resident, Little Hocking, Ohio.
- Hensel, Donald A., Engineer, Division of Abatement, National Air Pollution Control Administration.
- Herrington, Reverend Bailey, Pastor, First Lutheran Church, Parkersburg, West Virginia.
- Hindawi, Ibrahim Joseph, Ph.D., Botanist, Chief, Vegetation Effects Section, Division of Abatement, National Air Pollution Control Administration.
- Hodges, H. Ray, Jr., Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).
- Holland, Mrs. Alma Boice, Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).
- Hosey, Mr. & Mrs. Willard, Residents, Washington, West Virginia (Statement presented by Mrs. Joel Stern).
- Hoye, Robert L., Plant Manager, Woodmar Plant, Marbon Division, Borg-Warner Chemicals & Plastics Groups, Washington, West Virginia.
- Huey, Norman A., Deputy Chief, Laboratory Branch, Division of Abatement, National Air Pollution Control Administration.
- Jones, Herbert E., Jr., Chairman, West Virginia Air Pollution Control Commission.
- Linsky, Benjamin, Professor, School of Engineering, University of West Virginia.
- Lowers, Mrs. Vernon L., Resident, Washington, West Virginia (Statement presented by Mrs. Joel Stern).
- Megonnell, William H., Presiding Officer, Assistant Commissioner for Standards and Compliance, National Air Pollution Control Administration.
- Milsark, Mrs. Val E., Resident, Vienna, West Virginia.
- Moellendick, Arthur O., Resident, Washington, West Virginia.
- Moellendick, Mrs. Charles A., Resident, Washington, West Virginia.
- Moore, Honorable Arch A., Governor, West Virginia (Statement presented by Mr. Edwin F. Flowers).
- Morton, Reverend Paul, Pastor, St. John's United Methodist Church Vienna, West Virginia.
- Munda, Jack, Plant Manager, E. I. DuPont deNemours & Company, Washington, West Virginia.
- Nay, Mr. & Mrs. Jarrett, Residents, Washington, West Virginia (Statement presented by Mrs. Joel Stern).
- Poe, Howard, Resident, Parkersburg, West Virginia.
- Primm, Paul, Principal, Vienna Elementary School, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).
- Randolph, Honorable Jennings, United States Senator, West Virginia (Statement presented by Mr. John E. Daniel).
- Rymer, Honorable Aubrey L., Mayor, Williamstown, West Virginia (Statement presented by Mrs. Joel Stern).
- Schmitz, Mrs. Ralph A., Past President, National Council of State Garden Clubs, Incorporated, Vienna, West Virginia.
- Sidell, A. R., M.D., Williamstown, West Virginia (Statement presented by Mrs. Joel Stern).
- Slater, Hershel H., Chief, Meteorology Branch, Division of Abatement, National Air Pollution Control Administration.
- Smith, Maynard E., Smith-Singer Meteorologists, Incorporated, Massapequa, New York (Statement presented by Mr. Joseph A. Dowd).

Smith, Mr. & Mrs. Montelle L., Residents, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Smith, Paul L., Resident, Washington, West Virginia (Statement presented by Mrs. Joel Stern).

Smith, Mrs. Rex E., President, Tomlinson Garden Club, Williamstown, West Virginia (Statement presented by Mrs. Joel Stern).

Somerville, Mrs. Eugene, Resident, Parkersburg, West Virginia (Statement presented by Mrs. Joel Stern).

Spencer, S. W., Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Stark, Jack J., M.D., Vienna, West Virginia.

Stern, Mrs. Joel, Resident, Washington, West Virginia.

Stukey, Kenneth, Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Sullivan, Dallas E., Principal, Greenmount School, Vienna, West Virginia.

Toohy, R. Peter, Plant Manager, Shell Chemical Company, Belpre, Ohio.

Uhl, Honorable Curtis M., Mayor, Vienna, West Virginia.

Uhl, Mrs. Curtis M., Vienna Community Council, Vienna, West Virginia.

Van Kirk, Frank Q., Plant Manager, Johns-Manville Fiberglass, Incorporated, Vienna, West Virginia.

Vaughan, Mrs. R. H. Resident, Parkersburg, West Virginia (Statement presented by Mrs. Joel Stern).

Walters, Donald F., Director, Division of Abatement, National Air Pollution Control Administration.

Whiteacre, Mary, M.D., Health Commissioner, City of Marietta, Ohio.

White, Mrs. Alma H., Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Wiggins, Russell R., Resident, Vienna, West Virginia (Statement presented by Hon. Richard S. Cotterman).

Williams, J. Brunson, Resident, Vienna, West Virginia.

Wunderle, Jack A., Engineer-in-Charge, Air Pollution Unit, Ohio Department of Health.

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AMENDMENT TO RECOMMENDATIONS AND SUMMARY, PARKERSBURG, W. Va.—  
MARIETTA, OHIO, INTERSTATE AIR POLLUTION ABATEMENT CONFERENCE

The findings and recommendations issued March 19, 1970, by the Secretary, HEW, for the subject conference pertained to the abatement of pollutants other than sulfur oxides.

Specific recommendations regarding sulfur oxides emissions in the conference area were deferred until reports from Union Carbide Corporation were procured under the authority of Section 108(j) (1) of the Clean Air Act. The required information has been received and reviewed by the Conference Participants.

The executive session of the conference was reconvened March 31, 1970, to consider recommendations to abate and control sulfur oxide emissions in the conference area.

Revised findings and specific recommendations on sulfur oxide emissions from fuel-burning sources at Union Carbide Corporation have been formulated by the Conference Participants and will be submitted to the Secretary for his consideration as an amendment to Recommendation III presently set forth in the conference recommendations adopted and issued by the Department.

AMENDED RECOMMENDATION III

A. Findings

1. Combustion of fuel, primarily coal by industrial sources, produces approximately 68 percent of the particulate matter and 98 percent of the sulfur oxides emitted in the abatement area.

2. Particulate emissions have increased approximately one-third and sulfur dioxide emissions have increased approximately 14 percent since the 1965 emission inventory.

3. Sulfur oxide emissions from power generation at the Union Carbide Corporation in Ohio constitute approximately 86 percent of all sulfur oxide emissions in the abatement area: according to monthly fuel use data reported by the Company, sulfur oxide emissions from Union Carbide's power-generation fa-

cilities in 1969 varied from 16,600 pounds per hour to 28,100 pounds per hour, with an average emission rate of 22,500 pounds per hour.

4. The plume emanating from the Union Carbide Power Plant is released at an insufficient height to prevent frequent downwash of the undispersed plume to ground level in the vicinity of the plant and impaction of the plume on higher elevation away from the river valley.

5. Measures currently being taken to abate air pollution from such sources are inadequate, although some industries burning coal in the abatement area have installed particulate control systems and have been able to procure and utilize lower sulfur fuels.

### *B. Recommendations*

1. Union Carbide Corporation be required to reduce sulfur oxide emissions from the power-generation facilities at its Marietta, Ohio, plant in accordance with the following schedule :

(a) As soon as possible, but not later than six months after issuance of these recommendations, sulfur oxide emissions not exceed a rate of 13,500 pounds per hour.

(b) As soon as possible, but not later than two years after issuance of these recommendations, sulfur oxide emissions not exceed a rate of 6,750 pounds per hour.

2. No later than three months after issuance of these recommendations, Union Carbide Corporation be required to submit to the Conference Participants a schedule of modifications which will, in accordance with good engineering practice, substantially eliminate downwash of combustion effluents from its power-generating facilities. The schedule shall provide for the completion of such modifications as soon as possible but no later than two years after issuance of these recommendations.

3. Union Carbide Corporation be required to report, in accordance with Recommendation V.B.1 (issued by the Secretary of Health, Education, and Welfare on March 19, 1970), its plans and schedule for controlling sulfur oxide emissions.

Representative HECHLER. Mr. Chairman, a great deal of valuable time has been lost in the fight to control air pollution because of the lengthy and repeated refusals of the Union Carbide Corporation to cooperate. It is now reported that this great corporation plans to cooperate in the reduction of air pollution. I believe that actions speak louder than words, and I will believe this when I see it.

It is obvious that the current law is very weak, or it would have been possible to call the hand on the type of deliberate delay and obstructionism by Union Carbide in this case. I suggest that the proposals for new legislation before this committee are improvements, but they still allow far too much room for outright obstruction and delays by industries having the legal talent and lack of public interest in speedy action to clean up the air.

In view of the horror story I have related, it seems to me essential that new legislation shorten the time periods involved, toughen the penalties, and provide for quicker and surer methods of enforcing clean air standards. Under current practice, there is no authority for the Federal agency—the National Air Pollution Control Administration—to enter the picture except on request of a State Governor or where the situation involves more than one State. There are many situations where air pollution may seem be confined to an intrastate area, but actually affects the air in several states, and yet under current law the Federal Government cannot lift a finger to help.

Interstate Air Pollution Control Conferences are good sounding boards, but the Federal authorities should not be forced to wait for such conferences before taking positive action. A complete Federal-State-local coordinated action program must be initiated immediately,

and the State and local authorities should not have the power to veto any regulation and keep a protective cloak around an industry to prevent or delay action. There must be clear-cut and authoritative rules promulgated which will allow without any question the full inspection of plants and industries polluting the air. Then there must be clear-cut authority to issue regulations to control the source of pollutants. The National Air Pollution Control Administration should be empowered to order polluters to stop polluting forthwith, and have the necessary injunctive procedure to enforce such orders without the kind of lengthy delays and appeals which have elapsed under the current legislation. Fines should be stiff and meaningful—\$10,000 per day for each day of continued violation.

We have learned that industries for competitive and other reasons are not inclined to clean up the air on their own initiative unless they are encouraged by law, and even then many industries fight both the law and its enforcement and administration. I hope that the example of the Union Carbide Corporation will convince this committee of the need for tough legislation with teeth in it.

Senator BOGGS. We do appreciate your being here, and know how busy you are. We think it is wonderful you would take this interest in this important subject.

Let me just ask you one question. Has a regional ambient air criteria been set up for the area you are speaking of?

Representative HECHLER. This has been recommended.

Senator BOGGS. Congressman, we thank you very, very much, indeed, for being here this morning.

Representative HECHLER. Thank you, Mr. Chairman.

Senator BOGGS. We have statements that we will include in the record at this point. One is from Ernest M. May, Summit, N.J., who presents a proposal for a pollution tax on the internal combustion engine.

The Automobile Manufacturers Association wants to include the statement of their president, Thomas C. Mann, which was made before the NAM Congress of American Industry in New York, December 4, 1969.

There is also a statement which was made before the House Interstate and Foreign Commerce Committee for the National Coal Association.

Without objection, these statements will be made part of the printed record at this point.

(The statement referred to follows:)

SUMMIT, N.J., January 6, 1970.

HON. EDMUND S. MUSKIE,  
Senate Office Building,  
Washington, D.C.

DEAR SENATOR MUSKIE: Attached you will find a proposal that I have been thinking about for a long time as a way of solving a number of problems in the field of air pollution in Metropolitan areas as well as an additional source of revenue for these areas.

I personally think a pollution tax on the internal combustion engine in Metropolitan areas is a politically desirable and feasible way of solving a number of problems at the same time. However, like anything new, this idea must receive a certain amount of publicity, etc. before it can be enacted into law and therefore I am sending it to you for study by your aides with a view to seeing whether or not such a tax could be proposed and enacted.

Very truly yours,

ERNEST M. MAY.

## PROPOSAL TO COMBAT AIR POLLUTION IN METROPOLITAN AREAS

(By Ernest M. May)

## OBJECTIVE

The objective of this proposal is to :

1. Reduce, or at least maintain, the present air pollution levels in metropolitan areas.
2. Provide an incentive for automobile manufacturers and the oil industry to provide internal combustion engines which emit significantly lower amounts of pollutants.
3. Provide interim tax revenues to metropolitan areas which sorely need them.

## FACTS

1. At the present time many states have enacted legislation providing that chief executives may declare air pollution emergencies which forbid industrial activity and the use of automobiles during the emergency.

2. The internal combustion engine is now recognized to be the largest contributor to air pollution.

3. Essential transportation needs of the populace can be met with present internal combustion engines of smaller horsepower by using compact cars, etc. There is no need for high horsepower engines at the present time.

## PROPOSAL

The proposal is to enact legislation providing that the states or cities within these metropolitan areas may enact a pollution tax on motor vehicles registered or operated within their jurisdiction. This tax would be in proportion to the amount of pollutants emitted by the particular internal combustion engine used. Alternately, the tax could be levied by the federal government and returned, dollar for dollar, to each city and town in the area. In payment of such a tax a windshield sticker could be obtained. Administratively, for people in rural areas making a visit to a large city, they could obtain a windshield sticker for the term of their visit so that the tax would not be as great for people in rural areas as for people living in the metropolitan areas.

## RESULTS

If the tax were steep enough, it would provide a material incentive for people to buy lower horsepower cars, thus deferring the date of the critical emergency which is, evidently, according to experts, just over the horizon.

At the same time, it would provide a much greater incentive to the automobile and oil industries to step up their research and development on pollution free engines since such an engine would obviously have a lower tax than present engines. The tax would probably rule off the road older models at a faster rate since older car models would obviously pay a higher pollution tax.

## TIMING

Naturally such a tax would have to be signalled. It might be desirable to proclaim that such a tax would go into effect in 18 to 24 months and would be at an ascending rate annually. Presently, motor vehicles do not pay very much of a tax for license plates, etc. However, the State of Massachusetts has a very steep personal property tax on motor vehicles which evidently everybody pays so that a high tax on motor vehicles is practiced in at least one state.

Another advantage of a stiff pollution tax is to reduce overcrowding of streets in metropolitan areas, especially in New York City by cars and provide an incentive to use alternate means of mass transportation which is, in any event, a desirable objective. The federal government has been subsidizing highways into our urban centers to such an extent that the passenger vehicle is being subsidized and now the problem is to eliminate the automobile.

## POLITICAL FEASIBILITY

Such a tax would seem to be politically feasible. There is tremendous pressure from the cities to provide additional tax revenues to enable them to meet their budgets. This tax would provide it and, since it would be levied basically

on their own residents, it will be a new source of revenue. It should be not only politically acceptable to the inhabitants of our metropolitan areas but, even more so, to those now living in rural areas since they would not have to pay this tax. They would support it since now an increasing part of their tax dollar is going to the cities.

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AUTOMOBILE MANUFACTURERS ASSOCIATION, INC.,  
Washington, D.C., February 5, 1970.

Hon. EDMUND S. MUSKIE,  
U.S. Senate,  
Washington, D.C.

DEAR SENATOR MUSKIE: Because of your concern over environmental problems, we are enclosing a recent speech by Mr. Thomas C. Mann, President of the Automobile Manufacturers Association, entitled "Clean Air and the Automobile."

This speech gives a broad overview of the problems we face as consumers of air and as manufacturers of automobiles and it outlines what has been done and what is being done by the manufacturers to reduce vehicle emissions.

If we can be of any assistance to you, please let us know.

Very truly yours,

LEWIS B. HASTINGS,  
National Government Services.

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#### CLEAN AIR AND THE AUTOMOBILE

(Statement of Thomas C. Mann, President, Automobile Manufacturers Association, before the National Association of Manufacturers' Congress of American Industry in New York, December 4, 1969)

#### SUMMARY

Air pollution is rightfully a matter of concern to the American people. In view of its importance, the automobile manufacturers have assigned high priority to the task of ensuring that emissions from motor vehicles are effectively controlled and that, so far as motor vehicles are concerned, our atmosphere will not be polluted for future generations.

Knowledge is still limited about many relevant questions regarding this problem. Gaps in scientific knowledge partially explain why the need for pollution abatement programs was recognized only in relatively recent years. Intensive research programs are underway to provide answers to many of these unresolved questions, but we cannot wait until scientific knowledge is perfect. We must get on with the job of reducing emissions from both stationary and mobile sources.

Significant progress has already been made. In the past decade, automobile manufacturers have been able to reduce automobile emissions of hydrocarbons by slightly more than 80% and carbon monoxide by 65-70% of pre-control levels on 1970 model year cars sold in California.

If laboratory experiments accurately reflect what happens in the atmosphere, the photo-chemical smog conditions in California should by 1976 be somewhat better than they were in 1940. Total hydrocarbon emissions should remain below 1940 levels until the 1990's with controls now scheduled. In order to maintain those low levels after that date further controls may become necessary.

Improvements in air quality can also be expected in the other states, since nationwide vehicle emission controls have followed those pioneered in California.

Lower emission rates could be achieved sooner if state (or local) governments were to require periodic inspection and maintenance of emissions control systems on all cars. Periodic maintenance is an essential part of any effective air management program due to the fact that older cars—and particularly pre-controlled cars—emit relatively higher amounts of hydrocarbons and carbon monoxide.

In areas where vehicle-caused pollution problems cannot wait for older cars to be retired from use, governments could also require the installation of crank-



case controls on cars which do not already have them. (Crankcase controls were the first to be installed on new vehicles.) Reductions in the volatility of fuel sold in such areas could also be considered.

In addition to the reductions achieved in hydrocarbons and carbon monoxide, automobile manufacturers are now making intensive efforts to reduce the emissions of oxides of nitrogen. They are also concurrently engaged in extensive research and development to learn more about air chemistry, and to find better methods for controlling vehicle emissions. This research includes efforts to improve the internal combustion engine. In addition, work is going forward on cars powered by steam, electricity, gas turbines and hybrid engines, in the competitive search to find the power source which best fulfills our needs.

There is no disagreement about the urgency of the need to clean up the air in densely populated, highly industrialized areas. The challenge is to provide the kind of atmosphere required for people to exist in health and comfort without unnecessary waste and without adversely affecting the structure of our society. In the long term, the performance of both governments and industry will be judged not by how many pollutants are reduced or in what volume, but by whether reductions of particular pollutants actually result in cleaning up the air.

#### CLEAN AIR AND THE AUTOMOBILE

Fellow Panelists, Ladies and Gentlemen: The American people are irritated by the visible and tangible effects of dirty air on their environment. And they are concerned about the future effects of air pollution on plant and animal life.

Since motor vehicle emissions are a part of the problem,<sup>1</sup> I welcome this opportunity to describe very briefly what has been done to reduce them and the prospects for the future.

#### *Time-frame in which the industry's performance should be judged*

Governments, the private sector, the public in general—in short all Americans—were somewhat tardy in recognizing that the quality of our air had been deteriorating for many years and that abatement programs were needed.

One of the reasons for this is that until very recently we knew little about the atmosphere and the kinds of pollutants which exist in it and almost nothing about ways in which emissions of some pollutants could be reduced. As I shall explain later, even today there is much that we do not know.

This lack of scientific knowledge partially explains why it was that Congress, for example, waited until 1963 to enact the Federal Clean Air Act and until 1965 to authorize the fixing of emissions standards for motor vehicles. Even today the Department of Health, Education and Welfare is still in the process of determining what air quality criteria should be, that is to say, what concentrations of each pollutant in the atmosphere can be tolerated in safety and comfort.

Similarly, California, which pioneered in the control of both automotive and non-automotive emissions, did not fix limits on automotive emissions of hydrocarbons and carbon monoxide until December, 1959. Even then implementation was made dependent on prior approval by the California Motor Vehicle Pollution Control Board (MVPCB) of particular devices. And it was not until June, 1964 that qualified approval was given by the MVPCB to four devices, thus "triggering" emissions standards for automobiles applicable to 1966 model year cars.

More specifically, it was not until 1952 that Professor Arie Jan Haagen-Smit hypothesized that Los Angeles smog was caused by hydrocarbons reacting photochemically in the atmosphere with oxides of nitrogen. Professor Haagen-Smit identified the conditions which caused the photochemical reaction to take place, namely, low wind velocity, bright sunlight and an inversion layer.<sup>2</sup>

It is important to understand that this was the first time that the automobile was identified as a major contributor to photochemical smog. Since the constituents of Los Angeles smog are different from the gases which come out of the tail-

<sup>1</sup> The contribution of the various man-made and natural sources of pollution has yet to be scientifically established.

<sup>2</sup> Both the severity and frequency of photochemical smog are greater in Los Angeles than in any other American city. Other large metropolitan areas have different air pollution problems which do not necessarily lend themselves to the same solutions.

pipe of the automobile, before 1952 no one knew whether automotive emissions and smog were related and, if they were, in what way. Before then no one understood that hydrocarbons and oxides of nitrogen were transformed into other substances by a very complex chain of chemical reactions which occurred in the atmosphere under the climatic conditions prevailing in the Los Angeles basin. For this discovery all Americans are indebted to Dr. Haagen-Smit.

In September, 1953, the Director of the Los Angeles Air Pollution Control District said that if the relationship between smog and automotive exhaust emissions were established conclusively, emissions would be controlled. He requested that the industry conduct parallel research programs on the nature, effect and control of exhaust gases so that it could take appropriate action if required.

This reflected the California view, shared by the industry, that it would be prudent to test what was initially a theory rather than a demonstrated fact. Laboratory facilities were constructed in Los Angeles and Detroit. Photochemical smog was artificially produced in these laboratories and studied. These studies confirmed that hydrocarbons and oxides of nitrogen did indeed react together under artificial climatic conditions comparable to those which existed in the Los Angeles basin.<sup>3</sup>

From about 1954 forward, then, the need for intensive efforts to find practical ways to reduce emissions which caused smog was not, to my knowledge, questioned.

*The decision to give priority to the reduction of hydrocarbons*

The Government of California decided to concentrate first on the reduction of hydrocarbons, one of the two principal ingredients of photochemical smog. The hypothesis was that if one of the two basic components of photochemical smog (hydrocarbons) could be reduced, there would be comparable reductions in smog.<sup>4</sup> (The control of oxides of nitrogen, the other component of photochemical smog, did not become an objective until recently.)

The industry also thought that priority should be given to reducing hydrocarbons. Subsequently, since it was thought feasible to reduce carbon monoxide by substantially the same methods used to control hydrocarbons, reduction of this gas also became a goal.

At the outset, two kinds of problems presented themselves. One had to do with the need to develop instrumentation, to establish base lines against which progress could be measured, and to develop test procedures. The other part of the overall problem had to do with changes in, or additions to, the vehicle itself.

The California Motor Vehicle Pollution Control Board correctly described the overall problem as "one of the most difficult engineering challenges ever found in American car manufacture." The record of the industry's performance in meeting this challenge is one of continuous effort and achievement.

Starting in about 1954, then, the industry was engaged in a number of programs designed to reduce automotive emissions. While I attempt in Annex I briefly to list some of the important industry programs and put them into an approximate time-frame, you will understand, I am sure, that work went forward simultaneously on several fronts so that dates inevitably overlap each other.

*The industry's achievements in reducing hydrocarbons and carbon monoxide*

Annex I does not adequately reflect the difficulties inherent in modifying or adding devices to complex machines consisting of some 15,000 parts, each of which must function in harmony with all the others. These difficulties are compounded by the fact that, unlike other, less complex, machines, automobiles must function in extremes of hot and cold and over every conceivable kind of terrain, often with poor maintenance, driven by people with widely varying driving habits. And, as one might expect, nearly every modification (or device addition) aimed at emissions reduction involves some "trade-off" in engine performance.

Despite these difficulties, the progress has been dramatic. The figures speak for themselves. As a result of research and development within industry total automotive emissions of hydrocarbons have been reduced by over 80 percent

<sup>3</sup> While some of the important features in the complex series of chemical reactions that cause photochemical smog have since become better known, others remain obscure.

<sup>4</sup> The validity of this hypothesis appeared to be confirmed by laboratory tests. More recently, samplings of the atmosphere in the Los Angeles area indicate that the severity of smog has been reduced as emissions of hydrocarbons have been reduced. Much remains to be learned, however, about differences, if any, between smog in the air and smog artificially created in laboratories.

(compared to pre-control cars) and carbon monoxide by about 65-70 percent on all 1970 model year cars sold in California.

These reductions in *new car* emissions do not, of course, immediately reduce the *total volume* of the two gases escaping into the atmosphere. This is largely because of the number of older cars still on the road. Consider the figures:

The total number of motor vehicles on our roads today is a little over 100 million. The average life of a car is around 10 years. Older cars are replaced by new cars at a rate of about 8 percent per year. Thus, while automotive emissions of these two gases have been reduced as rapidly as the state of the art allowed, cars antedating 1963 (when crankcase controls were installed) are all relatively high emitters. And while cars produced between 1963 and 1969 had progressively lower emission rates, they are higher emitters than 1970 model year cars.

To repeat: Reductions in new car emissions can only gradually bring down the total volume of pollutants emitted by the entire car population. On this point of total volume, the estimates are that a peak of about 1,800 tons a day of automotive hydrocarbon emissions was reached in California in 1966. If there had been no reduction in hydrocarbon emissions, the current emission rate would have been about 2,450 tons a day in California. Because of the industry's achievements in reducing new car emissions, currently the total volume of hydrocarbon emissions in California has been brought down to 1,370 tons a day in spite of a larger car population. If all the cars in California today had an emission rate equivalent to 1970 model year cars total volume of this gas emitted into the California air would fall to about 450 tons a day.

The 65-70 percent reduction in new car carbon monoxide emissions translates itself, of course, into reductions in the total volume of automotive emissions of that gas in California. And the same reductions in the rate of new car emissions will bring about comparable reductions nationwide in the volume of emissions of these two gases.<sup>5</sup>

If this much progress has been made between 1954 and 1969, one may ask why it is that the ordinary citizen cannot already see and feel the difference in the quality of air he breathes.

In part, the answer to this question is that emissions from stationary sources still remain a significant part of our total air pollution problem.<sup>6</sup>

In part, the answer is that, unlike some kinds of emissions from smoke stacks, automotive emissions from properly maintained gasoline engines are largely odorless and invisible. The difference in the emission rates of these two gases from 1970 model year cars and pre-control cars is, therefore, not readily observable by the man on the street.

And, in part, the casual observer cannot see and feel the difference for himself because, as I have suggested, improvement in the quality of the air is necessarily gradual rather than sudden because of the large number of older, higher-emitter cars which are still on the road. This would be true even if the rate of new car emissions were zero.

This brings me to a facet of our clean air program which is seldom mentioned and which requires action by governments, principally state and local.

#### *The role of governments in air management programs*

*The Importance of Periodic Inspection and Maintenance.*—Automobile manufacturers have, over the years, been able to reduce the need for major repairs and frequent maintenance.<sup>7</sup> But the complex machine that is today's automobile still requires a minimum amount of maintenance.

A representative sampling of customer-owned and customer-maintained vehicles in California revealed, for example, that simple readjustments of idle speed and fuel mixture to conform to manufacturers' specifications can lower emissions of hydrocarbons by about 10 percent and carbon monoxide by about 15 percent. Engines which are badly "out of tune" or "missing" can have very

<sup>5</sup> Currently federal standards are the same as California standards except that evaporative controls are required now in California and will be required by Federal standards beginning with 1971 model year cars.

<sup>6</sup> While considerable progress has been made in some areas in reducing pollution from stationary sources, nationwide less progress has been made in reducing emissions from stationary sources than in reducing automotive emissions.

<sup>7</sup> For example, it is no longer necessary periodically to grind valves, rebore the engine block or to install new pistons or piston rings. Cars usually last longer without relatively frequent major repairs of this kind. Similarly, oil changes and greasing are required less frequently than they used to be.

high emission rates; in these cases, adjustment is even more effective. Some old cars, of course, are in need of major repair.

It needs to be emphasized that, unlike the better emissions performance of new cars, periodic inspection and maintenance affect the total car population and, hence, directly affect the total volume of pollutants escaping into the atmosphere. Maintenance is, therefore, an essential part of any effective air management program. It will continue to be so in the foreseeable future.

Yet, those who speak so often about the need for manufacturers to try harder are too often silent about the need for periodic maintenance of emissions controls. Hopefully, they will be willing to explain to the public that periodic inspection and maintenance is a relatively inexpensive way of getting total automotive emissions down promptly and, equally important, keeping them down—and that opposition to periodic maintenance is incompatible with the need for clean air.

In addition to periodic inspection and maintenance, there are other ways to speed up the rate of progress.

In many areas of the country the public interest might well be served best by waiting for older cars to be retired from use. In other, more densely populated areas where air pollution is considered severe—and where the automobile is a significant part of the problem—officials may well decide that prompt action concerning older cars is necessary. Where the latter is the case, governments have a number of options open to them:

*Crankcase Controls.*—In all states there are many older cars on the road which are not equipped with crankcase controls. A significant reduction in the total automotive hydrocarbons escaping into the atmosphere could be achieved by requiring all cars to be equipped with these controls. While this would involve more customer expense and inconvenience than periodic inspection, it ought to receive the serious consideration of governments which consider that the public interest would not be served by waiting for unequipped cars to be withdrawn from use.

*Reduced Fuel Volatility.*—If still further reductions in automotive hydrocarbon emissions are considered by governments to be immediately necessary, the petroleum industry could be consulted about the feasibility of reducing the volatility of fuel used by those cars not equipped with evaporative controls. The aim, of course, would be to reduce hydrocarbons escaping into the atmosphere in the form of evaporated gasoline.<sup>8</sup> This would appear to be feasible for selected areas.

#### *Oxides of nitrogen*

Because governments gave first priority to reducing emissions of hydrocarbons (because of its role in the formation of smog) and carbon monoxide (because of its toxic qualities), I have, up to this point, reviewed the progress made in reducing the volume of automotive emissions of these two gases.

Scientists have, however, identified three additional primary<sup>9</sup> air pollutants. These are sulphur oxides, solid particles and nitrogen oxides. While sulphur oxides are a major problem in some areas, they are not major products of gasoline engines and are therefore outside the scope of this discussion. Similarly, automobiles produce some particulates in the form of lead and lead salts which are exhausted from automobiles and originate in the anti-knock fluid added to gasoline. The importance of these particulates is under investigation. This is more properly a subject for discussion by others.

This leaves oxides of nitrogen—the third primary pollutant emitted from automobiles. The first regulations concerning automotive emissions of this gas were issued about one year ago and made applicable in California to 1971 model year cars. As was the case with hydrocarbons and carbon monoxide, California's schedule for reduction of this gas provides for increasingly stringent emissions standards in the years immediately ahead.

The control of nitrogen oxides emissions will require techniques different from those which have been successfully used in the past. High combustion temperatures, for example, are required to reduce emissions of hydrocarbons and carbon monoxide; the opposite is true with regard to nitrogen oxides. Similarly, a

<sup>8</sup> Low volatility fuels become less important as older cars are phased out.

<sup>9</sup> Some of the five primary pollutants react chemically in the atmosphere to form secondary pollutants.

"lean" fuel mixture helps to reduce emissions of the first two gases while a "rich" mixture reduces oxides of nitrogen. Thus, reductions in automotive emissions of hydrocarbons and carbon monoxide have actually operated to increase somewhat emissions of nitrogen oxides.

I cannot predict what the pace of progress will be in coping with this newest, hopefully the last, major dimension of the automotive emissions problem. Presumably companies individually may find it equally difficult to make predictions at this point in time. We all know that breakthroughs in technology can come at unexpected times and in unplanned ways as well as a result of the less glamorous, slower research and development work.

I should think it reasonable to presume, however, that the state of the art of reducing emissions of oxides of nitrogen is today comparable to that which existed a few years ago in regard to the two pollutants already discussed—and that among the challenges is the development of a better, more durable catalytic converter.<sup>10</sup> One thing is clear: Automobile manufacturers will give high priority to this task.

#### *Effects of the three automotive pollutants on animal and plant life*

Up to this point, we have been considering the progress that has already been made by automobile manufacturers to reduce the volume of the three automotive pollutants. Volume is important but, by and of itself, it doesn't tell us much about the harmful effect of these particular gases on plant and animal life.

Attempts by governments to identify and measure pollutants in the air were not made until shortly before and during the 1920's. The analyses made then were unfortunately few in number and of questionable accuracy. Not until the 1950's did governments undertake a monitoring program in a serious way.<sup>11</sup>

The result is that even today our knowledge of how pollutants in the atmosphere flow and disperse—and how some of them are converted into other forms by a complex series of chemical reactions—are not well understood. There is almost a total ignorance of possible synergistic effects. Nor is it possible to state with precision what the lifetime of pollutants in the air is<sup>12</sup>—something most relevant to the topic of clean air.

Moreover, a number of technical problems remain unsolved. Data being developed by different researchers often do not correlate well. Instrumentation capable of accurately measuring many substances in the atmosphere in very minute concentrations is still being developed. It is not clear that air sampling methods and sites are entirely satisfactory. Scientists have not succeeded in simulating many atmospheric chemical reactions in laboratories so that they can be studied and understood. Most of the data concerning photochemical smog—which is one form of air pollution—have been gathered in one geographic area (Los Angeles) so that there is inadequate knowledge about photochemical smog conditions in other areas.

Similarly, while the effect of *very heavy* concentrations of some pollutants on laboratory animals is known, we still have much to learn about the effects on human beings (and on other animals and plants) of exposure to the *much smaller* concentrations that are found actually to exist in the atmosphere.

All of these uncertainties have given rise to a great deal of speculation. Last month, for example, I read three news reports speculating about the global effects of air pollution. One scientist was reported to have theorized that air pollution could, by trapping energy from the sun, cause the polar ice cap to melt and bring on earthquakes, volcanic eruptions, flooding and other calamities. Another is reported to have reached the opposite conclusion—that air pollution, by reflecting the sun's rays away from the earth, would cool the earth and lead to the formation of glaciers, icebergs and ice. Attributed to a third scientist is the belief that air pollution from both man-made and natural sources caused global temperatures to increase by 0.6 degrees centigrade between the 1880's and 1940's. After the 1940's (when global temperatures are said to have decreased

<sup>10</sup> It is noted in passing that, in the current state of the art, lead additives in some gasolines adversely affect the effectiveness and durability of catalysts. The elimination of lead additives, in all gasoline consumed nationwide would presumably pose difficult problems for our petroleum industry. No attempt is made here to discuss this aspect of the problem.

<sup>11</sup> *Cleaning Our Environment: The Chemical Basis for Action*. A report by the Subcommittee on Environmental Improvement, Committee on Chemistry and Public Affairs, pp. 25-27. For only one gas, carbon dioxide, is there enough data to demonstrate that the gas' global concentration is changing.

<sup>12</sup> *Cleaning Our Environment*, op. cit., p. 27.

by about 0.3 degrees centigrade) the buildup of atmospheric turbidity was thought to deflect more heat away from the earth than the increase of carbon dioxide in the atmosphere retains. Thus the effect of different pollutants were thought to counteract each other to some extent.

Even a casual reader of the press these days can find equally conflicting scientific theories about almost any pollutant and their effects on plant and animal life. So long as the reader keeps clearly in mind the distinction between speculation and theory, on the one hand, and established scientific fact, on the other, speculation is a useful tool in widening the horizons of knowledge. But speculation which is presented as scientific fact with the aim of arousing people to political action does not necessarily lead to the right conclusions. Fear is a poor counselor.

After reviewing some of the current literature, I have attempted to summarize in Annex II what I have read about the characteristics of the three primary pollutants that come from the automobile. I know you will understand that this summary is neither complete nor definitive. In fact, the common denominator of nearly everything I have read is that we still have a great deal to learn—that there is an urgent need to carry out large-scale research and development programs designed to produce solid evidence on which sound anti-pollution programs can be built.

#### *Prospects for the future*

*Photochemical smog.*—The reduction in automotive emissions already described—plus additional reductions required in California for 1971 model year cars—means that the total volume of automotive hydrocarbons escaping into the atmosphere will, by 1976, be somewhat lower than the level which prevailed in 1940.<sup>13</sup> Assuming laboratory experiments accurately reflect what happens in the atmosphere, smog conditions in California should, by that date, be better than they were in 1940<sup>14</sup>—the goal originally set by California.

These estimates assume that California will not make periodic emissions maintenance mandatory. They also assume that California will not require the modification of gasoline sold in the Los Angeles basin for cars not equipped with evaporative controls and will not require crankcase controls on cars not already equipped with them. If California authorities were to take these actions, the emission rate would be somewhat lower<sup>15</sup> and, more important, the 1976 date for reaching 1940 hydrocarbon emissions levels would be advanced.

On the same premises, it is also estimated that the volume of automotive hydrocarbon emissions in California will, after 1976, remain below the 1940 levels until sometime in the 1990's when total volume may again rise above the 1940 level.<sup>16</sup> Estimates beyond 1990 depend, however, on a number of imponderables. These include the rate of increase in the human and car population and the number of miles driven; the rate of industrial growth and the location of that growth; and whether our car and human population will, in the future, be even more concentrated in a few areas or more dispersed. Depending on our experience with these and other factors, additional reductions in the rate of hydrocarbon emissions may become necessary.<sup>17</sup>

While we know very little about infrequent photochemical smog in other metropolitan areas, the practice of the Department of Health, Education and Welfare up to this time has been to adopt, shortly after their promulgation, the more stringent California standards. Thus, the other 49 states share both the costs and the benefits of the California program while benefitting from the ex-

<sup>13</sup> This estimate for the 1940's is based on emission measurements from cars owned and driven by Californians in the Los Angeles area. The cars were of various makes and models, of varying age and mileage and in varying states of maintenance. The calculations for 1976 taken into account anticipated increases in the car population and in the number of miles driven. These projections may well be on the conservative side since manufacturers continue to improve their control techniques each year.

<sup>14</sup> These estimates assume the correctness of the assertion that automotive emissions are the main cause of California smog.

<sup>15</sup> Our estimate is that this could mean an additional daily drop of about 335 tons of automotive hydrocarbons.

<sup>16</sup> An HEW official has stated: "In my judgment, the best we can expect from the Federal standards now in effect is that hydrocarbon and carbon monoxide emissions will in 1980 dip to approximately 60 percent of current emissions or roughly what they were in 1953." It is not clear to me at this time whether, in view of the underscored phrases used, this estimate conflicts with the estimates made here.

<sup>17</sup> Since the reaction of hydrocarbons and oxides of nitrogen to form smog takes place when there are certain ratios of one to the other, some scientists believe that oxides of nitrogen can serve to impede smog formation as well as to help form it. Others disagree. Hopefully research will soon provide a definitive answer to this question.

perience—usually a year—gained from the use of new systems and devices by customers.

*Other Power Plants.*—Automobile manufacturers have long been engaged in research programs aimed at the development of power plants other than today's conventional gasoline engine. One manufacturer recently exhibited here in New York, in Detroit and in California various kinds of vehicles powered by steam, electricity, gas turbines, and hybrid plants. Other automobile manufacturers have also been at work in developing gas turbine and electric cars.<sup>18</sup>

Contrary to what appears to be a rather widely held belief, all automotive power plants capable of even approaching the performance of the conventional gasoline engine directly or indirectly produce emissions.<sup>19</sup> As emissions knowledge increases—and as emissions standards become more and more stringent—the difference between emission rates of various types of power plants becomes increasingly narrow. In a very real sense today's gasoline engine competes with alternate power plants in emissions performance as well as in other respects.

The public's guarantee that the best possible power plant will be produced is the freedom which all Americans have to invent and innovate. It is pertinent to note, in this connection, that automobile manufacturers do not have a monopoly on technology. Other industries produce turbine engines. Still other industries produce batteries.<sup>20</sup> Other industries produce the fuel used in today's conventional engine the burning of which creates emissions. Other industries produce steam engines and still others produce heat resistant metals and catalysts.

If further opportunities and incentives to innovate were needed, it would seem to be provided by the recent announcement by responsible officials of the federal government that increased funds will be made available for development of new automotive power plants. Consistent with their competitive traditions, automobile manufacturing companies welcome additional research and development in this field. If a breakthrough in technology were to occur, they would be eager to use it and to seek ways to improve it. Meanwhile they continue their own research and development programs.

Finally, the Federal Clean Air Act contemplates two separate steps in the process of cleaning up our air. A determination is to be made of the quality of air needed. Standards applicable to all sources of emissions are then to be fixed so that acceptable air quality can be achieved and maintained.<sup>21</sup>

There is no disagreement about the need to preserve a global environment in which plant and animal life can flourish. Nor is there disagreement about the urgency of the need to clean up the air in densely populated, highly industrialized areas. I would hope there is also agreement on the proposition that virtually everything which contributes to man-made pollution of the air—the power plants, heating units in homes and plants, waste-disposal establishments, automobiles, trucks, airplanes and other segments of our industrialized society—are also important to our individual and collective well-being.

If this is so, the challenge is to provide the kind of atmosphere required for living things to exist in health and comfort without unnecessary waste and without doing damage to the structure of our society.

Certainly basic research programs aimed at identifying and measuring the many gases, liquids and solids in our air, learning about what happens to them, and what effect atmospheric concentrations have on our environment, deserve a high priority in the allocation of funds for government research programs.

We cannot, of course, afford to wait until scientific knowledge is perfect. We must get on with the job of reducing emissions from both stationary and mobile sources. But as automotive emissions standards reach lower and lower levels—and as the cost per gram becomes progressively higher—it becomes all the more important to proceed with due regard for the current deficiencies in our knowledge; with due regard for the possibility that the measures taken today may well be proven tomorrow to have been off-target and wasteful; and to have

<sup>18</sup> Time does not permit a more detailed description of the merits and demerits of various types of engines. If those interested in the subject will write to the Automobile Manufacturers Association, we will be pleased to provide you with additional information.

<sup>19</sup> The electric car is the "cleanest" since it does not require fuel combustion. Most electric power plants which generate electric power need to charge automobile batteries burn fossil fuels, however, and are themselves sources of pollutants.

<sup>20</sup> The need for better ways to store electric energy is the principal obstacle to the development of a high performance, low cost, light weight electric car.

<sup>21</sup> With the exception of California, automotive emissions standards are fixed by the federal government. State and local governments have the primary responsibility for fixing emissions standards for stationary sources of pollution.

clearly in mind that air quality criteria and emissions standards can, and should be, changed as knowledge grows. In the long term, the performance of both government and industry will be judged not by how many pollutants are reduced or in what volume but by whether reductions of particular pollutants actually result in cleaning up the air.

We are living in an increasingly interdependent society. The job of maintaining clean air is one of the many today which require the efforts of everyone. Industry has a primary role to play. Governments also have vital responsibilities. And each citizen, especially car owners, must also be willing to participate if a clean air program is to succeed. I have no doubt that—collectively—we can get the job done.

## ANNEX I.—ACHIEVEMENTS BETWEEN 1954—1970

### PRECONDITIONS OF EMISSIONS CONTROL

*Development of Measuring Instrumentation and Techniques.*—Initially, instruments and techniques for measuring automotive exhaust emissions did not exist. Developing them was not an easy task since it was necessary to identify and measure very small fractions (a few parts in a million parts) of exhaust gas flow.

In October, 1954, an automobile manufacturer published the first of several papers on a possible way to measure emissions. Thereafter, manufacturers, in cooperation with the Liston Beckman Company (now Beckman Instruments, Inc.), succeeded in developing for this purpose a non-dispersive, infra-red gas analyzer.<sup>1</sup> This first instrument was improved and later models were used by both government and industry.

*Establishment of a Base Line Against Which Progress Could be Measured.*—Instrumentation and measuring techniques having been developed, the next essential step was to discover what quantities of hydrocarbons and carbon monoxide were being emitted from automotive exhausts of cars owned and driven in California by Californians. To this end, what has come to be known as the Los Angeles Field Survey was jointly undertaken by the Los Angeles Air Pollution Control District, Los Angeles police and traffic experts, and industry engineers.

This survey was made between May, 1956 and February, 1957. Vehicle operation test cycles (consisting of a combination of acceleration, cruise, deceleration and idle modes) were developed, exhaust emissions of cars in use measured, and data accumulated and analyzed.<sup>2</sup>

Without the data developed in these surveys, there would have been no base line against which future progress in reducing emissions of the two gases could have been measured. This base line has subsequently been used by both California and federal authorities.

*Development of Test Procedures:* The next essential step was to develop standardized test procedures which would make it possible for industry engineers and government laboratories to conduct repeatable tests for development and, later, certification purposes.

This was accomplished between January and May, 1961 as a cooperative effort of industry engineers and California control authorities. A "driving schedule" was developed consisting of six identical seven-mode "warm-up" cycles and one eleven-mode "hot" cycle. In August, 1963, and again in January, 1964 these test procedures were changed somewhat by California authorities. Currently, test procedures consist of seven identical 7-mode driving cycles although industry engineers and government officials continue to study possible improved methods.

Each of these three problems had to be solved before governments could, as a practical matter, regulate emissions. While the manufacturers began work on the separate "hardware" aspects of emissions control before these three problems were solved, their solution was, as a practical matter, equally essential to the industry's ability to reduce emissions.

<sup>1</sup> Other possible measurement techniques were also studied (e.g., gas chromatography, flame ionization, ultra-violet analysis).

<sup>2</sup> In 1957 a similar field survey was made in Detroit for the purpose of enabling manufacturers more quickly to determine the rate of emissions from new cars.

In 1958, an automobile manufacturer, working with Clayton Manufacturing Company, developed ways to use a chassis dynamometer to take the place of road testing in the measurement of emissions.



## CHANGES IN THE VEHICLE

In October, 1953, the Governor of California convened a conference on air pollution. That conference requested the industry "to develop, as soon as possible, a device to reduce the contaminants coming from motor vehicles." In December, 1953 the industry, in response to this and other requests from California authorities, created the AMA Vehicle Combustion Products Committee (VCP) to "investigate thoroughly all available information on technical aspects of the air pollution problem as it relates to motor vehicles." In 1954 the industry enlisted the support of the Coordinating Research Council (CRC)—a technical, non-profit organization sponsored by the Society of Automotive Engineers and the American Petroleum Institute—to study techniques of sample analysis; to study engine, fuel and lubricant variables; to make a literature survey; and to make a field survey.<sup>3</sup>

*Catalytic Converters.*—Initially, it was thought that the best way of reducing hydrocarbons might be through the use of a catalytic converter—a device through which exhaust gases are passed for the purpose of altering the chemical characteristics of the gases.

Beginning in 1954, automobile manufacturers and various other enterprises undertook the task of developing such a device. Much of the work of the automobile manufacturers on such devices was done "in house" by individual manufacturers. The efforts of a single automobile manufacturer illustrate the magnitude of this endeavor.

One manufacturer tested units furnished by Oxy-Catalyst, Arvin, Ethyl, Norris-Thermador, Monsanto, du Pont and Walker. During this program, this company purchased a non-exclusive license from Oxy-Catalyst and began development work on an improved container and air supply. Oxy-Catalyst continued its work to improve efficiency, attrition characteristics and the surface area of the catalyst itself.

In April, 1960 the same automobile manufacturer supplied engineering drawings of this system to three major muffler manufacturers and gave them permission to manufacture units for sale without paying royalties. The Arvin converter, which was later certified by California authorities for use in that state, employed many of the principles developed through these efforts.<sup>4</sup>

While automobile manufacturers and other companies working on this device succeeded in developing a converter which reduced emissions, a number of problems remain including high initial cost, high maintenance cost and lack of durability.

Automobile manufacturers nevertheless continue their efforts in this area.

*Deceleration Devices.*—Initially it was thought that most hydrocarbons were emitted from the exhaust during deceleration of the engine. Industry engineers therefore made a major effort to perfect devices which would reduce emissions during periods of engine deceleration.

In August, 1957 industry engineers published a report on the development of some 30 prototypes of deceleration devices. Some 50 prototype devices were submitted to the California authorities for testing.

The value of this research and development work was diminished by the discovery that only about 20% (not 60% as previously thought) of automotive hydrocarbons were emitted during periods of deceleration. The work done was useful, however, because much of the knowledge gained was utilized in the more complex task of engine modification to which the industry later addressed itself.

*Air Injection Devices.*—One automobile manufacturer began research and development work in 1958 on the feasibility of reducing hydrocarbon emissions by injecting additional air *directly into the combustion chamber*. Check valves inserted into each combustion chamber, a timed air distributor and air injection were used. Tests showed that this approach was quite effective in reducing carbon monoxide but only moderately effective in reducing hydrocarbons.

<sup>3</sup> Later the CRC undertook to coordinate a \$13 million basic research program in the engineering, atmospheric and medical aspects of the air pollution problem. This program is sponsored by the automobile manufacturers, the petroleum industry and the Department of Health, Education, and Welfare.

<sup>4</sup> The Arvin device and 3 others not produced by automobile manufacturers were, in effect, decertified later after the California legislature placed an unrealistic ceiling on the retail price of such devices and failed to require periodic inspection and maintenance essential for their effective use.

In 1960 the same company experimented with injection of air into the *engine exhaust ports* with the air of oxidizing exhaust gases. The first tests were also disappointing.

Meanwhile, in 1957 another automobile manufacturer experimented with injecting air into the *exhaust manifold* as a part of its research and development work on catalytic converters. It was noted that the level of hydrocarbons entering the converter was somewhat lower when air had been injected in the exhaust manifold.

Subsequently, other automotive engineers begin to experiment with the injection of air into an enlarged exhaust manifold on the theory that hydrocarbons might be substantially reduced by oxidization if (a) sufficient quantities of oxygen were injected into such a chamber, (b) high temperatures were maintained, (c) hot exhaust gases and injected air were well mixed in the chamber and (d) the time of their residence there were longer. Their work, however, revealed a number of difficult problems inherent in this approach, including problems of durability and high initial and annual maintenance costs.

In spite of the problems initially encountered, three of the four automobile manufacturers elected to reduce hydrocarbon emissions from their engines by combining a limited engine modification approach with an air injection approach. The fourth manufacturer initially elected to rely principally on more extensive engine modification without air injection—a technique which is described later.

One of the problems that had to be solved in the air injection approach was exhaust system "backfires". Manufacturers worked on this problem individually and in cooperation with Holley Carburetor and Carter Carburetor. Eventually protective valves of various designs were developed which eliminated this particular problem.

By 1964 the most important unsolved problem in the air injection process was the lack of a practical air pump. After working with outside suppliers (e.g., TRW, AiResearch, Schwitzer, Norris-Thermador, Midland-Ross) one company finally succeeded in developing a durable and effective air pump. Pumps of this design, made available to other manufacturers and adapted to various engines, were installed by three manufacturers on some of their 1966 model year cars.

The air injection approach proved to be a practicable way of reducing both hydrocarbons and carbon monoxide by, in effect, making the manifold a second burning chamber in which a more complete oxidization of imperfectly burned fuel takes place under high temperatures.

*Direct Flame Afterburners.*—A direct flame afterburner is essentially a device which receives exhaust gases and into which air is injected. The gases and oxygen may be ignited by means of a type of spark plug to cause combustion. It differs from air injection, already discussed, in that air injection oxidization takes place automatically when hot exhaust gases are mixed with air.

The direct flame afterburner at first appeared to be a practicable method of reducing hydrocarbon emissions. From 1959 through 1964 automobile manufacturers worked with various companies (e.g., TRW, 3M, Arvin, George Cornelius, Clayton Manufacturing, duPont, McAlester Aircraft, American Chain & Cable, Owens-Corning Fiberglass, Robert Shaw-Fulton, Udylite Corporation, Norton-Portland Corp. (Monoxit), Dole Valve, American Machine and Foundry) in an effort to develop an effective device.

In January, 1964 an AMF device was certified by the California authorities and installed by one automobile manufacturer on a number of its cars. These cars, however, failed to meet California requirements.

The experimentation with direct flame afterburners revealed a number of problems which remain unsolved up to this time.

High temperature requirements created a durability problem. Significant engine and afterburner maintenance was required. Additional insulation appeared necessary to protect components as well as passengers from temperatures which might rise as high as 3400° F. The devices also created various engine performance deficiencies.

*Engine Modification System.*—The conclusion—announced in January, 1959 after much experimentation with vehicles in service tests—that periodic inspection and maintenance of automobiles could reduce exhaust emissions of hydrocarbons and carbon monoxide by as much as 60% helped cause engineers to begin thinking about the feasibility of making modifications in engines to reduce exhaust emissions of the two gases; the goal was complete burning of fuel in the engine itself.

As already noted, initially it was thought that the devices already described (catalytic converter, air injection and direct flame afterburners) offered the most promise. Efforts to develop such devices were given priority. As research and development programs on the three devices revealed difficulties already described, automobile manufacturers gave greater priority to a systems approach rather than a device approach—to engine modification. As already stated, some manufacturers turned to a combination of limited engine modification and air injection.

Engine modification reduces exhaust emissions of hydrocarbons and carbon monoxide by modifying components of the engine in order to obtain a more complete burning of the fuel. It is important to understand that different engines and different engine-transmission combinations react in different ways to modification of engine components. Changes in design of engine components could not therefore be alike in every instance; they had to be adapted to the requirements of each engine so that unacceptable penalties in engine performance could be avoided.

Essentially, engine modification includes redesign of the carburetor and choke to introduce less fuel and more air into the combustion chamber. The distributor and spark timing are modified to increase temperature. Radiators and water pumps are modified to take account of higher temperatures. Pistons, cylinders and cylinder heads are modified to eliminate "quench areas" in which burning is incomplete. Engine modification also requires changes in other components too numerous to list.

Needless to say, in addition to modifying components on existing engines, automobile manufacturers also began to give high priority to emissions performance in the design of new engines. All of the emissions knowledge gained in modifying older engines continue to be built into the design of new engines.

By March, 1962 one manufacturer was able to prepare 100 Clean Air Package Kits consisting of hand-built parts applicable only to its 1962 model 318 cubic-inch engine. The kits were made available to government officials, technical laboratories, other automobile manufacturers and others interested in evaluating the system.

Early in 1963 an engine modification system of this same manufacturer was tested on two of its 1963 model engines with automatic transmissions in order to gain field experience under actual driving conditions. In 1964 the same manufacturer supplied a limited number of automobiles, equipped with engine modification, to the Los Angeles County fleet.

In June, 1963, the California legislature amended its laws so as to permit engine modification systems to be treated as a "device". This amendment permitted California authorities, after testing the system, to certify it for use in California in November, 1964.

Between 1964 and 1966 the system continued to be improved and it was adopted in various forms by all manufacturers in their later model year cars although air injection continued to be also used on some engine-transmission combinations.

Engine modification and air injection, or combinations of the two, are the principal techniques currently used to reduce exhaust emissions of hydrocarbons and carbon monoxide. They have made possible the very considerable progress which had been made in reducing *exhaust emissions* of these two gases.

#### ELIMINATION OF THE EMISSIONS FROM THE CRANKCASE

As early as August, 1959, an automobile manufacturer discovered that unburned gases escaping into the atmosphere from the crankcase accounted for a significant percentage of the total hydrocarbons escaping from automobiles. Automobile manufacturers therefore also addressed themselves to this aspect of the problem.

By November, 1959 the industry was able to inform the California authorities that they would be able to re-route most unburned hydrocarbons in the crankcase to the engine for reburning. The first device voluntarily installed by a manufacturer called Positive Crankcase Ventilation or PCV—had certain deficiencies. These deficiencies, as well as new technical problems arising out of a California requirement that crankcases be completely "closed", were, however, overcome and an improved PCV was installed on all cars sold in the United States beginning with 1963 model year cars.

This effectively eliminated the crankcase as a source of hydrocarbon emissions and reduced the total amount of hydrocarbons emitted from automobiles by about 20%.

## REDUCTION OF AUTOMOTIVE EMISSIONS OF HYDROCARBONS THROUGH EVAPORATION

Hydrocarbons in the form of evaporated fuel also escape from the automobile principally through vents in the gasoline tank and carburetor.

In about 1962 automobile manufacturers began to study ways in which these evaporative losses could be eliminated. It was first necessary to develop equipment for capturing all of the fuel lost in evaporation so that it could be measured. This was solved by placing the entire automobile inside a leak-proof plastic bag.

The next step was to create artificially inside the plastic bag the conditions which exist under typical driving conditions, including particularly the generation of heat. These conditions existing, the evaporated fuel inside the plastic container had to be accurately measured according to realistic test procedures.

This accomplished, it was next necessary to close all possible escape routes for evaporated fuels (principally vents in the gasoline tank and carburetor); to route such gases into containers (some companies used charcoal canisters, others the crankcase); and then to re-route the evaporated fuel to the engine for burning.

This process, in turn, required the development of valves and sensing devices so that the evaporated fuel could be fed into the engine at an even rate and mixed in the proper proportion with fuel coming from the gas tank.

All of this was successfully accomplished and evaporative controls installed as standard equipment on 1970 model year cars sold in California. The same controls will be on all new cars sold nationwide beginning with the 1971 model year cars. The evaporative controls have meant the elimination of about 90% of evaporated fuels. Total hydrocarbon emissions from new cars were reduced by about another 20 percent by these controls.

## ANNEX II.—CHARACTERISTICS OF POLLUTANTS

## CARBON MONOXIDE

One source estimates that motor vehicles contribute "more than 80 percent of carbon monoxide emissions globally, with smaller amounts coming from other combustion processes."<sup>1</sup> Stanford Research Institute has estimated that natural sources are responsible for 22 percent of the estimated 350 million tons annual production of the gas. Of the remaining 78 percent, 55 percent is a result of gasoline combustion and 23 percent the result of combustion of other materials.<sup>2</sup>

Scientists seem to be in agreement that carbon monoxide is chemically inert, that is to say, it does not react in the atmosphere to any significant degree with other substances to form other pollutants.<sup>3</sup> Therefore it does not contribute in a significant degree to the formation of "secondary" pollutants.

The atmospheric concentration of carbon monoxide does not appear to be increasing. Thus it would appear that the ecological balance is not being upset by emissions of this gas and that virtually all of this particular gas returns from the atmosphere to what the scientists call a "sink." The nature of the "sink," or scavenging mechanism, is not yet known but currently some of the unverified theories include absorption and retention by plant life or by microorganisms in the soil, or absorption and oxidation by biological processes in the ocean, or conversion to carbon dioxide. Nor is the length of time which carbon monoxide resides in the atmosphere known. It could be as short as a few days or as much as three years.<sup>4</sup>

It is, of course, known that high concentrations can cause death by interfering with the ability of hemoglobin in blood to exercise its function of carrying oxygen from the lungs to body tissue. It is also known that the reaction of the body to heavy concentrations of carbon monoxide is reversible, that is to say, the system cleanses itself after exposure.

These known facts do not, however, resolve the question of the effects on people of much lower concentrations of carbon monoxide found in the atmosphere. A government survey of off-street locations in five major cities found the average

<sup>1</sup> *Cleaning Our Environment: The Chemical Basis for Action*. A Report by the Subcommittee on Environmental Improvement, Committee on Chemistry and Public Affairs, p. 34.

<sup>2</sup> *Sources, Abundance and Fate of Gaseous Atmospheric Pollutants*, Stanford Research Institute, June 1969, p. 44.

<sup>3</sup> *Cleaning Our Environment*, op. cit., p. 34.

<sup>4</sup> *Cleaning Our Environment*, op. cit., p. 35.

concentration of carbon monoxide to be somewhere around 7.3 parts per million. The minimum yearly average was 6.7 p.p.m. and the maximum was 7.9.<sup>5</sup> Sudden and temporary concentrations of 100 p.p.m. and higher have been reported.<sup>6</sup> By contrast, cigarette smoke has a concentration of between 400–475 parts per million<sup>7</sup> and global atmosphere concentration is estimated at 0.1 parts per million.

Identification of health and other effects on people of the comparatively low concentrations of this pollutant in urban environments is one of the subjects being studied in the research program by the Air Pollution Research Advisory Committee of the Coordinating Research Council, jointly sponsored by the Department of Health, Education and Welfare, the petroleum industry and the automobile manufacturers.

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#### STATEMENT ON PROPOSED AMENDMENTS TO THE CLEAN AIR ACT

(By Joseph W. Mullan and Robert F. Stauffer)

Mr. Chairman, Members of the Committee: I am Joseph W. Mullan, Director of Air Pollution Control for the National Coal Association. I am accompanied by Robert F. Stauffer, Assistant General Counsel of the organization. National Coal Association is the principal spokesman for the coal industry and represents the major coal producing and sales companies of the nation. We appreciate this opportunity to appear here and express our views on the proposed clean air legislation.

Air pollution is not a new problem. It has been with us, I suppose, since the first campfire. However, it wasn't until 1963 that the Federal Government took an active interest in its control, with the enactment of the Clean Air Act of 1963, which was a product of this committee.

Much was accomplished in the succeeding six years. In that respect, I have attached an exhibit to my statement, graphic evidence that the air is getting cleaner—not dirtier in some of our major cities. This is not to say it is clean enough, but it's a start.

The sulfur dioxide level in the Chicago area has declined steadily over the last six years. The attached chart illustrates this improvement. In 1968 and 1969 the level was well below the suggested goal of less than .040 parts per million as published in the U.S. Department of Health, Education and Welfare Criteria.

This improvement in the ambient air is due entirely to the voluntary efforts made by Chicago citizens, since the sulfur restrictions of the Chicago Air Quality ordinance do not become effective until July 5, 1970.

The 1969 average sulfur dioxide level of .026 parts per million was reached five years ahead of the schedule projected by the coal industry when the ordinance was being considered. Philadelphia, New York and Washington have made similar progress.

Federal leadership, beginning in 1963, and expanded by the 1967 Act is, I believe, principally responsible for the improvements that have been made. But none of it would have been accomplished without cooperation by the governments of lesser jurisdictions, and the active efforts of the industrial community.

We have had the opportunity to view the process as it now exists on a first hand basis. Either Mr. Stauffer or myself have testified at practically every air pollution hearing—state or federal—held under the existing law. Certainly, based on experience under the law, improvements can be made, but, basically it is a “good law.”

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<sup>5</sup> An HEW official has stated that at measuring stations in several large cities “. . . carbon monoxide exposures regularly exceed the level at which this pollutant is believed by many to endanger human health—10 parts per million over a five-hour period. Exposures exceed this level at all stations at least some of the time and at some stations much of the time. What is more, studies we have made show that carbon monoxide measured inside vehicles in traffic, and measured at the sidewalk, are considerably higher than measurements taken at monitoring stations, which are usually some distance removed from traffic.” Assuming the accuracy of the data, these levels of concentration will presumably fall as older cars are replaced. Medical experts are not agreed on the level of atmospheric concentration which can safely be tolerated by human beings.

<sup>6</sup> *Cleaning Our Environment*, op. cit., p. 34.

<sup>7</sup> Dinman, B. D., “Pathophysiologic Determinants of Community Air Quality Standards for Carbon Monoxide,” *Proceedings of the Symposium on Air Quality Criteria*, New York City, June 4–5, 1968, p. 23.

Section 104 would be amended to provide for a new expiration date, and (I quote) "such sums as may be necessary . . ." In this respect, I can only say that like any major national problem, it will take time and money to clean our air. But it must be done. It must be accomplished without sacrificing our industrial base and our power generation facilities. When it comes time to talk specific dollars and cents we would hope you will give serious consideration to expanding the funds to assist utility companies in the construction of full-scale size, sulfur removal facilities. These devices require huge capital expenditures, almost as much as a power plant itself, and therefore every electric utility is reluctant to take the first step alone, and justifiably so. But, a cooperative effort by the Federal Government, the manufacturer of the abatement device and an electric utility could result in a proven full-scale facility. This would not be a novel undertaking, for it would be no more, in fact many times less, than what the government has done with respect to nuclear power.

Inasmuch as Mr. James R. Garvey, our Vice President of Research and Engineering, testified at your hearings in 1967 on the state of the art of sulfur dioxide abatement devices, we feel it necessary to bring you up-to-date. In the interest of conserving the Committee's time, we are including as an exhibit, his February 25, 1970, statement to the Joint Committee on Atomic Energy. His testimony at that time is exactly on point. It was accompanied by a number of exhibits, which we have not included, but if the Committee wishes, we can furnish them for the record.

Simply stated, Mr. Garvey said, three years ago, that the sulfur abatement devices were near reality. On February 25, 1970, he described several systems that have been developed by industry without financial support from the government and guaranteed by the manufacturer to effectively remove the sulfur dioxide from the stacked gases at efficiencies at or near 90 percent.

Section 107 would be amended to provide for National Air Quality Standards and the repeal of the criteria procedure. We strongly support the continuance of the criteria procedure. We believe that the National Air Pollution Control Administration best explained the value of the criteria in its introduction in the criteria documents. I quote:

"Air quality criteria are an expression of the scientific knowledge of the relationship between various concentrations of pollutants in the air and their adverse effects on man and his environment. They are issued to assist the States in developing air quality standards. Air quality criteria are descriptive; that is, they describe the effects that have been observed to occur when the ambient air level of a pollutant has reached or exceeded specific figures for a specific time period. In developing criteria, many factors have to be considered. The chemical and physical characteristics of the pollutants and the techniques available for measuring these characteristics must be considered, along with exposure time, relative humidity, and other conditions of the environment. The criteria must consider the contribution of all such variables to the effects of air pollution on human health, agriculture, materials, visibility, and climate. Further, the individual characteristics of the receptor must be taken into account.

"Air quality standards are prescriptive. They prescribe pollutant exposures which a political jurisdiction determines should not be exceeded in a specified geographic area, and are used as one of several factors in designing legally enforceable pollutant emission standards."

It is vital that appropriate criteria be issued on each contaminant prior to hearings on air quality standards. Only in this manner can anyone even begin to appreciate the problem accompanying the particular pollutant. This procedure should be maintained.

We have strong reservations with respect to National Air Quality Standards. We say this even with the knowledge that some jurisdictions have adopted air quality standards which will never be realized.

The establishment of National Air Quality Standards would only serve to confuse and forestall action that has already been taken by many states. While it is known that the standards for only one air quality region have been accepted, some sixteen have been submitted, and are awaiting action by NAPCA. Many also have completed the public hearing stage, and standards are now being finalized. The states are obviously fulfilling their obligations under the Clean Air Act.

Should the Congress adopt the concept of a National Air Quality Standard, it is imperative that such a standard be evaluated in a manner similar to the procedures used in developing criteria. None of the current air pollution bills before this Committee would require public hearings prior to adoption of national

standards. Certainly, hearings are cumbersome and time-consuming. This is particularly true with regard to a subject as politically attractive as air pollution control. However, scientific evidence, as well as public opinion, is accumulated in such a process and it would be unwise to sacrifice intelligence and prudence for speed in an area as vital to the nation as air pollution control.

Section 108, of the existing law, deals with Air Quality Standards and Abatement of Air Pollution. Inasmuch as the proposed amendment of this section relates directly to proposed Section 107, much that we have previously stated would apply here. However, we are pleased to note that public hearings are called for with respect to implementation.

There are, however, two minor points upon which we would like to comment. The word "area" or "areas" appears in numerous places in the proposed section. Presumably, it refers to an air quality region. If so, we believe it should be so defined.

The second problem has to do with the word "STANDARDS." In the area of air pollution control, it is probably the most misunderstood word that exists. We believe the word should be "GOALS," and as this has also been recognized by NAPCA, we believe it should be made clear in any new legislation. Paragraph 2.20 of HEW's Guidelines for the Development of Air Quality Standards and Implementation Plans, states:

*"2.20 Air Quality Standards*

Air quality standards represent air quality goals established for the purpose of protecting public health and welfare. They provide a basis for State, local, and regional planning for the abatement and control of pollutant emissions from existing sources and for preventive measures to insure that urban and economic growth trends do not add to community air pollution problems."

In this manner, all concerned will know that it is a "GOAL" to be achieved, not a "STANDARD" to be met today.

Our final comments refer to the proposed changes of Section 112, "Stationary Source Emission Standards." While this seemingly duplicates the authority of Section 108(k) of the existing law in some respects, it represents a completely new approach to federal clean air legislation. The Federal Government has never been involved in this problem, so we must presume it is the result of the study called for under Section 211 of the Clean Air Act of 1967.

The Act required that the report be made to Congress but we understand that it is being made public this week. Since we have not seen it, we cannot comment on its findings.

Subsection (a) of this section does not specifically refer to electric power plants or any other industrial complex. However, for purposes of discussion we shall assume that the authors are referring to such installations, and this was apparently the conclusion drawn by HEW's witness last Monday.

If this interpretation is correct, we believe that in addition to a public hearing prior to setting the emission standards, a procedure similar to the present criteria setting procedure should be followed.

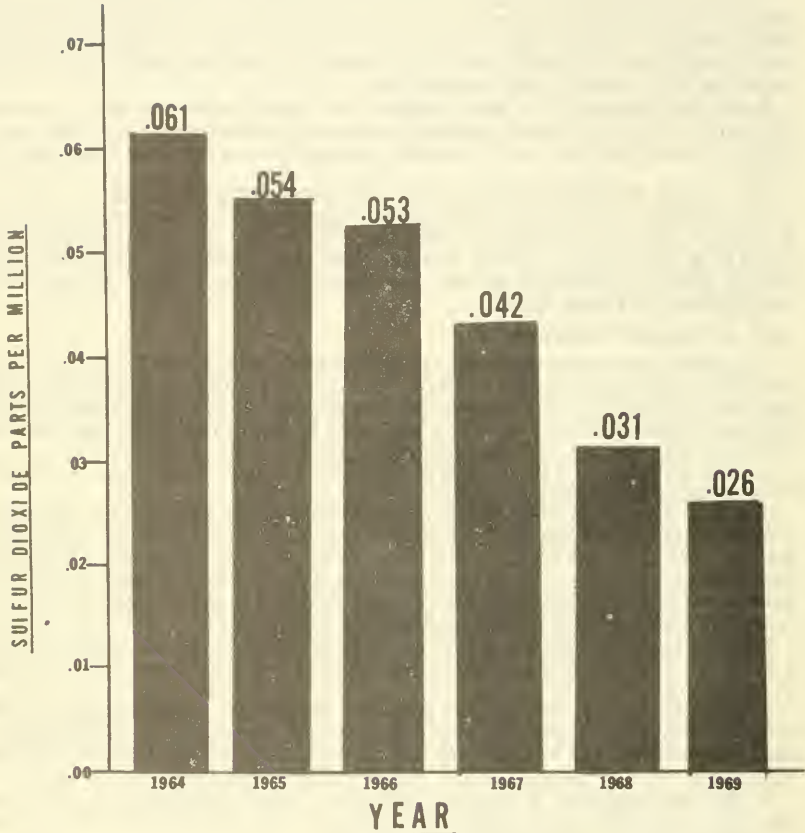
We would, of course, support subsection (b) which provides for limitations on the emission of pollutants that are "extremely hazardous to health." So defined, there are probably few who could oppose it.

Finally, if it is determined that stationary sources should be federally regulated, we request that any stationary source emission standards apply to new installations only. This is specifically stated with respect to emissions that are extremely hazardous to health (subsection (b)), but not with respect to subsection (a). It is true that the Secretary could probably exempt any existing installation under the broad powers proposed for Section 112(a). However, we believe existing sources should be specifically exempt since, in the case of electric power plants, the life is limited, and old plants are constantly being phased out and new ones are brought on line. It would be anything but prudent to try to up-date some of these old plants.

And, the Secretary is given discretion with respect to "technological feasibility." This, of course, is a phrase subject to wide interpretation. If liberally interpreted, the impact could be minimal. But if conservatively viewed, the Secretary could shut down practically every fossil-fueled power plant in the country.

In closing, we would like to paraphrase a question that we had directed to us at perhaps a dozen State and local air pollution hearings: "If we can put a man on the moon, why can't we have clean air?" Gentlemen, if we had the NASA budget, we could!!!

## CHICAGO AIR YEARLY AVERAGE SULFUR DIOXIDE



**Source:** Chicago Department of Environmental Control Statistics; Figures shown are the arithmetic average of the 24-hour averages for the 20 station network in the Chicago area.

**Prepared By:** Mid-West Coal Producers Institute, Inc.  
February, 1970

### STATEMENT OF JAMES R. GARVEY BEFORE THE JOINT COMMITTEE ON ATOMIC ENERGY FEBRUARY 25, 1970

Mr. Chairman: My name is James R. Garvey. I am President of Bituminous Coal Research, Inc., Monroeville, Pa. BCR is an affiliate of National Coal Association, Washington, D.C. A biographical summary of my qualifications is attached to my written statement.

In the almost twenty-five years I have been with the national research agency of the coal industry, I have been engaged in or directed research on coal combustion including control of pollution resulting from coal combustion. During the past ten years I have on numerous occasions appeared before Committees of Congress and other governmental agencies to testify on the "state of the art" of control of sulfur oxides.

At one such appearance, before the New Jersey State Department of Health on October 6, 1967, I said:



"With all the activity by various research organizations, we are confident that an economically attractive approach for the recovery of sulfur oxides from flue gases will be available in the next three years, give or take a year."

The purpose of my testimony here today is to bring to your attention the fact that this prediction of about two and one-half years ago was correct. We now have commercial processes available for use although their economic attractiveness may not be all we desire; the added cost for sulfur oxide control may increase the cost of electricity to residential consumers by at least three and perhaps eight percent.

There are four companies offering for sale sulfur oxide recovery systems for existing and new electric power generating plants which when applied will enable the use of high sulfur fuels with stack emissions equivalent to the burning of fuels with 0.5 percent or less sulfur. We had hoped to have the four companies offering these systems appear here individually to describe their processes, and their confidence therein, but in the interest of conserving the Committee's time, three companies have agreed for me to present brief summary of their development and to submit their written statements on the processes for the record. These statements are attached to my statement, together with a copy of the published review of the fourth. I hope the Committee will approve the inclusion of them in the published record of these hearings.

All four processes have some similarities and some basic differences. Because of these, one or the other may have certain advantages in application to a given power plant depending upon size, location, age and available space. But all have in common the desirable advantage of upwards of ninety percent elimination of sulfur oxide emissions. For your information I will briefly describe the processes without any attempt to favor one over the others, although the coal research agency which I represent carried out work in our laboratories on one of the approaches and contributed financially to one other.

To fully understand the technical problems involved, and to better appreciate the cost, we must keep in mind that even with a very high sulfur fuel the gases emitted from a power plant stack contain very little sulfur oxides per cubic foot—of the order of a couple of thousand parts per million. To remove the dilute quantities of sulfur oxides we must first convert them chemically to another material so a separation can be made. All four systems available do this, but in a somewhat different manner.

One system is offered by Monsanto Chemical Company, a large and well-known chemical company, located in St. Louis, Missouri. Their process converts the sulfuric oxides into saleable sulfuric acid. The principal advantage of the Monsanto process is that the chemical recovery of the sulfur values is self-sufficient; that is, no chemical reagents must be brought into the power plant. By use of a catalyst and changes in the heat exchange cycle, a disposable liquid, sulfuric acid, instead of an untouchable gas, sulfur dioxide, is produced. To reduce the idea to commercial practice has required millions of dollars and the operation of a 15,000 KW pilot plant in Eastern Pennsylvania for two and one-half years. But the necessary development work has been done and Monsanto is prepared to sell this process and guarantee performance.

The second process has been developed by Combustion Engineering, Inc., whose main offices are in Windsor, Conn. Combustion Engineering is one of the leading suppliers of power boilers to the electric power industry—for both fossil and atomic fuel firing.

The Combustion Engineering approach to sulfur oxide control differs considerably from the Monsanto approach. First of all, no saleable product results. In addition, a chemical reagent must be brought in to react with the sulfur oxides—to change them into removable solids. But the end result is the same, removal of both particulates and sulfur oxides from the exit gas stream. The process has been proven feasible at a pilot installation in St. Louis and another at Lawrence, Kansas. As Combustion Engineering has pointed out in public statements, they are confident they can design and erect a recovery plant with a guaranteed sulfur removal equivalent to that of burning 0.5 percent sulfur coal and a guaranteed particulate removal of ninety-nine percent. Further, they have stated that while they will guarantee this high level of recovery, they expect to do even better.

One mid-west utility, Kansas Power and Light Company, has sufficient faith in the process that they are incorporating it into the design of a new 430 MW plant planned for operation in 1971. The decision of that Company is best expressed by an official thereof who, in discussing their pilot test of the Combustion Engineering process and their future plans, said:

"As you can appreciate, I am sure, this has not been an easy road, and there have been numerous detours, but it does look like we are going to be able to accomplish what we set out to do. Retain the clean air in Kansas, and burn coal at the same time."

The remaining two systems which are described in statements attached to my written test have not quite reached the advanced state of commercial development as that of Monsanto and Combustion Engineering. However, they are nearly there and as the statements of the companies indicate, they are confident of success in the near future.

Wellman-Lord Company, a prominent consulting firm in the phosphate fertilizer plant field, has pilot tested a sulfur oxide recovery plant at a large Maryland power station, and will start up another in New Jersey this year. Like Monsanto, this process produces a saleable product—but concentrated sulfur dioxide instead of sulfuric acid. This product can be used directly or shipped for ultimate conversion into sulfuric acid or fertilizer depending on markets in the power plant vicinity. Unlike the Monsanto process, an alkali reagent must be introduced.

The final sulfur oxide recovery system described in the statements submitted is under development by Chemical Construction Corporation, commonly referred to in the trade as Chemico. This company is one of the oldest and largest chemical engineering firms in the world. For more than 50 years Chemico has been designing and erecting major process plant installations for the chemical, petrochemical and mineral process industries.

The Chemico sulfur oxide recovery process also produces a saleable product, elemental sulfur. But the approach is unique in that the final product is not evolved at the power plant. Recognizing that (1) electric power generating plants are not in the chemical business nor interested in getting into it, and (2) the economics of any sulfur recovery process will be primarily a function of the size of the plant which produces a final chemical product, Chemico conceives the total system as being in two parts. First, the power plant would be supplied with a chemical reagent for use in scrubbing sulfur oxides from the flue gases and, second, the used reagent would be shipped to a central processing plant for recovery of sulfur values and regeneration of the reagent for return to the power plant. Under this system, one large reagent processing plant could serve many small utilities—and even some industrial plants—in the most economic manner. As with the other three processes described, Chemico is ready to move into full scale application and eliminate sulfur oxide pollution.

The four processes which I have briefly described have been developed by industry without financial support from government. It is estimated that fifteen to twenty million dollars have been spent on them to date. A number of other companies have processes in various stages of development. In addition the National Air Pollution Control Administration of the Department of Health, Education and Welfare is researching with public funds other feasible approaches to sulfur oxide control. One of these, the use of dry alkalal additives, is currently undergoing large scale pilot test at a TVA power plant.

Gentlemen, that concludes my description of what we believe are currently available commercial processes and which, in at least two cases, the manufacturer is prepared to guarantee will eliminate the so-called "SO<sub>2</sub> pollution problem." I have made only passing reference to cost. As the President in a recent message to Congress stated, the cost of pollution control will be high. But the processes for sulfur oxide recovery which we are calling to your attention today are less costly than other solutions which have been suggested.

These include the use of natural gas and imported foreign fuels. As this Committee has acknowledged, fossil fuels must be the source of energy for our power plants for many years to come despite the expected growth in atomic power. We feel the means are available to supply the needs without sulfur pollution by use of our vast reserves of coal, most of which is high in sulfur, through the application of the processes I have described and others now under development by the National Air Pollution Control Administration of HEW.

Still to be accomplished is the application of such processes to existing and new power plants. When one considers the tremendous capital investment required for sulfur oxide control processes, the reluctance of the utility companies to apply them is understandable. We believe the Federal government could stimulate more interest by applying the available systems to government-owned power plants and by participating in the financing of installations at privately-owned plants for demonstration purposes.

JAMES R. GARVEY, PRESIDENT AND DIRECTOR OF RESEARCH, BITUMINOUS COAL RESEARCH, INC., 350 HOCHBERG ROAD, MONROEVILLE, PENNSYLVANIA

James R. Garvey, president and director of research of Bituminous Coal Research, Inc., and vice president, research and engineering, National Coal Association, received a Bachelor of Engineering degree in Mining from the Ohio State University in 1941. Since then, with the exception of four years during World War II when he served in the Air Force, he has been associated with the coal industry in mining and in research.

He joined Bituminous Coal Research, Inc., in 1946, as a development engineer, rising to supervising engineer, assistant director of research, director of research in 1958, and president in 1963. As president of BCR, he has the primary responsibility for the development and execution of the cooperative research program of the coal and related industries. Early in 1966, the Board of Directors of National Coal Association, of which BCR is an affiliate, elected him vice president, research and engineering. In that capacity, he assumed the management of the industry's cooperative engineering service program as well as its research.

Mr. Garvey is a member of the New York and American Academies of Science; the American Institute of Mining, Metallurgical, and Petroleum Engineers, and the American Society of Mechanical Engineers. He is also a member of the American Gas Association, International Briquetting Association, American Association for the Advancement of Science, and American Coke and Coal Chemicals Institute. He has been an active member of committees of these societies, serving as chairman of several of them.

Mr. Garvey's service to the state and federal governments has been extensive. On appointment by Governor Scranton and reappointment by Governor Shafer, he has served on a Pennsylvania Advisory Committee on Pneumoconiosis. At the federal level, he serves on the General Technical Advisory Committee to the Office of Coal Research, U.S. Department of Interior; is a member of the Environmental Pollution Panel of the U.S. Chamber of Commerce, and is a member of the National Air Quality Advisory Committee of the U.S. Department of Health, Education, and Welfare.

In addition to mining engineering, his experience includes design and development of coal-handling and coal-burning equipment for residential, commercial, and industrial markets and technical supervision of coal utilization research covering a wide scope. He holds several patents on coal-combustion equipment and is the author of many professional papers covering research and engineering application in these fields.

In 1963, Mr. Garvey received the Percy Nicholls Award. This award is presented annually by the Fuels Division, ASME and Coal Division, AIME, for notable scientific and industrial achievement in the field of solids fuels research.

Senator Boggs. We will recess until the call of the Chair.

(Whereupon, at 11:55 A.M., the subcommittee recessed, subject to the call of the Chair.)



## AIR POLLUTION—1970

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APRIL 1, 1970

U.S. SENATE,  
SUBCOMMITTEE ON AIR AND WATER POLLUTION  
OF THE COMMITTEE ON PUBLIC WORKS,  
*Los Angeles, Calif.*

The subcommittee was scheduled to meet at 10 a.m. in open hearing at the chamber of the Los Angeles County Board of Supervisors, Los Angeles, Calif.

Members of the subcommittee who were present in Los Angeles for the hearing were called back to the Senate floor by Majority Leader Senator Mansfield for important business of the Senate on this day, making it necessary to cancel the scheduled proceedings.

By order of the chairman, and without objection, statements which would have been presented by the scheduled witnesses are included herein as read.

### STATEMENT OF HON. JESS UNRUH, ASSEMBLYMAN, CALIFORNIA LEGISLATURE

Mr. UNRUH. Mr. Chairman and members of this distinguished committee, it is a pleasure to meet with you today to discuss one of the most serious health and safety problems facing all Californians and most Americans. It is particularly appropriate that you meet today in Los Angeles which, in addition to its many well-deserved and proud accomplishments, is also holder of the dubious honor of smog capital of the world.

We in Los Angeles have lived with a serious problem of air pollution longer than almost any other large urban center in the world. For that reason, we are especially concerned with finding an immediate solution.

The American public is just beginning to wake up to the consequences of its mad dash for affluence and the good life. It's a sad fact, but affluence does breed effluence. We are poisoning our environment in slow stages. The slowness of that poisoning is perhaps the reason that we have been so late in awakening to the seriousness of the problem.

If, for example, we were to experience a spell of smog in Los Angeles comparable to the killer fogs in London, can anybody doubt the consequences? Private automobiles would be immediately banned from the road until their emissions could be controlled.

What we are engaged in now is a war of attrition—with ourselves. But the war is no less real than if we were dropping bombs on our cities. An examination of some of the casualties may be instructive.

Between American industry and the motor vehicle, we pour almost 200 million tons of garbage into the air annually.

In Los Angeles County alone we are using our air for a sewer for more than 13,000 tons of waste emissions per day.

Who would believe that we would permit the situation to deteriorate to a point where today we must eliminate physical education in our public schools on days when air pollution reaches a critical level? We have in Los Angeles.

Respiratory disease has increased in southern California at a frightening rate—much of that increase is attributable to air pollution.

The Ponderosa pine forests on the mountains near Los Angeles are beginning to die—again smog is the cause.

Certain species of birds are being destroyed by contaminants in the air.

I could continue with a recitation of a dozen or a hundred more such cases. Unfortunately, such horror stories are becoming all too common. But we cannot let ourselves become hardened to such facts and accept them as the price we pay for civilization.

Without strong and immediate action to contain and control our wastes, there is a strong chance that our planet will be uninhabitable within a century. What we require is action now—action which will cost money, and action which will put restrictions on the consumer and industry. The roadblocks to action are not technical. Rather, they are social and political. But they must be overcome. The price for failure is too great.

#### LEGISLATION

The problem of air pollution in this country is probably best characterized by Los Angeles. The severe nature of the problem in California led the State legislature to pass the strictest vehicle emissions control act in the world—the Clean Air Act of 1968. Since that time California has continued to lead the Nation in emission controls.

In the past year or 2, the Federal Government has moved to take strong action on this problem. This is as it should be. The problem is truly a national one and must be solved at that level. I would make the point, however, that the Federal Government probably could not have moved as strongly without the example set by California. The nature of the problem demands that where an area has a particularly critical need, it be permitted to solve that problem with all the tools at its disposal. Without the ability to move ahead of the Federal Government in emission control standards California would not have even taken its first steps on the road to recovery.

You have before your committee several pieces of legislation which attempt to solve parts of the problem. I would particularly like to make some remarks regarding those bills.

I am speaking on the subject of air pollution control as a layman. However, as a citizen I am concerned about the problem, and as an elected representative, I have a responsibility to do something about this threat to the public health and safety.

I would like to speak to some general control concepts before I comment specifically on legislation before your committee.

While we have taken some of the necessary first steps to control air pollution, there remains much to be done. We must move to a position of assuming that all new vehicles conform to emission control regulations. This means assembly line testing of all new vehicles and periodic

inspection thereafter. Such a measure will cost money. However, the costs seem to me to be far outweighed by the potential benefits.

Minimum Federal standards are absolutely required. However, States must be permitted to establish stronger control standards where circumstances dictate.

Additionally, we must recognize the fact that we may not be able to clean up the internal combustion engine sufficiently. We must therefore put forth a maximum effort to find a clean and acceptable alternative.

#### SPECIFIC LEGISLATION

Your committee has before it two major pieces of air pollution control legislation, S. 3229 and S. 3466. Both bills, if enacted, would bring about significant changes in the control of air pollution.

#### S. 3229

The control philosophy embodied in S. 3229 is a logical and necessary extension of existing law. The concepts set forth in the bill are very sound, although I believe certain elements might be expanded upon and strengthened.

The fixed appropriation for development of alternatives to the ICE is desirable but the dollar amount is not sufficient. Private industry has invested billions of dollars in the development and refinement of ICE. A smog free alternative engine will cost a similar amount, and it is obvious that Detroit will not give a fair test to alternatives until they are forced to. Therefore, we need Government-sponsored research to prove alternatives are viable, thereby permitting establishment of the necessary emission control standards.

The inclusion of all moving sources of emission is a much needed and welcome step forward.

The establishment of standards for fuel and fuel additives is a necessary, complimentary step in controlling emissions at their source.

The tightening of procedures regarding the designation of air quality control regions will give Government a tool for speeding up its control of emissions.

The inclusion of noise measures is a recognition of the seriousness, and major source, of this problem.

There are certain elements which might be included in the bill which would strengthen it. I would recommend the inclusion of the following items:

A timetable for the elimination of lead from gasoline. Lead presents a serious potential health problem and also is detrimental to the control of emissions from the internal combustion engine.

The development of procedures for barring from the road any new vehicle with emissions exceeding control standards.

The preservation of air quality in major recreational areas by sharply curtailing the use or construction of any source of emissions which would degrade the quality of the air.

Development of a program to site energy sources. Powerplant construction should be regulated to preserve the quality of the environment. The introduction of these measures either as amendments to S. 3229 or as separate bills would help to accelerate the war on air pollution and allow us to breathe clean air sooner.

Senate bill 3466 contains a number of desirable features.

In providing for a revocation of the certificate of conformity the Federal Government is moving strongly to keep high emitters off the roads.

The provision for mandatory testing of a sample of vehicle engines gives the necessary information for establishment of emission levels.

The establishment of national emission standards for stationary sources is a significant first step if we are to effect meaningful control of stationary sources.

However, I must take exception to and recommend the amendment of the following sections of S. 3466:

*Section 107 (National Air Quality Standards)*

The bill currently provides for the promulgation of national standards of ambient air without requiring public hearings. The California experience has proven that public hearings tend to move Government closer to the limits of technological feasibility than would otherwise be the case. The bill should therefore be amended to require public hearings as part of the standard-setting process.

*Section 112 (1) and (2) (National Stationary Source Emission Standards)*

While the establishment of national stationary source emission standards is laudable, I have serious reservations concerning the language in section 112(1) and (2). The section reads in part “\* \* \* establish standards with respect to emissions which, (1) \* \* \* contribute substantially to endangerment of the public health or welfare, and (2) \* \* \* can be prevented or substantially reduced.”

Such an approach is, at best, ambiguous and open to broad interpretation. The question must be asked, “What is substantial endangerment” and who defines “substantial”? What criteria are employed in the definition of substantial? This area of control is too critical to permit the use of such loose wording. This section also puts the burden of proof unfairly on the citizen rather than on the polluter.

*Section 112 (National Stationary Source Emission Standards)*

This section permits the Secretary of Health, Education and Welfare to make “\* \* \* a specific exemption with respect to \* \* \* construction or operation of stationary sources.” This section would seem to preempt the authority of a State to control stationary sources by allowing the Secretary to grant a variance that has been denied by a State. Additionally, this language seems somewhat redundant in light of language in section 112 (a) which gives the Secretary the right to exempt “\* \* \* any industry or establishment or any class thereof, from this section upon such terms and conditions as he may find necessary to protect the public health or welfare, for the purpose of research investigations, studies, demonstrations, or training, or for reasons of national security.”

The changes that I have suggested would provide for a more positive and stronger control on sources of pollutants.

In the past we did not even recognize that a problem existed. For the present we are running very fast to stand still. For the future, we must



look generations ahead and take all necessary steps to create an environment fit for our children to inhabit.

## STATEMENT OF HON. RONALD REAGAN, GOVERNOR OF CALIFORNIA

Governor REAGAN. The regulation of air pollution is not new to California. Since 1947, there have been conducted in this state programs for the control of pollutants from all recognized sources. Not only has California been one of the first States to take organized action against pollution of the atmosphere, it has been the innovator of many programs for air pollution control.

The recognition of and first regulations dealing with the pollution from automobiles originated in California. Under a waiver from the Federal Government, California still conducts a motor vehicle pollution control program more stringent than the national program. The first regional air pollution control district was organized in the San Francisco Bay Area. Many of the regulations that have been enforced in air pollution control districts in California for many years are not yet in general use in other States. The State is proud, therefore, of its record and is confident of its ability to cope with its air pollution problems in a manner appropriate to the conditions that exist here.

The subject Federal legislation empowers the Secretary of Health, Education, and Welfare to do a number of things or to require these to be done. Among these are:

- (a) Test a sample of new production motor vehicles against emissions standards of the Federal Government;
- (b) Set air quality standards nationwide and enforce the standards through the Federal courts;
- (c) Set and enforce national emissions standards;
- (d) Set emissions standards for ships and planes;
- (e) Regulate fuel additives;
- (f) Regulate the use of solvents and solvent composition;
- (g) Require construction permits based upon latest control technology, either from the State or Federal Government;
- (h) Require the establishment of air pollution control regions both interstate or intrastate, and the establishment and enforcement of air quality standards therein.

Most of these actions are already in progress in California or are under consideration in the State legislature. California has:

- (a) Established regulations of the emissions from motor vehicles and enforced them. This program is projected through 1975. (A copy of these standards is attached as appendix A.) As part of the implementation of the State program, a plan is being prepared to test at the assembly line, all new motor vehicles intended to be sold in California.
- (b) Set air quality standards for oxidant, carbon monoxide, nitrogen dioxide and hydrogen sulfide statewide, and standards for particulate matter, visibility and sulfur dioxide in the two Federal air quality control regions in this State. (A copy of these standards is attached as appendix B.)
- (c) Divided the State into air basins and passed enabling legislation permitting regional air pollution control in these basins. (A report on the air basins of California is attached as appendix C.)

(d) Enacted legislation limiting the smoke from jet aircraft effective in 1972.

(e) Introduced legislation not only regulating motor fuel additives containing lead, but also regulating fuel composition with respect to volatility and composition.

(f) Delegated to the local and regional air pollution control districts the authority to set emissions standards for stationary sources. Many local districts have adopted and are enforcing regulations for emissions from nonvehicular sources, including the regulation of solvent usage and solvent composition. Permits are required for both construction and operation of potential sources in many local air pollution control districts in California. Among these, the standards of the Los Angeles County Air Pollution Control District and the Bay Area Air Pollution Control District have served as models for other areas.

As you can see, State and local agencies in California have done many of the things included in S. 3229, S. 3466, and S. 3546. We recognize that the controls embodied in the proposed Federal legislation are required for effective air pollution control. California believes that its present program manifests its intention to carry out such procedures in a manner consistent with the problems and conditions within its borders.

Our principal interest and concern over the proposed legislation is the delegating to the Federal Government the authority to take actions the State has already taken or will take. We are concerned over the freedom California will lack to develop the air pollution control programs we deem suitable to our specific needs. The Federal laws do not establish clearly the right of the States to promulgate standards of air quality, emissions, or of fuel and solvent composition more stringent than those of the Federal Government. It does not seem reasonable that standards suitable to the Nation as a whole will always be adequate under some of the special conditions in California. Nor does it seem reasonable that very strict control sometimes necessary in the highly populated and industrialized areas of this State need be imposed on less populous regions of California, or to other parts of the Nation. National emission standards may prove inadequate under some conditions and excessively restrictive under other circumstances. We believe that these matters can best be resolved by the competent and experienced legislators and technicians in California long familiar with conditions here.

The proposed legislation removes from the States and centers in the national government all or nearly all of the responsibility and authority for management of air quality, reserving for State and local government the task and the cost of implementing decisions of the Federal Government under the threat of fines and punishment if the job is not done to the satisfaction of the Secretary of Health, Education and Welfare. Air pollution control in this country should be a cooperative effort among various levels of government. Legitimate differences of opinions, however, do occur. The law should allow for differences in approaches to achieve clean air. Under the proposed law, a State may be fined for having a difference of opinion with the Secretary of Health, Education and Welfare. We, therefore, question the wisdom of this provision which is contradictory to the traditions and philosophy

of government. In this State traditions and philosophy are to reserve for the lowest level of government all authority consistent with adequate management of the affairs of the people.

Some aspects of air pollution in which the Federal Government could provide needed assistance are included in the bills. The proposed laws make no specific reference to the control of air pollution from agricultural operations. This is a subject of great importance to California. The disposal of agricultural wastes by open burning is a source of widespread pollution in many parts of this State. Lacking adequate alternatives to burning, the State has proposed legislation to confine and limit such burning to periods meteorologically favorable to the dispersion of the smoke. Such a program is severely handicapped by the lack of meteorological data from locations suitable to the program or in a form suitable to make and disseminate timely forecasts of burning conditions. As the United States Weather Bureau is the major agency collecting and analyzing meteorological data, it should be provided with the necessary resources for the development of meteorological data useful to the States' air pollution control program and be authorized to furnish the data to the States.

Regulated burning is, of course, a stopgap measure at best. Alternative methods of disposal of the many kinds of agricultural wastes must be developed to eliminate pollution from this source. Such methods would have wide application. Their study under national sponsorship would contribute to the clearing of the atmosphere in many localities.

Much of the proposed legislation is to be admired and encouraged. Strengthening of the national program for the control of motor vehicle emissions is desirable. Additional testing of vehicles at the time of production will assist that program. Adequate national regulation of emissions from ships and planes would simplify control of these sources as they move frequently and quickly from State to State. Research into the development of cleaner sources of power for motor vehicles is in the national interest and is beyond the effective implementation of individual States. Assistance in the development of inspection and maintenance procedures to insure continuing good results from control systems on motor vehicles has much general application on a national scale. On these and similar matters, expansion of the Federal program would be much favored by California. Likewise, interstate air pollution regions would benefit from Federal overview to resolve disputes and to prevent inaction in one State imposing problems on the people of a neighboring State. But, we feel that intrastate problems should be under the control of the people of the communities affected. Local circumstances should dictate the means used to accomplish the air quality goals.

The State of California, therefore, believes that the proposed laws should be modified to clearly define the role of the States in air pollution control and to allow for expansion of the present State program, not to confine the States to a course of action which may be less stringent than the actions already being taken. We would favor Federal legislation that:

- (1) Assists in the designation of interstate control areas and develops administrative means for control of air pollution within these areas;

(2) Strengthens the Federal program of motor vehicle emission control, while permitting California to pursue a more stringent program if needed;

(3) Stimulates the development of cleaner sources of power for motor vehicles and electric power generating plants;

(4) Regulates emissions from ships and airplanes;

(5) Accelerates the development of control of agricultural burning;

(6) Provides meteorological data necessary to State and local agencies;

(7) Sets such air quality standards as relate to human health as these are common to all people regardless of where they live;

(8) Reserves for the States matters pertaining to emissions standards, fuel composition, control methods, and other factors nearing on local air quality.

Through such legislative principles, the Federal Government and the States can enter into a cooperative partnership to develop regulations for the preservation of the atmospheric quality for the health and well-being of the public within the constraints of the differing circumstances throughout the United States.

(Materials included with statement of Governor Reagan follows:)

STATE OF CALIFORNIA  
Ronald Reagan, Governor

**California  
Air Basins**

May 1969

California Air Resources Board  
The Resources Agency

(1303)



State of California  
The Resources Agency  
AIR RESOURCES BOARD

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## CALIFORNIA AIR BASINS Air Resources Board

### INTRODUCTION

The observed ability of the winds to carry air pollution from its points of origin over large areas, and the effects of topography and temperature inversions to determine how such transport occurs, long ago gave rise to a concept of "basins" around the major metropolitan areas in California.

In 1967 the State Legislature, recognizing that air pollution might be more rationally dealt with by defining the problem in terms of a region containing both the sources and the total area affected, directed the Air Resources Board to divide the State into air basins. The Mulford-Carrell Air Resources Act requires that these basins define areas having similar meteorological and geographical conditions, and that the Board in setting the boundaries take into consideration existing political boundaries wherever practicable. The Air Resources Board established the boundaries to the air basins on November 20, 1968.

The Act's purposes, as they apply to basins are: (1) to establish air quality standards that may vary from basin to basin; (2) adopt emissions standards for air pollutants for each basin as found necessary; (3) inventory all sources of emissions for each basin; and (4) provide a mechanism for the establishment of regional air pollution control districts within the basins.

The criteria on which the basins are defined are to some extent in conflict where meteorological and topographical boundaries depart widely from political boundaries. In these cases a judgment had to be made as to which criterion to follow.

The first step in dividing the State into basins was an examination of the physical and meteorological factors that influence the distribution of climatic conditions within the State. Unlike watersheds, it is not possible to define air basins wherein the air pollution problems would be completely isolated from adjacent basins. Winds do not start and stop at political or geographic boundaries. Land breezes from coastal plains or valleys can move offshore and return inland into another valley or basin further up or down the coast. In mountain regions, air moves through gaps and passes from one region to another. Nevertheless, California is peculiarly suited to application of the concept of basins because its large valleys, plains and plateaus are in most instances separated by mountain ranges. Marked differences in topographical and meteorological conditions are found in the several portions of California. The coastal plains, central valley, desert, and mountain areas have different meteorology and topography and hence a different potential for air pollution. As a background for discussing air basins, it is important to have in mind the principal topographical features and meteorological factors in California.



## TOPOGRAPHY

California, the third largest of the 50 states, lies along the Pacific coast between  $32^{\circ} 20'$  and  $42^{\circ}$  North latitudes. It is 780 miles long and from 150 to 350 miles wide, with a land area of 159,000 square miles. Elevations range from 14,495 feet at the top of Mt. Whitney to 282 feet below sea level in Death Valley. Conspicuous among the topographic features is the Great Central Valley, which lies along the north-south axis of the State for a distance of about 450 miles and is approximately 50 miles in width. The valley is nearly completely enclosed by the Sierra Nevada and coast ranges which curve toward each other at the northern and southern ends of the valley and merge with the Cascade and Tehachapi Mountains to bound one of the largest mountain-ringed valleys in North America. See Figure 1.

Separated from the central valley and from the coast by mountain ranges are two large desert or semidesert areas. In the south, a portion of the Great Basin and Southwestern U.S. Desert reaches from the Nevada and Arizona borders to the east side of the mountains. In the northeast corner of the State, a portion of the Intermountain Plateau lies between the Cascade Range and the Nevada and Oregon borders.

The balance of the State is essentially mountainous. The Sierra Nevada Range is approximately parallel and close to most of the eastern border of the State from the Cascades at the north end of the central valley to the Tehachapi Mountains at the south. Except where bisected by individual valleys, the coast ranges and the associated southern ranges lie along the coast, often extending to the shore but sometimes set back by narrow coastal plains. River valleys, such as the Salinas, Russian and Santa Clara, penetrate deep into the neighboring mountains. Where the river valleys narrow to become canyons (often at relatively low elevations) they become part of the mountain region. North of the San Francisco Bay, the coast ranges widen and spread inland to blend into the Cascades, while continuing along the coast to form a large mountainous area in the northwestern part of the State.

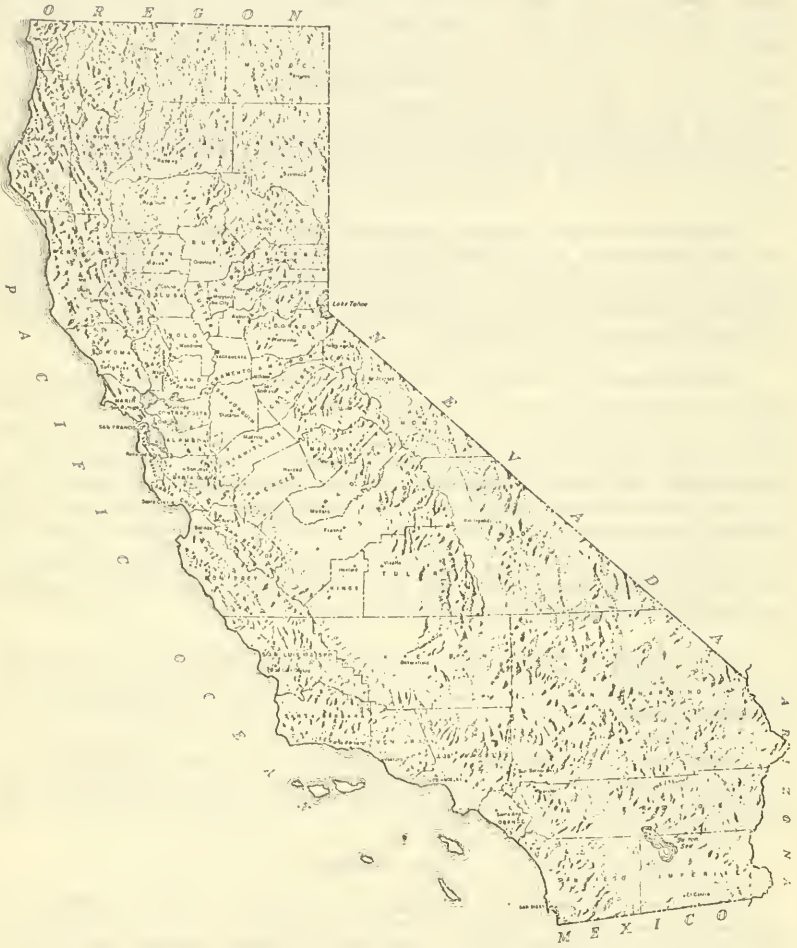
In the numerous valleys and coast plains that extend from the sea into the coast ranges are found many of the major cities and important agriculture areas of California. It is in some of these areas that the most severe air pollution problems occur.

Lake Tahoe, Scott Valley, Round Valley and other encircled mountain valleys are small but distinct topographic basins tucked well back into the mountains, where they share in the general climate of their respective mountain regions.

## METEOROLOGY

Throughout the north-south extent of California, climatic conditions vary from subtropical in the southern part, to subtemperate in the northern part. The east-west transverse ranges through Santa Barbara, Ventura, Los Angeles and San Bernardino Counties tend to provide a northern topographic limit for the subtropical climate zone though encroachments of subtropical weather may reach into the central part and the southeastern deserts of the State on some occasions.

Figure 1



In the east-west direction across the State there is a sharp contrast in climates. The eastern boundary of California lies in the Great Intermountain Plateau. On the western boundary, the Pacific Ocean provides moist maritime air that profoundly affects the climate of the coastal sections. The coast ranges and the Sierra Nevada Range, separated by the Great Central Valley, are oriented parallel to the State's eastern and western borders. These mountains and the intervening valleys amplify and define the gradations of climates which lie between the contrasting border climates.

These general climatic regions are considerably modified by the vertical differentiation within the State. Major and minor mountain ranges not only bound the climate regions of the valleys, but also are climatic zones in their own right because of the differences produced by elevation. Cooler climates with more wind are, in general, characteristic of the mountains as contrasted with the nearby valleys. This change with increase of elevation is a gradual one, but, due to temperature inversion, conditions may be sharply defined on a day-to-day basis.

Temperature inversions--atmospheric layers in which temperature increases with height rather than decrease, as is the general condition--form an effective barrier against the vertical interchange of air and, incidentally, the dispersion of air pollution upward. Inversions in California are due to three major causes: the chilling of the air in contact with the ground due to the radiation of ground heat into space at night which produces radiation inversions; the intrusion of cold marine air beneath the warmer air over the land along the coast; and the large-scale, inversion produced by the general tendency for the air along the entire coast and several hundred miles inland to sink toward the earth from higher altitudes. This latter inversion, called a "subsidence inversion", is present over almost all of California during most of the spring, summer and fall.

The base of the subsidence inversion layer is the boundary between mountain climatic zones and the adjacent valley climatic zones throughout the spring, summer and fall. The inversion base slopes upward from the coastline to the interior. Also, the inversion layer along the coast slopes gently upward both north and south from about San Luis Obispo County. As a result, the elevations that bound the mountain climatic zones tend to slope upward from west to east and upward toward both the north and south from the central part of the State.

The zones above and below the inversion layer in the coastal areas are fairly well described by the 1,000 to 2,000 foot contours. On the eastern side of the coastal ranges the boundary is about the 2,000-foot contour as far north as Colusa County. From there northward, it slopes up to about 4,000 feet. On the west side of the southern Cascades and the Sierra Nevada, the boundary is at about 4,000 feet; on the east side it lies at about 6,000 feet. The Tehachapi Mountains and the eastern transverse ranges zones are bounded by about the 4,000-foot elevation. The 1,000-foot level marks the western transverse ranges mountain zone near the coast. The boundary rises to about 2,000 feet along the peninsular ranges in Riverside and San Diego Counties.

During the winter season, the boundary between valley and mountain zones descends to somewhat lower elevations due to ground-based inversions created by nocturnal radiation cooling and cold air drainage from the upper mountain slopes.

None of the mountain climatic zones can be classed as basins in the topographic or meteorological sense of the word. They do, however, have similar weather and air pollution potential. During the warm portions of the year, wind circulation in the mountain zones is generally up-slope with only brief periods of down-slope winds at night. During the cold season, wind circulation in the absence of storm activity is generally down-slope with brief periods up-slope winds on south-facing slopes. Mountain climatic zones, thus, are characterized by considerable vertical wind motion and by winds and temperatures different from those in the valleys and on the plains.

The mountain climatic zones are shown as shaded areas in Figure 2.

A number of lower elevation areas, more or less flat valleys, plains and plateaus, also constitute distinct climatic zones. These are the areas that give rise to the "basin" concept, and these are the regions upon which the "air basins" required by the Mulford-Carrell Air Resources Act were developed. The major ones are: The Great Central Valley, the Southeastern Desert and Great Basin Region, the portion of the great intermountain plateau in the northeastern corner of the State and the coastal area.

#### INTERIOR CLIMATIC ZONES

##### Central Valley

The Great Central Valley is the most distinctly bounded, large topographic basin in the State. The valley is more complex climatically than it is topographically. Because of the temperature contrast much of the year between the valley and the Pacific waters, air from the coast enters the valley, primarily through the gap at San Francisco Bay, and undergoes rapid modification in temperature and relative humidity. Part of the flow turns northward into the Sacramento valley and part southward into the San Joaquin valley. Thus, the two valleys differ climatically in that each has a separate and distinct system of wind circulation, although, from the standpoint of temperature and humidity, they differ rather little during the warm seasons. A wind divergence zone is created by the splitting of the airflow through the coastal range. This divergent zone separates the valleys as far as summer wind patterns are concerned. The mean summer position of this divergent zone lies at about the Sacramento-San Joaquin and the Amador-El Dorado County borders.

During the late fall and winter, cold air drains off the mountain slopes into the two valleys. This often results in airflow toward the north in the San Joaquin valley and southward in the Sacramento valley, creating a zone of wind convergence that fluctuates to the north and south of the delta area according to the relative strengths of the airflow out of each valley. The central valley, therefore, while topographically a single large basin, is meteorologically two distinct basins whose common boundary fluctuates with the seasons.

Figure 2



## Southeastern Desert and Great Basin Valleys

The next largest climatic zone is the southeastern deserts and the great basin valleys, which lie east of the Sierra Nevada and peninsular ranges, and north of the transverse ranges. In this area there are three distinct subparts. Owens, Panamint, Saline and Death Valleys make up one subpart; the Mojave Desert (high desert) is another; and the Colorado Desert (low desert) is the third. Each subpart has a distinct wind climate, but all three subregions merge with one another without sharp climatological or topographical boundaries. All are windy and dry and often hot. March through June is the windiest period of the year in all subparts.

Temperature inversion conditions are quite different in this area as compared to the coastal regions to the west. When a subsidence inversion exists over the southeastern desert area, the height of the inversion base lies between 6,000 to 8,000 feet above the desert surface. (Average surface elevation is a little above 2,000 feet.) Radiation inversions at night are prevalent throughout the year. These tend to be destroyed early in the day in summer, but persist throughout much of the day during the winter, when they limit the mixing in the lower atmosphere to a height of from 200 to 2,000 feet.

## Intermountain Plateau

The northeast corner of the State--Modoc and Lassen Counties and parts of Siskiyou and Shasta Counties--lies in a portion of the Great Intermountain Plateau at an elevation of about 4,000 feet. This part of the State is beyond the influence of the subsidence inversion most of the time. When present, the inversion base is probably about 6,000 feet elevation. Very few weather data are available for this region.

The climate here is dry, cool and windy, with strong radiation inversions during non-stormy periods in the fall and winter months. The area is separated from the rest of the State by the Cascade Mountains to a degree that permits very little air movement to or from other regions in the State.

## COASTAL CLIMATIC ZONES

The balance of the State is largely mountainous, broken up by relatively small but often densely populated plains and valleys. Several of these are of considerable extent with well-defined boundaries that clearly delineate their shape and size. Among these are the San Francisco Bay Area, Salinas Valley and the Los Angeles Basin. Others, such as the coastal plains in San Diego, Santa Barbara, Ventura and San Luis Obispo Counties and along the north coast, are somewhat less well defined. Unlike the central valley and the large areas east of the Sierra Nevada Mountains, these coastal zones have no western boundary to serve as a barrier to windflow.

## North Coast

The North Coast Plain is a narrow strip between the coastal ranges and the sea. The maritime influence is almost complete, being interrupted by land-to-sea airflow during the fall, and by winter storms. The plains of Humboldt and Del Norte Counties are the largest of this north coastal area.

The base of the inversions is somewhat higher in the north coast than in the Bay Area, the most frequent heights ranging from 1,000 to 3,000 feet in the south to 1,000 to 5,500 feet in the north.

#### Bay Area

The San Francisco Bay Area and associated valleys constitute a well-defined zone somewhat broken into subparts in terms of wind climatology. Rather low hills, the influence of the large water areas of the bays, and a large influx of maritime air produce several well-defined wind patterns in the area.

During much of the year the winds from the sea divide to flow northward into the Sonoma and Napa valleys, eastward through the Carquinez Strait, and southward into the Santa Clara valley. This division of airflows makes the opposite ends of the Bay Area meteorological subparts of the region. The large flow of marine air through the Carquinez Strait has a marked influence upon the climate in portions of Solano and San Joaquin Counties.

As in other coastal areas, the subsidence inversion is dominant over this area most of the year. It varies seasonally and daily between 1,000 and 3,000 feet elevation. Due to solar heating, the inversion may be destroyed over the extreme ends of the Sonoma and Santa Clara valleys. Wide variations in vertical mixing occur over the extreme ends of these valleys.

Except during late September and October, and during hot spells in April, May or June, wind movement provides consistent ventilation in much of the Bay Area.

#### Salinas Valley

The Monterey Bay plain and the Salinas River valley together constitute another climatic entity which is parallel to the central coast of California. The wind climatology of this area is uniquely defined by the topography. The Salinas River valley furnishes a channelizing path for penetration by the sea breeze, which is rapidly modified as it flows toward the head of the valley. From mid-September to mid-April, air frequently flows from the southeast out of the Salinas valley and across the Monterey Bay Plain during night and morning hours.

The height of the subsidence inversion base over this climatic area varies between 1,000 and 2,500 feet. Over the southern end of the Salinas valley during summer months the inversion probably is destroyed each afternoon by solar heating, to be reestablished again at night. Vertical mixing thus undergoes considerable variation in the southern end of the Salinas valley on a daily basis.

#### Central Coast

The coastal plain of San Luis Obispo and northwestern Santa Barbara Counties is exclusively a maritime environment. The plain is isolated by the San Rafael and Santa Ynez mountains, even though the Santa Maria and Santa Ynez River valleys penetrate rather deeply into them. The winds follow a sea-land and land-sea breeze pattern in this coastal plain. The average inversion height over this area is probably lower than in any other part of California.

The coastal plains of Santa Barbara and Ventura Counties face more toward the south than do the coastal plains farther north or south. The western transverse ranges isolate these plains and most of the connecting valleys excepting the Santa Clara River valley. Inversion conditions tend to be at a slightly lower elevation over these coastal plains than over the coastal section of the Los Angeles Basin.

#### South Coast

The Los Angeles Metropolitan area is the most important in the State in terms of present-day air pollution. Contiguous valleys such as the San Fernando valley and the Santa Ana valley, as well as the coastal plain of Orange County, are bound together by the primarily sea and valley breeze climatology of the area. Nocturnal and winter season land breezes tend to provide an inter-related pattern of circulation.

The subsidence inversion is generally continuous over the area, being lowest near the coast (1,000 to 2,500 feet in summer and early fall). The height of the inversion undergoes a daily change. Though the inversion layer slopes upward toward the interior, the inversion may be closer to the ground in the interior portions of the basin because the ground slopes up more sharply. There is sufficient temperature contrast between the interior and the coast to induce a sea breeze on most days. The ebb and flow of land, sea and valley breezes from day-to-day often result in the same air passing over the same parts of the area more than once.

The southern part consists of that portion of San Diego County lying west of the summit of the peninsular range of mountains. This basin is somewhat separated from the Los Angeles Basin to the north by the relatively low intervening hills near the southern corner of Orange County.

Wind patterns of the San Diego coast are generally distinct from those in the Los Angeles Basin as the San Diego coast is usually outside the influence of the large eddy in the Santa Barbara Channel and receives winds from the west and southwest more frequently than the northern part of the zone. Inversion heights in the San Diego area average somewhat higher than in the vicinity of Los Angeles.

#### AIR POLLUTION POTENTIAL

Population concentrations and industrial development are greatest in the coastal plains and valleys containing Los Angeles, the Bay Area and San Diego. The Great Central Valley and many of the valleys of the coast ranges are basically agricultural. Small and medium-sized cities, many of which are growing rapidly, are located along the axis of the Central Valley and in several coastal valleys.

The mountain and desert regions remain lightly populated except where towns and small cities have grown up in the vicinity of recreational and, transportation centers or in conjunction with forest, mineral or agricultural activities. Other than at Lake Tahoe, there are no large population centers at elevations above about 1,500 feet.



The distribution of air pollution sources over the State will resemble closely the distribution of population. Figure 3 shows the population distribution in the State projected forward to the year 1980 according to data provided by over 100 local planning commissions in the State.

Under meteorological conditions favoring the accumulation of maximum concentration of contaminants, the horizontal transport of pollution is a minimum. Light variable winds allow the air to remain over the source region for several days. The boundaries of the source area itself, expanded slightly to allow for the variable back and forth vacillations of the air, delineate the expected area of pollution.

In the central valley atmospheric stagnation may assume particular significance when population centers have increased and coalesced as projected. A potentially serious situation in the central valley, however, may occur in the winter when there is little interchange of air between the valley and the coast. This type of weather is associated with the tule fog regime when temperature inversions at ground level persist over the entire valley for several weeks and air movement is virtually absent. Air pollution under these circumstances is principally primary pollutants--carbon monoxide, nitric oxide, and particulate matter--because the fog and low clouds preclude the production of the photochemical smog. During these weather regimes there is little transfer across the central valley boundaries and the valley is totally responsible for its own atmospheric pollution.

#### DESCRIPTION OF THE BASINS

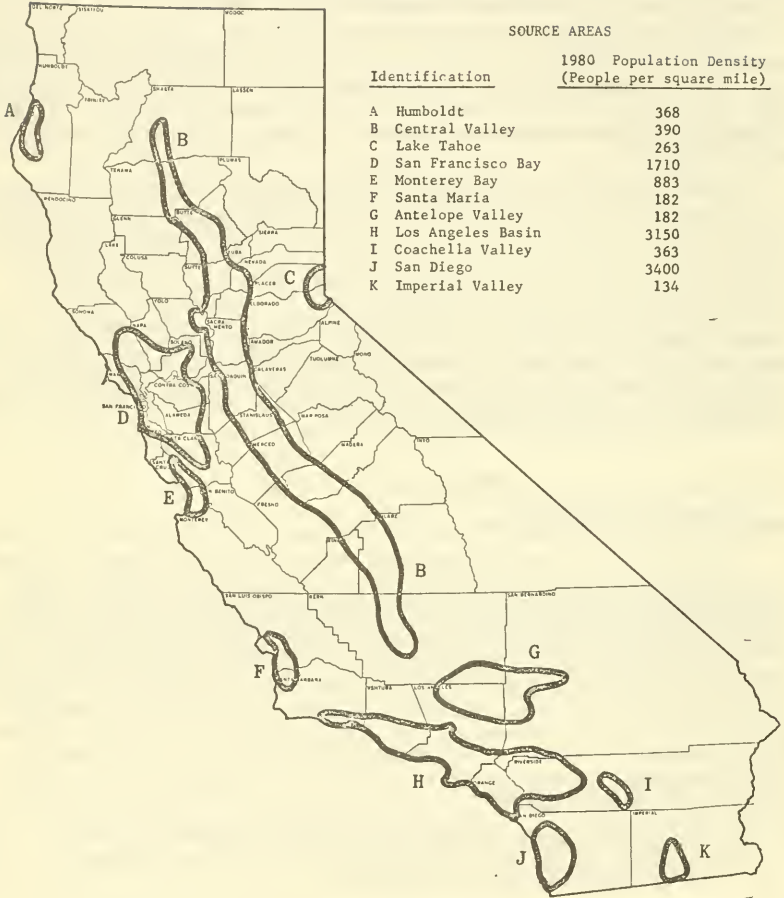
##### Factors in Defining Boundaries

It has been shown that topographical features and meteorological conditions in California result in several large and well-defined basins. Many areas of the State are mountainous or divided into relatively small "valley type" basins and coastal plains. The small basins and associated mountain areas, mostly along the coast, group into several general climatic zones. For example, the North Coast area with its coastal plains and river valleys differs climatically from the somewhat topographically similar Central Coast area. These features form the basis for the air basins. Meteorological and topographical differences, however, generally do not produce the distinct and unvarying demarcation necessary to define areas that may be used for administrative purposes. It was necessary, therefore, to apply additional considerations to the basin boundaries:

1. The basins should approximate the climatic zones and should separate, as far as practicable, the air pollution problems of one zone from those of another.
2. Because the law requires that all of the State be divided into basins, basins cannot be restricted to the low elevation areas but must include the adjacent mountain climatic zones. Some "basins" must be composed almost entirely of mountainous areas.

Figure 3

## POPULATION DISTRIBUTION IN CALIFORNIA



3. Basin boundaries must be clearly specified so they can be readily identified for administrative purposes--county lines and crests of mountains would be such boundaries. County lines that also coincide with crests of mountains are ideal basin boundaries that meet practical administrative needs. A large percentage of the county lines in northern and central California meet this criterion with only minor deviations. This is not the case in southern California.
4. The basin boundary need not be restricted to the crests of the mountain ranges. So long as the boundary is located within the mountain zone, the principal of separating the air pollution problems of one basin from the next is maintained. This permits the use of county boundaries for basin boundaries in areas where county boundaries are not at the crest of the mountains, and enables the boundaries to be moved a short distance to avoid running through a town or a national park.
5. Where the mountain zones separating the basins do not include county boundaries, prominent topographic features related to the mountain zones determine the basin boundaries. Some counties had to be divided into two areas in different basins.
6. Transitional zones where the boundaries between basins are indistinct or variable have to be treated somewhat arbitrarily. The division between the Central Valley Basin and the San Francisco Bay Area, for example, is not marked by topographical features, and changes its relative position under different seasonal conditions.
7. The Bay Area Air Pollution Control District, established by legislation to include nine counties, is exempt from the regional aspects of the Mulford-Carrell Air Resources Act. Humboldt County is, likewise, exempt from the Act's provisions for regional control. The exemption becomes an important factor in setting the boundaries between the Bay Area Basin and the Central Valley Basin. It is not of the same weight with respect to Humboldt County which is contained within a single climatic region.
8. The basins must be large enough to permit organization within them of regional air pollution control agencies capable of dealing effectively with air pollution. Isolated coastal plains or small valley basins, while separated from other air pollution problems, are frequently too small to administer independent air pollution control agencies.

Application of these factors to the climatic zones within the State together with recommendations received at four public hearings led the Air Resources Board to divide California into eleven basins as described below and as shown in Figure 4. Where these basins do not adhere to county lines it is still necessary for administrative purposes that the boundaries be clearly definable and readily located lines. Township and section lines, where available are admirably suited to this purpose, as are the boundaries of land grants, national parks, Indian reservations and similar land parcels. The basin boundaries have been described, therefore, in terms of these methods of identification wherever county lines cannot be used. A detailed description of the basins and their boundaries, together with information on their areas and populations, are given in Appendix A and B.

#### The North Coast Basin

The North Coast Basin contains all of Del Norte, Humboldt, Trinity, Mendocino and Lake Counties, and the west portion of Siskiyou County. This is, essentially, the North Coast mountain Climatic Zone with minor modifications. The eastern boundary of the basin, instead of following the crest of the Coast Range and the Cascade Range, is within the mountain climatic zone but east of the summit to permit the use of county boundaries.

#### The San Francisco Bay Basin

The San Francisco Bay Basin is made up of the nine counties that constitute the Bay Area Air Pollution Control District--Sonoma, Napa, Solano, Marin, Contra Costa, San Francisco, San Mateo, Alameda and Santa Clara. This includes all of the San Francisco Bay Climatic Zone and extends a short distance into the delta area. The boundary between the San Francisco Bay Zone and the Central Valley Zone is not sharp nor is it marked by any topographic feature. There is, however, a rapid modification of the marine atmosphere characteristic of the Bay Area as it leaves the influence of the bay and moves inland into the central valley. The rapid changes in temperature and humidity result in an increased mixing height and an increase in the dilution capacity of the air stream. As the Bay Area Air Pollution Control District is specifically exempt from the regional air pollution control provisions of the legislature, its eastern boundaries provide a logical boundary between this basin and the valley basins.

#### The North Central Coast Basin

The North Central Coast Basin contains Santa Cruz, Monterey and San Benito Counties. This is the Monterey Bay-Salinas Valley Climatic Zone modified by including part of the mountain climatic zone east of the summit in San Benito County, and by cutting across the Santa Clara and Salinas valleys. The separation of the Santa Clara valley from the Pajaro River valley between Gilroy and Hollister is marked by a low summit among relatively low hills. Air entering the upper Pajaro River valley from the Bay Area is extensively modified as it moves up the Santa Clara valley.

Figure 4

## CALIFORNIA AIR BASINS

- 1 NORTH COAST
- 2 SAN FRANCISCO BAY AREA
- 3 NORTH CENTRAL COAST
- 4 SOUTH CENTRAL COAST
- 5 SOUTH COAST
- 6 SAN DIEGO
- 7 NORTHEAST PLATEAU
- 8 SACRAMENTO VALLEY
- 9 SAN JOAQUIN VALLEY
- 10 GREAT BASIN VALLEYS
- 11 SOUTHEAST DESERT



The Santa Clara valley also narrows appreciably near the Santa Clara County line and the temperature modification occurring in the valley during the summer produces a meteorological boundary.

The status of the Bay Area Air Pollution Control District in the act is applicable to this locality also.

#### The South Central Coast Basin

The South Central Coast Basin includes San Luis Obispo County and that portion of Santa Barbara County north of the Santa Ynez Mountains. This is the Central Coast Climatic Zone and associated mountain slopes. The narrow coastal plain in Southern Santa Barbara County is separated from the rest of the county by meteorological changes produced by the Santa Ynez Mountains and the abrupt change in orientation of the coast. The area lying south of the mountains is sheltered from the prevailing north westerly winds and partakes of the climatic features of the Oxnard Plains.

#### The South Coast Basin

The South Coast Basin is made up of all of Ventura and Orange Counties and portions of Los Angeles, Santa Barbara, San Bernardino and Riverside Counties. The basin is bounded by the Santa Ynez Mountains in Santa Barbara County. The western and northern boundaries of Ventura County are within this same mountain system. In northern Los Angeles County and western San Bernardino and Riverside Counties, the San Gabriel, San Bernardino, San Geronimo, and San Jacinto Mountains form a chain of mountain ranges separating the South Coast Climate Zone from the Great Basin Valleys and Southeastern Deserts Climatic Zone. The Channel Island is included in the South Coast Basin.

#### The San Diego Basin

The San Diego Basin contains all of San Diego County west of the peninsular range. The range of hills reaching the coast at the Orange-San Diego County line is judged to mark the approximate position of the shift in wind climatology separating this basin from the South Coast Basin.

#### The Northeast Plateau Basin

The Northeast Plateau Basin includes Modoc and Lassen Counties, and two-thirds of Siskiyou County and the north east corner of Shasta County on the east side of the Cascade Range. This is the desert area of the Northwest Plateau Climatic Zone and the associated mountain ranges.

#### The Sacramento Valley Basin

The Sacramento Valley Basin is all of the northern part of the Central Valley Climatic Zone. It is bounded on the west by the coast range, on the north and east by the Cascade range and the Sierra Nevada range, and on the south by the change in wind climatology between the two valleys. As this transition zone moves north and south during different times of the year the basin boundary has been placed at the mean summertime position approximated by the southern boundaries of Sacramento and El Dorado Counties. The basin contains 14 counties--all of Shasta except the northeast corner, Tehama, Plumas, Glenn, Butte, Sierra, Colusa, Sutter, Yuba, Nevada, Yolo, Placer, Sacramento and El Dorado.

#### The San Joaquin Valley Basin

The San Joaquin Valley Basin is made up of the southern part of the Central Valley Climatic Zone and the neighboring mountain slopes. It is bounded on the west by the coast range, on the east by the Sierra Nevada Range, on the south by the Tehachapi Mountains, and on the north by a meteorological separation from the Sacramento valley. Contained in the San Joaquin Valley Basin are Amador, San Joaquin, Calaveras, Stanislaus, Tuolumne, Merced, Mariposa, Madera, Fresno, Kings and Tulare Counties, and the portion of Kern County north and west of the Tehachapi Mountains.

#### The Great Basin Valleys

The Great Basin valleys include Inyo, Mono and Alpine Counties. This basin is bounded on the west by the Sierra Nevada Mountains, on the east by the Nevada border, and on the south by the desert. As the transition from the Great Basin valleys to the desert is somewhat indistinct, the Inyo-San Bernardino County line has been chosen as the basin boundary.

#### The Southwest Desert Basin

The Southwest Desert Basin includes all of Imperial County, the portion of San Diego, Riverside, San Bernardino and Los Angeles Counties east of the peninsular range, and associated mountain ranges extending up the Tehachapi Mountains, and the portion of Kern County south and east of the Tehachapi Mountains.

Date of adoption, amendment, or repeal:

July 3, 1969

By:

Executive Officer  
(Title)

DO NOT WRITE IN THIS SPACE

DO NOT WRITE IN THIS SPACE

The State Air Resources Board hereby amends its regulations in Title 17, Part III Section 60104 to add sub-section (f)

- (f) That portion of Los Angeles County which lies south and west of a line described as follows:

Beginning at the Los Angeles-San Bernardino County boundary and running west along the township line common to T.3 N and T.2 N, San Bernardino Base and Meridian; then north along the range line common to R.8 W and R.9 W; then west along the township line common to T.4 N and T.3 N; then north along the range line common to R.12 W and R.13 W to the southeast corner of Section 12, T.5 N, R. 13 W; then west along the south boundaries of Sections 12, 11, 10, 9, 8, 7, T.5 N, R. 13 W to the boundary of the Angeles National Forest which is collinear with the range line common to R. 13 W and R. 14 W; then north and west along the Angeles National Forest boundary to the point of intersection with the township line common to T.7 N and T. 6 N (point is at the northwest corner of Section 4 in T.6 N, R. 14 W); then west along the township line common to T.7 N and T.6 N; then north along the range line common to R. 15 W and R. 16 W to the southeast corner of Section 13, T.7 N, R. 16 W; then along the south boundaries of Sections 13, 14, 15, 16, 17, 18, T.7 N, R. 16 W; then north along the range line common to R.16 W and R. 17 W to the north boundary of the Angeles National Forest (collinear with township line common to T.8 and T.7 N) then west and north along the Angeles National Forest boundary to the point of intersection with the south boundary of the Rancho La Liebre Land Grant; then west and north along this land grant boundary to the Los Angeles-Kern County boundary.

DO NOT WRITE IN THIS SPACE



APPENDIX A: DESCRIPTION OF CALIFORNIA AIR BASINS (AN EXTRACT OF PART III,  
TITLE 17, PUBLIC HEALTH, CALIFORNIA ADMINISTRATIVE CODE).

PUBLIC HEALTH (Register 68, No. 49—12-21-66)  
TITLE 17

Article 1. Description of California Air Basins

60100. North Coast Basin.

- (a) All of Del Norte County
- (b) All of Humboldt County
- (c) All of Mendocino County
- (d) All of Lake County
- (e) All of Trinity County
- (f) That portion of Siskiyou County described as follows:

Beginning at the Oregon border and running south along the eastern boundary of T. 45 N., R. 8 W. to the northeast corner of T. 47 N., R. 8 W., Humboldt Base and Meridian; then east along the north boundary of T. 47 N., R. 7 W. to the northeast corner of Section 4, T. 47 N., R. 7 W.; then south along the east boundaries of Sections 4, 9, 16, 21, 28 and 33, T. 47 N., R. 7 W.; then west along the southwest boundary of T. 47 N., R. 7 W. to the northeast corner of T. 46 N., R. 8 W.; then south along the east boundary of T. 46 N., R. 8 W. to its intersection with the north boundary of T. 45 N., R. 8 W.; then east one-quarter mile to the northeast corner of T. 45 N., R. 8 W.; then south along the east boundary of T. 45 N., R. 8 W. and T. 44 N., R. 8 W. to the northeast corner of Section 24, T. 44 N., R. 8 W.; then east along the section line to the northeast corner of Section 20, T. 44 N., R. 7 W.; then south along the eastern boundaries of Sections 20, 29 and 32, T. 44 N., R. 7 W. to the north boundary of T. 43 N., R. 7 W.; then east along the north boundary of T. 43 N., R. 7 W. to the northeast corner of Section 3, T. 43 N., R. 7 W.; then south along the east boundaries of Sections 3, 10, 15, 22, 27 and 34, T. 43 N., R. 7 W. and continuing south along the east boundaries of Sections 3, 10, 15, 22, 27, and 34, T. 42 N., R. 7 W.; then east to the intersection of the Klamath and Shasta National Forest boundaries; then south along the common boundary of the two National Forests to the Trinity County boundary.

Notes: Authority cited: Section 39051, Health and Safety Code.

History: 1. New Article 1 (Sections 60100 through 60110) filed 12-16-68; effective thirtieth day thereafter (Register 68, No. 48).

60101. San Francisco Bay Area Basin.

- (a) All of Sonoma County
- (b) All of Napa County
- (c) All of Solano County
- (d) All of Contra Costa County
- (e) All of Alameda County
- (f) All of Santa Clara County
- (g) All of San Mateo County
- (h) All of San Francisco County
- (i) All of Marin County

60102. North Central Coast Basin.

- (a) All of Santa Cruz County
- (b) All of San Benito County
- (c) All of Monterey County

TITLE 17 AIR RESOURCES BOARD  
(Register 68, No. 49—12-21-66)

60103. South Central Coast Basin.

- (a) All of San Luis Obispo County
- (b) That portion of Santa Barbara County north of a line described as follows:

Beginning at the Pacific Ocean outfall of Jalama Creek and running east and north along Jalama Creek to a point of intersection with the west boundary of the San Julian Land Grant; then south along the San Julian Land Grant boundary to its southwest corner; then east along the south boundary of the San Julian Land Grant to the northeast corner of partial Section 20, T. 5 N., R. 32 W., San Bernardino Base and Meridian; then south and east along the boundary of the Las Cruces Land Grant to the southwest corner of partial Section 22, T. 5 N., R. 32 W.; then northeast along the Las Cruces Land Grant boundary; then east along the north boundaries of Section 13, T. 5 N., R. 32 W., and Sections 18, 17, 16, 15, 14, 13, T. 5 N., R. 31 W., and Sections 18, 17, 16, 15, 14, 13, T. 5 N., R. 30 W., and Sections 18, 17, 16, 15, T. 5 N., R. 29 W.; then south along the east boundary of Section 23, T. 5 N., R. 29 W.; then east along the north boundaries of Sections 15, 23 and 24, T. 5 N., R. 28 W., and Sections 19 and 20, T. 5 N., R. 27 W.; then south along the east boundary of Section 20, T. 5 N., R. 27 W.; then east along the north boundaries of Sections 28, 27, 26, 25, T. 5 N., R. 27 W. and Section 30, T. 5 N., R. 26 W.; then south along the east boundary of Section 30, T. 5 N., R. 26 W.; then east along the north boundaries of Sections 32, 33, 34, 35, T. 5 N., R. 26 W.; then south along the east boundary of Section 35, T. 5 N., R. 26 W. to the township line common to T. 4 N. and T. 5 N.; then east along this township line to the Santa Barbara-Ventura County boundary.

60104. South Coast Basin.

- (a) All of Ventura County
- (b) All of Orange County
- (c) That portion of Santa Barbara County which lies south of a line described as follows:

Beginning at the Pacific Ocean outfall of Jalama Creek and running east and north along Jalama Creek to a point of intersection with the west boundary of the San Julian Land Grant; then south along the San Julian Land Grant boundary to its southwest corner; then east along the south boundary of the San Julian Grant to the northeast corner of partial Section 20, T. 5 N., R. 32 W., San Bernardino Base and Meridian; then south and east along the boundary of the Las Cruces Land Grant to the southwest corner of partial Section 22, T. 5 N., R. 32 W.; then northeast along the Las Cruces Land Grant boundary; then east along the north boundaries of Section 13, T. 5 N., R. 32 W., and Sections 18, 17, 16, 15, 14, 13, T. 5 N., R. 31 W., and Sections 18, 17, 16, 15, 14, 13, T. 5 N., R. 30 W., and Sections 18, 17, 16, 15, T. 5 N., R. 29 W.; then south along the east boundary of Section 15, T. 5 N., R. 29 W.; then east along the north boundaries of Sections 23 and 24, T. 5 N., R. 29 W., and Sections 19, 20, 21, 22, 23, 24, T. 5 N., R. 28 W., and

Sections 19 and 20, T. 5 N., R. 27 W.; then south along the east boundary of Section 20, T. 5 N., R. 27 W.; then east along the north boundaries of Sections 28, 27, 26, 25, T. 5 N., R. 27 W., and Section 30, T. 5 N., R. 26 W.; then south along the east boundary of Section 30, T. 5 N., R. 26 W.; then east along the north boundaries of Sections 32, 33, 34, 35, T. 5 N., R. 26 W.; then south along the east boundary of Section 35, T. 5 N., R. 26 W. to the township line common to T. 4 N. and T. 5 N.; then east along this township line to the Santa Barbara-Ventura County boundary.

(d) That portion of Riverside County which lies west of a line described as follows:

Beginning at the Riverside-San Diego County boundary and running north along the range line common to R. 4 E. and R. 3 E.; then east along the township line common to T. 8 S. and T. 7 S.; then north along the range line common to R. 5 E. and R. 4 E.; then west along the township line common to T. 6 S. and T. 7 S. to the southwest corner of Section 34, T. 6 S., R. 4 E.; then north along the west boundaries of Sections 34, 27, 22, 15, 10, 3, T. 6 S., R. 4 E.; then west along the township line common to T. 5 S. and T. 6 S.; then north along the range line common to R. 4 E. and R. 3 E.; then west along the south boundaries of Sections 13, 14, 15, 16, 17 and 18, T. 5 S., R. 3 E.; then north along the range line common to R. 2 E. and R. 3 E.; then west along the township line common to T. 4 S. and T. 3 S. to the intersection with the southwest boundary of partial Section 31, T. 3 S., R. 1 W.; then northwest along that line to the intersection with the range line common to R. 2 W. and R. 1 W.; then north to the Riverside-San Bernardino County line.

(e) That portion of San Bernardino County west and south of a line described as follows:

Beginning at the San Bernardino-Riverside County boundary and running north along the range line common to R. 3 E. and R. 2 E.; then west along the township line common to T. 3 N. and T. 2 N. to the San Bernardino-Los Angeles County boundary; also included is that portion of Los Angeles County which lies south and west of a line described as follows: beginning at the Los Angeles-San Bernardino County boundary and running west along the township line common to T. 3 N. and T. 2 N.; then north along the range line common to R. 8 W. and R. 9 W.; then west along the township line common to T. 4 N. and T. 3 N.; then north along the range line common to R. 12 W. and R. 13 W. to the southeast corner of Section 12, T. 5 N., R. 13 W.; then west along the south boundaries of Sections 12, 11, 10, 9, 8, 7, T. 5 N., R. 13 W. to the boundary of the Angeles National Forest which is collinear with the range line common to R. 13 W. and R. 14 W.; then north and west along the Angeles National Forest boundary to the point of intersection with the township line common to T. 7 N. and T. 6 N. (point is at the northwest corner of Section 4 in T. 6 N., R. 14 W.); then west along the township line common to T. 7 N. and R. 14 W.; then north along the range line common to R. 15 W. and R. 16 W. to the southeast corner of Section 13, T. 7 N., R. 16 W.; then

along the south boundaries of Sections 13, 14, 15, 16, 17, 18, T. 7 N., R. 16 W.; then north along the range line common to R. 16 W. and R. 17 W. to the north boundary of the Angeles National Forest (collinear with township line common to T. 8 N. and T. 7 N.); then west and north along the Angeles National Forest boundary to the point of intersection with the south boundary of the Rancho La Liebre Land Grant; then west and north along this land grant boundary to the Los Angeles-Kern County boundary.

#### 60105. Northeast Plateau Eschin.

- (a) All of Modoc County  
 (b) All of Lassen County  
 (c) That portion of Siskiyou County which lies east of a line described as follows:

Beginning at the Oregon border and running south along the eastern boundary of T. 48 N., R. 8 W., Humboldt Base and Meridian; to the northeast corner of T. 47 N., R. 8 W.; then east along the north boundary of T. 47 N., R. 7 W. to the northeast corner of Section 4, T. 47 N., R. 7 W.; then south along the east boundaries of Sections 4, 9, 16, 21, 28 and 33, T. 47 N., R. 7 W., then west along the south boundary of T. 47 N., R. 7 W. to the northeast corner of T. 46 N., R. 8 W.; then south along the east boundary of T. 46 N., R. 8 W. to its intersection with the north boundary of T. 45 N., R. 8 W.; then east one-quarter mile to the northeast corner of T. 45 N., R. 8 W.; then south along the east boundary of T. 45 N., R. 8 W., and T. 44 N., R. 8 W. to the northeast corner of Section 24, T. 44 N., R. 8 W.; then east along the section line to the northeast corner of Section 20, T. 44 N., R. 7 W.; then south along the eastern boundaries of Sections 20, 29 and 32, T. 44 N., R. 7 W. to the north boundary of T. 43 N., R. 7 W.; then east along the north boundary of T. 43 N., R. 7 W.; to the northeast corner of Section 3, T. 43 N., R. 7 W.; then south along the east boundaries of Sections 3, 10, 15, 22, 27 and 34, T. 43 N., R. 7 W. and continuing south along the east boundaries of Sections 3, 10, 15, 22, 27 and 34, T. 42 N., R. 7 W.; then east to the intersection of the Klamath and Shasta National Forest boundaries; then south along the common boundary of the two National Forests to the Trinity County boundary.

(d) That portion of Shasta County which lies east and north of the line described as follows:

Beginning at the Shasta-Siskiyou County boundary and running south along the range line common to R. 2 E. and R. 1 E. to the southwest corner of T. 35 N., R. 2 E.; then east along the township line common to T. 35 N. and T. 34 N. to the northwest corner of T. 34 N., R. 3 E.; then south along the range line common to R. 3 E. and R. 2 E. to the southwest corner of T. 33 N., R. 3 E.; then east along the township line common to T. 33 N. and T. 32 N. to the northwest corner of T. 32 N., R. 4 E.; then south along the range line common to R. 4 E. and R. 3 E. to the point of intersection with the northwest corner of the Lassen Volcanic National Park boundary; then east along the north boundary of Lassen-Shasta National Park to the point of intersection with the Lassen-Shasta County boundary.

**60106. Sacramento Valley Basin:**

- (a) All of Tehama County
- (b) All of Glenn County
- (c) All of Butte County
- (d) All of Plumas County
- (e) All of Colusa County
- (f) All of Yolo County
- (g) All of Sutter County
- (h) All of Yuba County
- (i) All of Sierra County
- (j) All of Nevada County
- (k) All of Placer County
- (l) All of Sacramento County
- (m) All of El Dorado County
- (n) That portion of Shasta County which lies west and south of

a line described as follows:

Beginning at the Shasta-Siskiyou County boundary and running south along the range line common to R. 2 E and R. 1 E, Mt. Diablo Base and Meridian; to the southwest corner of T. 33 N, R. 3 E; then east along the township line common to T. 33 N and T. 32 N to the northwest corner of T. 32 N, R. 4 E; then south along the range line common to R. 4 E and R. 3 E to the point of intersection with the north-west corner of the Lassen Volcanic National Park boundary; then east along the north boundary of Lassen Volcanic National Park to the point of intersection with the Lassen-Shasta County boundary.

**60107. San Joaquin Valley Basin.**

- (a) All of San Joaquin County
- (b) All of Amador County
- (c) All of Colusa County
- (d) All of Tuolumne County
- (e) All of Stanislaus County
- (f) All of Merced County
- (g) All of Mariposa County
- (h) All of Madera County
- (i) All of Fresno County
- (j) All of Kings County
- (k) All of Tulare County
- (l) That portion of Kern County which lies west and north of a

line described as follows:

Beginning at the Kern-Los Angeles County boundary and running north and east along the northwest boundary of the Rancho La Liebre Land Grant to the point of intersection with the range line common to R. 15 W and R. 16 W, San Bernardino Base and Meridian; north along the range line; then east along the township line common to T. 32 S, Mount Diablo Base and Meridian; and T. 12 N, San Bernardino Base and Meridian; then north along the range line common to R. 34 E and

R. 33 E, Mount Diablo Base and Meridian; then east along the township line common to T. 32 S and T. 31 S; then north along the range line common to R. 35 E and R. 34 E; then east along the township line common to T. 29 S and T. 28 S; then north along the range line common to R. 36 E and R. 35 E; then east along the township line common to T. 23 S and T. 27 S; then north along the range line common to R. 37 E and R. 36 E to the Kern-Tulare County boundary.

**60108. Great Easin Valleys Basin.**

- (a) All of Alpine County
- (b) All of Mono County
- (c) All of Inyo County

**60109. Southeast Desert Basin.**

- (a) All of Imperial County
- (b) That portion of San Diego County which lies east of a line described as follows:

Beginning at the U.S.-Mexico border and running north along the range line common to R. 7 E and R. 6 E to the southeast corner of T. 16 S, R. 6 E; then west along the township line, San Bernardino Base and Meridian; common to T. 16 S and T. 17 S to the southwest corner of T. 16 S, R. 6 E; then north along the range line common to R. 6 E and R. 5 E to the southeast corner of T. 14 S, R. 5 E; then west along the township line common to T. 14 S and T. 15 S to the point of intersection with the east boundary of Cuyamaca Park; then north along the east boundary of Cuyamaca Park to the point of intersection with the range line common to R. 5 E and R. 4 E; then north along this range line to the point of intersection with the south boundary of the San Felipe Land Grant; then east and north along the land grant boundary to the eastern most corner; then continuing west and north along the land grant boundary to the point of intersection with the range line common to R. 5 E and R. 4 E; then north along this range line to the point of intersection with the township line common to T. 10 S and T. 9 S; then west along this township line to the point of intersection with the range line common to R. 4 E and R. 3 E; then north along this range line to the San Diego-Riverside County boundary.

- (c) That portion of Riverside County which lies east of a line described as follows:

Beginning at the Riverside-San Diego County boundary and running north along the range line common to R. 4 E and R. 3 E, San Bernardino Base and Meridian; then east along the township line common to T. 8 S and T. 7 S; then north along the range line common to R. 5 E and R. 4 E; then west along the township line common to T. 6 S and T. 7 S to the southwest corner of Section 34, T. 6 S, R. 4 E; then north along the west boundaries of Sections 34, 27, 22, 15, 10, 3, T. 6 S, R. 4 E; then west along the township line common to T. 5 S and T. 6 S; then north along the range line common to R. 4 E and R. 3 E; then

west along the south boundaries of Sections 13, 14, 15, 16, 17 and 18, T. 5 S., R. 3 E.; then north along the range line common to R. 2 E and R. 3 E.; then west along the township line common to T. 4 S and T. 3 S to the intersection with the southwest boundary of partial Section 31, T. 3 S., R. 1 W.; then north west along that line to the intersection with the range line common to R. 2 W and R. 1 W.; then north to the Riverside-San Bernardino County line.

(d) That portion of San Bernardino County east and north of a line described as follows:

Beginning at the San Bernardino-Riverside County boundary and running north along the range line common to R. 3 E and R. 2 E, San Bernardino Base and Meridian; then west along the township line common to T. 3 N and T. 2 N to the San Bernardino-Los Angeles County boundary.

(e) That portion of Los Angeles County which lies north and east of a line described as follows:

Beginning at the Los Angeles-San Bernardino County boundary and running west along the township line common to T. 3 N and T. 2 N, San Bernardino Base and Meridian; then north along the range line common to R. 8 W and R. 7 W; then west along the township line common to T. 4 N and T. 3 N, R. 7 W; then north along the range line common to R. 12 W and R. 13 W to the southeast corner of Section 12, T. 5 N., R. 13 W.; then west along the south boundaries of Sections 12, 11, 10, 9, 8, 7, T. 5 N., R. 13 W to the boundary of the Angeles National Forest which is collinear with the range line common to R. 13 W and R. 14 W; then north and west along the Angeles National Forest boundary to the point of intersection with the township line common to T. 7 N and T. 6 N (point is at the northwest corner of Section 4 in T. 6 N., R. 14 W); then west along the township line common to T. 7 N and T. 6 N; then north along the range line common to R. 15 W and R. 16 W to the southeast corner of Section 13, T. 7 N., R. 16 W; then along the south boundaries of Sections 13, 14, 15, 16, 17, 18, T. 7 N., R. 16 W; then north along the range line common to R. 16 W and R. 17 W to the north boundary of the Angeles National Forest (collinear with township line common to T. 8 N and T. 7 N) then west and north along the Angeles National Forest boundary to the point of intersection with the south boundary of the Rancho La Liebre Land Grant; then west and north along this land grant boundary to the Los Angeles-Kern County boundary.

(f) That portion of Kern County east and south of a line described as follows:

Beginning at the Kern-Los Angeles County boundary and running north and east along the northwest boundary of the Rancho La Liebre Land Grant to the point of intersection with the range line common to R. 15 W and R. 16 W, San Bernardino Base and Meridian; north along the range line; then east along the township line common to

T. 22 S, Mount Diablo Base and Meridian; and T. 12 N, San Bernardino Base and Meridian; then north along the range line common to R. 34 E and R. 33 E, Mount Diablo Base and Meridian; then east along the township line common to T. 32 S and T. 31 S; then north along the range line common to R. 35 E and R. 34 E; then east along the township line common to T. 29 S and T. 28 S; then north along the range line common to R. 36 E and R. 35 E; then east along the township line common to T. 28 S and T. 27 S; then north along the range line common to R. 37 E and R. 36 E to the Kern-Fuller County boundary.

#### 60110. San Diego Basin.

That portion of San Diego County which lies west of a line described as follows:

Beginning at the U. S.-Mexico border and running north along the range line common to R. 7 E and R. 6 E, San Bernardino Base and Meridian; to the southeast corner of T. 16 S., R. 6 E; then west along the township line common to T. 16 S and T. 17 S to the southwest corner of T. 16 S., R. 6 E; then north along the range line common to R. 6 E and R. 5 E to the southeast corner of T. 14 S., R. 5 E; then west along the township line common to T. 14 S and T. 15 S to the point of intersection with the east boundary of Cuyamaca Park; then north along the east boundary of Cuyamaca Park to the point of intersection with the range line common to R. 5 E and R. 4 E; then north along this range line to the point of intersection with the south boundary of the San Felipe Land Grant; then east and north along the land grant boundary to the eastern most corner; then continuing west and north along the land grant boundary to the point of intersection with the range line common to R. 5 E and R. 4 E; then north along this range line to the point of intersection with the township line common to T. 10 S and T. 9 S; then west along this township line to the point of intersection with the range line common to R. 4 E and R. 3 E; then north along this range line to the San Diego-Riverside County boundary.

## APPENDIX B

## POPULATION DENSITY OF CALIFORNIA AIR BASINS

BASIN	TOTAL AREA (SQUARE MILES)	POPULATION	POPULATION DENSITY <sup>1</sup>
North Coast	15,500	206,000	13
San Francisco Bay Area	7,000	4,590,000	660
North Central Coast	5,200	380,000	73
South Central Coast	5,500	276,000	50
South Coast	8,600	9,761,000	1,100
Northeast Plateau	12,900	58,000	5
Sacramento Valley	20,900	1,194,000	57
San Joaquin Valley	30,200	1,660,000	55
Great Basin Valleys	13,900	20,000	1
Southeast Desert	33,800	345,000	10
San Diego	3,100	1,283,000	410

<sup>1</sup> Density values rounded to 2 significant figures.

Source: Population estimates by State of California, Department of Finance as of July 1, 1968, rounded to nearest thousand.

State of California

AIR RESOURCES BOARD

Resolution 70-4

January 21, 1970

WHEREAS, the motor vehicle is the major source of pollutants released into the air of California; and

WHEREAS, the California Legislature enacted the Pure Air Act of 1968 establishing motor vehicle emission standards which all new vehicles must meet beginning in 1970 and which become increasingly more stringent through 1974; and

WHEREAS, Section 39052.5 of the Health and Safety Code authorizes the California Air Resources Board to establish more stringent motor vehicle emission standards based on a finding of necessity and technological feasibility; and

WHEREAS, the Technical Advisory Committee to the California Air Resources Board has found that such more stringent standards are both necessary and technologically feasible and has recommended that the Board adopt such standards,

NOW, THEREFORE, BE IT RESOLVED, That the Air Resources Board finds compliance with the standards for exhaust emissions set forth below to be necessary and technologically feasible for 1975 and subsequent model gasoline-powered motor vehicles under 6001 pounds gross vehicle weight. In accordance with this finding, the standards for such vehicles are:

Hydrocarbons - 0.5 grams per mile

Carbon Monoxide - 12 grams per mile

Oxides of Nitrogen - 1.0 gram per mile

AND BE IT FURTHER RESOLVED, That the test procedures for determining compliance with exhaust emissions standards for 1975 and subsequent model gasoline-powered motor vehicles under 6001 pounds gross vehicle weight are "California Exhaust Emission Standards and Test Procedures for 1971 and Subsequent Model Gasoline-Powered Motor Vehicles Under 6001 Gross Vehicle Weight, dated November 20, 1968."

## Assembly Bill No. 357

An act to amend Sections 39051, 39052, 39054, and 39065 of, to add Sections 39009.3, 39052.5, and 39052.6 to, and to repeal and add Chapter 4 (commencing with Section 39080) of Part 1, Division 26 of, the Health and Safety Code, to add Section 14808.1 to the Government Code, to amend Sections 2814, 4000, 4000.1, 4750, 24007, 28500, 28502, 28506, and 28506 of, and to add Section 27153.5 to, the Vehicle Code, and to amend Sections 12300, 12302, and 12303 of the Vehicle Code, as added by Assembly Bill No. 1320 of the 1968 Regular Session, relating to air pollution.

The people of the State of California do enact as follows:

Section 1. Section 39009.3 is added to the Health and Safety Code, to read:

39009.3. As used in this part and in Section 14808.1 of the Government Code, the low emission standard is an emission standard more stringent than the approval test standard. In establishing the low emission standard the board shall attempt to insure that no more than 50 percent of the new motor vehicles sold and registered in California that year would be able to comply with the low emission standard.

Sec. 1.5. Section 39051 of the Health and Safety Code is amended to read:

39051. The board shall after holding public hearings:

(a) Divide the state into basins to fulfill the purposes of this division not later than January 1, 1969.

(b) Adopt standards of ambient air quality for each basin in consideration of the public health, safety and welfare, including but not limited to health, illness, irritation to the senses, aesthetic value, interference with visibility, and effects on the economy. These standards may vary from one basin to another. Standards relating to health effects shall be based upon the recommendations of the State Department of Public Health.

(c) Adopt rules and regulations in accordance with the provisions of the Administrative Procedure Act (commencing with Section 11370 of the Government Code) necessary for the proper execution of the powers and duties granted to, and imposed upon, the board by this division.

(d) Adopt emission standards for all nonvehicular air pollution sources for application for each basin as found necessary as provided in Section 39054.

Sec. 2. Section 39052 of the Health and Safety Code is amended to read:

39052. The board shall:

(a) Conduct studies and evaluate the effects of air pollution upon human, plant, and animal life and the factors responsible for air pollution. The board may call upon the Department of Public Health, Department of Agriculture, the University of California, and such other state agencies it may deem necessary.

(b) Encourage a cooperative state effort in combating air pollution.

(c) Inventory sources of air pollution within the basins of the state and determine the kinds and quantity of air pollutants. The board shall use, to the fullest extent, the data of local agencies fulfilling this purpose.

(d) Monitor air pollutants in cooperation with other agencies to fulfill the purpose of this division.

(e) Coordinate and collect research data on air pollution.

(f) Review rules and regulations of local or regional authorities filed with it pursuant to Sections 39314 and 39461 to assure that reasonable provision is made to control emissions from nonvehicular sources and to achieve the air quality standards established by the board.

(g) Adopt formal procedures, after consultation with the Department of Motor Vehicles, for making timely and decisive mutual agreements on vehicle air pollution matters with which both agencies are concerned, and submit a copy of these procedures to the Legislature by January 1, 1969.

(h) Adopt formal procedures, after consultation with the Department of Public Health, for the performance of services required by the board and for evaluating and resolving air pollution matters with which both agencies are concerned, and submit a copy of these procedures to the Legislature by January 1, 1969.

(i) Adopt formal procedures, after consultation with the Department of the California Highway Patrol, for making timely and decisive mutual agreements on vehicle air pollution matters with which both agencies are concerned, and submit a copy of these procedures to the Legislature by January 1, 1969.

(j) Publish annually a report of the results of the tests administered pursuant to subdivision (k) of this section, which shall include all of the following:

(1) The total number of motor vehicles tested.

(2) The total number of each engine and transmission combination tested.

(3) The average emissions of all motor vehicles tested.

(4) The average emissions of each engine and transmission combination tested.

(5) An Analysis of the emissions of each engine and transmission combination tested.

(k) Adopt test procedures as soon as possible, but in no event later than 45 days after the effective date of the amendments to this section enacted by the Legislature at the 1968 Regular Session, specifying the manner in which new motor vehicles shall be approved based upon the emission standards contained in Article 2 (commencing with Section 39100) of Chapter 4 of this part. The board shall base its test procedures on driving patterns typical in the urban areas of California, and shall weight approval standards appropriately to reflect normal engine deposit accumulation. The board shall administer the test for new motor vehicles in accordance with such procedures.

(l) Adopt regulations specifying the manner in which used motor vehicles shall be accredited based upon their emissions. These regulations are to be submitted to the Legislature by January 1, 1969.



(m) Adopt regulations specifying the manner in which motor vehicles on factory assembly lines are to be emission tested. Such tests shall take into consideration the recommendations of the Technical Advisory Panel to the Assembly Transportation and Commerce Committee as set forth in its report of April 14, 1968. Board regulations shall require manufacturers to submit copies of their test procedures and the test results to the board. These regulations are to be submitted to the Legislature by March 31, 1969.

(n) Adopt exhaust emission standards for hydrocarbons, carbon monoxide, and oxides of nitrogen for new diesel-powered vehicles, and diesel engines for vehicles first sold and registered in this state, no later than January 1, 1971.

(o) Adopt emission standards for motor vehicles which shall be applicable only to motor vehicles for which emission standards have not been specified in Article 2 (commencing with Section 39100) of Chapter 4 of this part.

(p) Adopt low emission standards for the purpose of carrying out Section 14808.1 of the Government Code and Section 6377 of the Revenue and Taxation Code for each model year motor vehicle beginning in 1970.

Sec. 3. Section 39052.5 is added to the Health and Safety Code, to read:

39052.5. The board may adopt motor vehicle emission standards more stringent than those specified in Article 2 (commencing with Section 39100) of Chapter 4 of this part, which the board has found to be necessary and technologically feasible to carry out the purposes of this part.

Sec. 4. Section 39052.6 is added to the Health and Safety Code to read:

39052.6 The Board may adopt and implement motor vehicle emission standards for the control of other contaminants and sources of air pollution which are not included within Article 2 (commencing with Section 39100) of Chapter 4 of this part, which the board has found to be necessary and technologically feasible to carry out the purposes of this part.

Sec. 5. Section 39054 of the Health and Safety Code is amended to read:

39054. If the board finds after investigation and testing that its ambient air quality standards are not being complied with within a basin or that any local or regional authority has not taken reasonable action to control emissions from non-vehicular sources, it may request a report from such local or regional authority as to the action taken to control the sources responsible. If the board's investigation and testing reveals that its standards are not being complied with, or the local or regional standards are not being complied with or are inadequate, and that the report of the local or regional authority is unsatisfactory, the board may hold public hearings. If the board after holding public hearings, is still unsatisfied it may issue a statement of findings, and may direct the local or regional authority, to take further reasonable action. If any local or regional authority does not comply with the directive of the board within 30 days after the date of the directive, the board shall enforce the standards and the rules and regulations adopted by the board pursuant to this part within the area under the jurisdiction of such local or regional authority until such time as the directive is withdrawn by the board or the local or regional authority complies with the directive. The board may take any other appropriate legal action to carry out its responsibilities in such area. The board shall also have the authority, if such area is within any air pollution control district which is functioning and exercising its powers, to take any action which the district may take. If such

area is not within an air pollution control district which is functioning and exercising its powers, the board shall also have the authority to take any action which Chapter 2 (commencing with Section 24193) of Division 20 authorizes a district which is functioning and exercising its powers under that chapter to take. Every person who violates any standard, rule or regulation adopted by the board pursuant to this part in any area in which such standards, rules, and regulations are being enforced by the board is guilty of a misdemeanor. Every day during any portion of which such violation occurs constitutes a separate offense.

Sec. 6. Section 39065 of the Health and Safety Code is amended to read:

39065. All present standards and rules and regulations for the purposes of air pollution control established by the State Department of Public Health and the Motor Vehicle Pollution Control Board shall remain in effect until the State Air Resources Board incorporates them into its rules and regulations or standards or adopts rules and regulations or standards.

Sec. 7. Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code is repealed.

Sec. 8. Chapter 4 (commencing with Section 39080) is added to Part 1 of Division 26 of the Health and Safety Code, to read:

#### Chapter 4 MOTOR VEHICLE POLLUTION CONTROL

##### Article 1. Application and Definitions

39080. This chapter may be cited as the "Pure Air Act of 1968."

39081. The Legislature finds and declares:

- (a) That the emission of pollutants from motor vehicles is the primary cause of air pollution in many portions of the state.
- (b) 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.
- (c) That the state has a responsibility to establish uniform procedures for compliance with standards which control or eliminate such pollutants.
- (d) That the California goal for pure air quality is the achievement of an atmosphere with no significant detectable adverse effect from motor vehicle air pollution on health, welfare and the quality of life and property by 1975.
- (e) That vehicle emission standards applied to new motor vehicles and to used motor vehicles equipped with emission control devices are standards with which all such vehicles shall comply subject to the approval, accreditation, and certification provisions of this part.

39082. The provisions of this chapter shall not apply to any racing vehicle, as defined in Section 39090.7.

39083. The provisions of this chapter shall not apply to any limited production motor vehicle, as defined in Section 39090.

39083.5 The provisions of this chapter shall not apply to any motorcycle as defined in Section 39084.

39084. As used in this chapter the following terms shall be construed as defined in the Vehicle Code:

- (a) Commercial vehicle
- (b) Implement of husbandry
- (c) Motor vehicle
- (d) Motorcycle
- (e) Used vehicle
- (f) Passenger vehicle
- (g) New vehicle
- (h) Truck
- (i) Truck tractor
- (j) Bus

39085. As used in this chapter, "approval" means the findings of the board that the device for new vehicles has satisfied the tests and procedures established by the board to determine whether the various makes and models of new motor vehicles for each model year may be sold and registered in this state. Approval shall be determined on the basis of motor vehicle emissions and such other related factors as the board may in regulations indicate.

39086. As used in this chapter, "crankcase emissions" means substances emitted directly to the atmosphere from any opening leading to the crankcase of a motor vehicle engine. Crankcase gases which are conducted to the engine intake or exhaust systems are not included in the definition of crankcase emissions, but are defined as exhaust emissions.

39087. As used in this chapter, "exhaust emissions" means substances emitted to the atmosphere from any opening down-stream from the exhaust port of a motor vehicle engine.

39088. As used in this chapter, "fuel evaporative loss emissions" means vaporized fuel emitted into the atmosphere from the fuel system of a motor vehicle.

39089. As used in this chapter, "fuel system" means the combination of fuel tank, fuel lines and carburetor, or fuel injector, and includes all vents and fuel evaporative emission control systems or devices.

39090. As used in this chapter, "limited production vehicle" means a make of motor vehicle manufactured in quantities of less than 2,000 units for any given model year.

39090.5. As used in this chapter, "racing vehicle" means a competition vehicle not used on public roads or highways.

39091. As used in this chapter, "model year" means the time of actual manufacture either (1) within the annual production period of such vehicles as designated by the calendar year in which such period ends, or (2) if the manufacturer does not so designate the annual production period of such vehicles manufactured by him, within the 12-month period beginning November 1 of the preceding year. In the case of any vehicle manufactured in two or more stages, the time of manufacturer shall be the date of completion of the chassis.

39092. As used in this chapter, "accreditation" means a finding by the board, pursuant to the procedures established in Article 5 (commencing with Section 39175) of this chapter, that a used motor vehicle emission control device has satisfied the tests and procedures established by the board pursuant to Sections 39107 and 39108.

39093. As used in this chapter, "motor vehicle pollution control device" means equipment designed for installation on a motor vehicle for the purpose of reducing the pollutants emitted from the vehicle, or a system or engine modification on a motor vehicle which causes a reduction of pollutants emitted from the vehicle.

39094. As used in this chapter, "certified device" means a motor vehicle pollution control device required to be installed on various motor vehicles under regulations adopted by the former Motor Vehicle Pollution Control Board prior to November 8, 1967, or under regulations adopted by the board prior to the effective date of the applicable standards provided in this part.

39095. As used in this chapter other than in Section 39094, "Motor Vehicle Pollution Control Board" means, and is applicable to, the board.

39096. As used in this chapter, the terms hydrocarbons, carbon monoxide, and oxides of nitrogen, shall be construed as defined in the regulations of the board, such definitions to be developed in accordance with the purpose of this chapter.

## Article 2. Motor Vehicle Emission Standards

39100. Approval of new motor vehicles for sale and registration and accreditation of devices for used motor vehicles shall be contingent upon compliance with the standards established in this part or pursuant thereto, under the test procedures established by the board pursuant to Section 39052. Motor vehicles which do not so comply with the applicable standards shall not be sold and registered in California.

39100.1. Every manufacturer of motor vehicles sold in the State of California during the calendar year 1968 shall file with the board, not later than 60 days after the effective date of this section, a report describing such manufacturer's research and development activities, including test data, during the preceding 12 months relating to the control of oxides of nitrogen emitted from its vehicles. Where proprietary or competitive requirements necessitate, such reports shall refer to vehicles, technical innovations, and devices by code name or number. Additional progress reports shall be filed with the board by such manufacturers at three-month intervals from 60 days after the effective date of this section until July 1, 1970. Failure to submit such reports shall be considered as constituting failure of compliance under Section 39154.

39100.5. The standards in this article have been found to be technologically feasible and capable of implementation with reasonable economic cost by a technical advisory panel of nine California engineers, scientists, and air pollution experts.

39101. The exhaust emissions from a new 1970 model year gasoline-powered motor vehicle under 6,001 pounds, manufacturer's maximum gross vehicle weight rating having an engine displacement of 50 cubic inches or greater, subject to registration and first sold and registered in this state, shall not exceed:

- (a) 2.2 grams per mile hydrocarbons.
- (b) 23 grams per mile carbon monoxide.

39101.5. The exhaust emissions from a new 1971 model year gasoline-powered motor vehicle under 6,001 pounds, manufacturer's maximum gross vehicle weight rating having an engine displacement of 50 cubic inches or greater, subject to registration and first sold and registered in this state, shall not exceed:

- (a) 2.2 grams per mile hydrocarbons.
- (b) 23 grams per mile carbon monoxide.
- (c) 4.0 grams per mile oxides of nitrogen.

39102. The exhaust emissions from a new 1972 or later model year gasoline-powered motor vehicle under 6,001 pounds, manufacturer's maximum gross vehicle weight rating having an engine displacement of 50 cubic inches or greater, subject to registration and first sold and registered in this state, shall not exceed:

- (a) 1.5 grams per mile hydrocarbons.
- (b) 23 grams per mile carbon monoxide.
- (c) 3.0 grams per mile oxides of nitrogen.

39102.5. Notwithstanding the provisions of subdivision (c) of Section 39102, the oxides of nitrogen exhaust emissions from a new 1974 or later model year gasoline-powered motor vehicles under 6,001 pounds, manufacturer's maximum gross vehicle weight rating having an engine displacement of 50 cubic inches or greater, subject to registration and first sold and registered in this state, shall not exceed 1.3 grams per mile oxides of nitrogen.

39104. The exhaust emissions from a new 1970 or 1971 model year gasoline-powered truck, truck tractor or bus, except those which are diesel-powered, over 6,001 pounds, manufacturer's maximum gross vehicle weight rating, subject to registration and first sold and registered in this state, shall not exceed:

- (a) 275 parts per million hydrocarbons.
- (b) 1.5 percent carbon monoxide.

39105. The exhaust emissions from a new 1972 or later model year gasoline-powered truck, truck tractor or bus, except those which are diesel-powered, over 6,001 pounds, manufacturer's gross vehicle weight rating, subject to registration and first sold and registered in this state, shall not exceed:

- (a) 180 parts per million hydrocarbons.
- (b) 1.0 percent carbon monoxide.

39106. Fuel evaporative losses from the fuel system in a 1970 or later model year gasoline-powered motor vehicle having an engine displacement of 50 cubic inches or greater, under 6,001 pounds, manufacturer's maximum gross vehicle weight rating, subject to registration and first sold and registered in this state, shall not exceed six grams hydrocarbons per test.

39107. In order for an exhaust emission device to be accredited by the board pursuant to Article 5 (commencing with Section 39175) of this chapter it shall not allow emissions exceeding any of the following:

- (a) 275 parts per million hydrocarbons.
- (b) 1.5 percent carbon monoxide.

39108. In order for an evaporative loss device to be accredited by the board pursuant to Article 5 (commencing with Section 3917 ) of this chapter, it shall not allow fuel system evaporative loss greater than six grams hydrocarbons per test.

39109. Exhaust emission standards for hydrocarbons, carbon monoxide and oxides of nitrogen for new diesel-powered vehicles first sold and registered in this state as established by the board pursuant to subdivision (n) of Section 39052, shall apply to all such vehicles at such time as the board determines it is technologically feasible, but no later than January 1, 1973.

### Article 3. Previously Certified Devices

39125. All motor vehicles previously required to have certified pollution control devices pursuant to the provisions of Chapter 1545, Statutes of 1967, shall be required to continue to have such devices, unless otherwise specifically exempted by this chapter.

39126. The board may exempt classifications of motor vehicles subject to this article for which certified devices are not available and motor vehicles whose emissions are found by appropriate tests to meet state standards without additional equipment, and motor-driven cycles, implements of husbandry, and vehicles which qualify for special license plates under Section 5004 of the Vehicle Code.

39127. The board may revoke, suspend, or restrict a certificate of a previously certified device or an exemption previously granted upon a determination by the board that the device no longer operates within the standards set by the board or no longer should be exempted. Provided that once any motor vehicle is equipped with a certified device it shall not thereafter be deemed in violation of this chapter or of Section 27156 of the Vehicle Code, because the certification of such device is subsequently revoked, suspended or restricted, and replacement parts for such device may continue to be supplied and used for such vehicle, unless such revocation, suspension or restriction is based upon a finding that the certified device has been found to be unsafe in actual use or is otherwise mechanically defective, in which event such devices shall be brought into compliance with this chapter within 30 days after such finding.

39128. Proceedings under this chapter with respect to the granting of exemptions, or for the revocation, suspension or restriction of certificates previously issued, or exemptions previously granted, by the board, shall be conducted in accordance with the provisions of Chapter 5 (commencing with Section 11500), Part 1, Division 3, Title 2 of the Government Code, and the board shall have all the powers granted therein.

39129. The following classifications of motor vehicles are subject to the provisions of this article:

- (a) Every 1966 or later year model motor vehicle subject to registration in this state shall be equipped with a certified device or devices to control emission of pollutants from the crankcase and exhaust.
- (b) Every motor vehicle of 1963 or later year model, subject to registration in this state shall be equipped with a certified device to control the emission of pollutants from the crankcase.
- (c) Every motor vehicle of 1955 through 1962 year model subject to registration in this state upon transfer of ownership and registration to an owner whose residence is in a county or portion of a county within an air pollution control district which may function and exercise its powers shall be equipped with a certified device to control the emission of pollutants from the crankcase.
- (d) Every motor vehicle of 1955 through 1965 year model subject to registration in this state upon transfer of ownership and registration to an owner whose residence is in a county or portion of a county within an air pollution control district which may function and exercise its powers, shall be equipped with a certified device to control the emission of pollutants from the exhaust.
- (e) The provisions of subdivisions (a), (b), (c), and (d) of this section shall not be applicable to any of the following vehicles:
- (1) Any motor vehicle or class of motor vehicles exempted by the board.
- (2) Any motor-driven cycle, implement of husbandry or vehicle which qualifies for special plates under Section 5004 of the Vehicle Code.
- (f) The provisions of subdivisions (c) and (d) shall not be applicable in any district activated after July 1, 1959, so as to be able to perform its functions unless the board of supervisors of each county in which the district is situated adopts a resolution based upon its finding that subdivisions (c) and (d) are necessary to the preservation of air quality within that district; nor shall the provisions of subdivisions (c) and (d) be applicable in any county situated within a multicounty district formed prior to July 1, 1959, which county is adjacent to a district activated prior to January 1, 1960, unless the board of supervisors in such county adopts a resolution based upon its finding that subdivisions (c) and (d) are necessary to the preservation of air quality within that county.
- (g) Every 1968 year model passenger vehicle, except motorcycles, subject to registration and first sold and registered in this state shall be equipped with a certified device or devices to control emission of pollutants from the crankcase and exhaust. Notwithstanding any other provision of this section or of Article 5 (commencing with Section 3917.) of this chapter, the board may only grant an exemption for not to exceed 1 percent of a manufacturer's passenger vehicle sales in California in the preceeding model year.
- (h) Every 1967 year model commercial motor vehicle under 6,001 pounds manufacturer's maximum gross vehicle weight rating subject to registration and first sold and registered in this state shall be equipped with a certified device or devices to control emission of pollutants from the crankcase and exhaust.
- (i) The provisions of subdivisions (c) and (d) of this section shall not be applicable to motor vehicles registered to an owner whose residence is in an area, designated pursuant to this subdivision, of any county having an area in excess of 7,000 square miles in which an air pollution control district consisting of a single

county may function and exercise its powers and within 60 days after the effective date of this section the board of supervisors of such county has classified the county into two areas because of substantial geographic and climatic differences between the two areas, and within 60 days after the effective date of this section the board of supervisors of the county has found that within one of such areas, designated by the board, the equipment of motor vehicles with devices to control the emission of pollutants is unnecessary for the preservation of air quality within that area.

(j) Notwithstanding any provision of subdivision (f), if after the effective date of this section subdivisions (c) and (d) are made applicable to a district or county in which subdivisions (c) and (d) are inapplicable under subdivision (f) on such effective date, subdivisions (c) and (d) shall not be applicable to any other district or county unless its governing board adopts a resolution based upon its finding that subdivisions (c) and (d) are necessary to the preservation of air quality in such other district or county, as the case may be.

39130. No person shall sell, display, advertise, or represent as a certified device any device which, in fact, is not a certified device. No person shall install or sell for installation upon any motor vehicle, any motor vehicle pollution control device which has not been certified by the board.

39131. Any manufacturer of a device required by this article shall, as a condition of certification of such device by the board, agree that so long as only one such device is certified by the board such manufacturer shall either: (1) agree to enter into such cross-licensing or other agreements as the board determines are necessary to insure adequate competition among manufacturers of such devices to protect the public interest; or (2) agree as a condition to such certification that if only one such device from one manufacturer is made available for sale to the public, the board shall, taking into consideration the cost of manufacturing the device and the manufacturer's suggested retail price, and in order to protect the public interest, determine the fair and reasonable retail price of such device and may require, as a condition to continued certification of such device, that the retail price of such device, including installation, not exceed such price as determined by the board. In either event the retail price so determined by the board for a device required by subdivision (d) of Section 39129 or Section 39176 shall not be in excess of sixty-five dollars (\$65) per vehicle.

#### Article 4. New Motor Vehicle Approval

39130. The board shall have the powers and authority necessary to carry out the duties imposed on it by this article including, but not limited to, the following:

(a) To adopt rules and regulations in accordance with the provisions of the Administrative Procedure Act (commencing with Section 11370) of the Government Code, necessary for proper execution of the powers and duties granted to, and imposed upon, the board by this article.

(b) To employ such technical and other personnel as may be necessary for the performance of its powers and duties.



39151. No new motor vehicle required pursuant to this part to meet the emission standards in Article 2 (commencing with Section 39100) of this chapter or the standards set pursuant to Sections 3902.5 or 3902.6 shall be sold and registered in this state unless the engine and transmission combination used in that vehicle has been approved by the board.

Vehicle manufacturers shall test engine and transmission combinations in vehicles which are representative of the types of vehicles in which that engine and transmission combination is used.

39154. No new motor vehicle required pursuant to this part to meet the emission standards in Article 2 (commencing with Section 39100) of this chapter shall be sold and registered in this state if the vehicle manufacturer has in the previous year for which the board approved his vehicles failed to comply with the standards established in this part or with such regulations as the board may establish, unless the manufacturer thereof complies with such other conditions as the board may by regulation indicate.

The procedures for determining, and the facts constituting, compliance and failure of compliance shall be established by the board pursuant to subdivision (c) of Section 3901.

#### Article 5. Used Motor Vehicle Device Accreditation

39175. The board shall have the powers and authority necessary to carry out the duties imposed on it by this article including, but not limited to, the following:

(a) To adopt rules and regulations in accordance with the provisions of the Administrative Procedure Act (commencing with Section 11370) of the Government Code, necessary for proper execution of the powers and duties granted to, and imposed upon the board by this article.

(b) To employ such technical and other personnel as may be necessary for the performance of its powers and duties.

(c) To determine and publish by January 1, 1969, tests and procedures for the accreditation of used car exhaust emission control and fuel system evaporative loss control devices.

(d) To accredit motor vehicle pollution control devices following tests by the board or by a board-designated laboratory in which the board finds that the device operates within the standards set in Article 2 (commencing with Section 39100) of this chapter or that the device effectively controls harmful pollutants not specifically mentioned in Article 2 (commencing with Section 39100) of this chapter, or that the device effectively controls emissions from a part of the vehicle not specifically mentioned in Article 2 (commencing with Section 39100) of this chapter. Any device accredited shall be technologically feasible.

39176. Whenever an exhaust emission control device is accredited pursuant to the provisions of this article and is available for installation as determined by the board, every 1955 through 1965 year model vehicle shall be equipped with an accredited device to control the emission of pollutants from the exhaust in accordance with the requirements, exemptions and schedule of installation provided in Article 3 (commencing with Section 39125) of this chapter.

39177. The board may exempt classifications of motor vehicles for which accredited devices are not available, and motor vehicles whose emissions are found by appropriate tests to meet state standards without additional equipment, and motor-driven cycles, implements of husbandry, and vehicles which qualify for special license plates under Section 5004 of the Vehicle Code.

39178. The board may revoke, suspend or restrict an accreditation of a previously accredited device or an exemption previously granted upon a determination by the board that the device no longer operates within the standards set by the board or no longer should be exempted. Provided that once any motor vehicle is equipped with an accredited device it shall not thereafter be deemed in violation of this chapter or Section 27156 of the Vehicle Code because the accreditation of such device is subsequently revoked, suspended or restricted, and replacement parts for such device may continue to be supplied and used for such vehicle, unless such revocation, suspension or restriction is based upon a finding that the accredited device has been found to be defective, in which event such devices must be brought into compliance with this chapter within 30 days after such finding.

39179. Proceedings under this article with respect to the denial of applications for accreditation, the granting of exemptions, or for the revocation, suspension, or restriction of accreditation previously granted by the board shall be conducted in accordance with the provisions of Chapter 5 (commencing with Section 11500), Part 1, Division 3, Title 2 of the Government Code, and the board shall have all the powers granted therein.

39180. In establishing tests and procedures the board shall adopt standards including, but not limited to, the following:

- (a) An accredited exhaust emission control device shall not cost more than sixty-five dollars (\$65), including the cost of installation.
- (b) An accredited exhaust emission control device shall not require maintenance more than once each 12,000 miles, and such maintenance shall not cost more than fifteen dollars (\$15), including the cost of parts and labor.
- (c) An accredited exhaust control device shall equal or exceed the performance criteria established by the board for devices for new motor vehicles or, in the alternative, have an expected useful life of at least 50,000 miles of operation.
- (d) Standards for an accredited fuel system evaporative loss control device shall take into consideration 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 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.
- (e) An accredited fuel system evaporative loss control device shall equal or exceed the performance criteria established by the board for such new devices required on new motor vehicles, or in the alternative, must have an expected useful-life of at least 50,000 miles of operation.

39180.1. Whenever the board accredits a fuel system evaporative loss control device for which standards have been set by this chapter, it shall submit a report of its findings and its recommendations for installation on used vehicles to the Legislature within 10 days, if it is then in session, or if not in session not later than January 15, of the next general session. Such report shall contain a report on the cost of such device, including the cost of installation and a review

of its potential performance, including required maintenance and the cost of parts and labor.

39180.2. No accredited fuel system evaporative loss control device for installation on used motor vehicles, nor any other accredited device not mentioned in Section 39129 shall be required to be installed on any used motor vehicles until approved by statute enacted by the Legislature.

39181. The board may issue permits for the testing of experimental motor pollution control devices installed in used motor vehicles, or for the testing of experimental or prototype motor vehicles which appear to have very low emission characteristics.

39182. Any manufacturer of a device required by this article shall, as a condition of accreditation of such device by the board, agree that so long as only one such device is accredited by the board such manufacturer shall either: (1) agree to enter into such cross-licensing or other agreements as the board determines are necessary to insure adequate competition among manufacturers of such devices to protect the public interest; or (2) agree as a condition to such accreditation that if only one such device from one manufacturer is made available for sale to the public, the board shall, taking into consideration the cost of manufacturing the device and the manufacturer's suggested retail price, and in order to protect the public interest, determine the fair and reasonable retail price of such device and may require, as a condition to continued accreditation of such device, that the retail price of such device, including installation, not exceed such price as determined by the board. In either event the retail price so determined by the board for a device required by Section 39176 shall not exceed sixty-five dollars (\$65) per vehicle.

39183. Whenever the board accredits a device for the control of emissions of pollutants from a particular source of emissions from motor vehicles for which standards have been set by this chapter and the board, it shall so notify the Department of Motor Vehicles.

39184. No person shall sell, display, advertise, or represent as an accredited device any device which, in fact, is not an accredited device. No person shall install or sell for installation upon any used motor vehicle any motor vehicle pollution control device which has not been accredited by the board.

#### Article 6. Variances

39190. The Governor with the advice and consent of the Senate shall appoint a hearing board to consist of three members, none of whom is employed by the board or the state. Two members shall be registered professional engineers knowledgeable in motor vehicle emission control. One member shall have been admitted to practice law in this state.

39191. The Governor shall appoint one member of the hearing board for a term of one year, one for a term of two years, and one for a term of three years. Thereafter the terms of members of the hearing board shall be three years.

39192. The hearing board at the request of any person may hold a hearing to determine under what conditions and to what extent a variance from the emission standards for new or used cars established by Article 2 (commencing with Section 39100) of this chapter or by rules, regulations, or orders of the board is necessary

and will be permitted. All such hearings shall be open to the public and shall be held at a place which the board determines to be convenient to the public in the area most affected by the motor vehicle air pollution problem.

39193. The board may provide, by regulation, a schedule of fees which will yield a sum not exceeding the estimated cost of the administration of this article, for the filing of applications for variances or to revoke or modify variances. All applicants shall pay the fees required by such regulations.

39194. The hearing board shall serve a notice of the time and place of a hearing to grant a variance upon the chairman and the executive officer of the board and upon the applicant, if any, not less than 10 days prior to such hearing.

39195. If the hearing board finds that because of conditions beyond control, compliance with the standards in Article 2 (commencing with Section 39100) of this chapter or with any rule, regulation, or order of the board will result in an arbitrary and unreasonable taking of property or in a serious and demonstrable economic hardship without a sufficient corresponding benefit or advantage to the people in the reduction of air pollution, it shall prescribe other and different standards not more onerous applicable to named classes of industries or persons. Tests and procedures for determining compliance with the standards established by the hearing board shall be the same as those tests and procedures established by the State Air Resources Board.

In establishing other and different standards the hearing board shall not prescribe standards less onerous than any applicable federal standards. Any federal standard enacted or implemented during the period for which a variance granting a less onerous standard is running shall immediately supersede the standard established by the hearing board.

39196. Notwithstanding the provisions of Section 39195, the hearing board shall grant variances to manufacturers of new motor vehicles only on a showing that the vehicle manufacturer is making all reasonable efforts to comply with the standards as soon as possible.

39196.5. The hearing board may revoke or modify by written order, after a public hearing held upon not less than 10 days' notice, any order permitting a variance.

39197. The hearing board shall serve notice of the time and place of a hearing to revoke or modify any order permitting a variance not less than 10 days prior to such hearing upon the director and the executive officer of the board, upon all persons who will be subjected to greater restrictions if such order is revoked or modified as proposed and upon all other persons interested or likely to be affected who have filed with the hearing board or board a written request for such notification.

39197.5. The hearing board shall serve a notice of the time and place of a hearing to grant a variance or to revoke or modify an order permitting a variance either by personal service or by first-class mail, postage prepaid. If either the identity or address of any person entitled to notice is unknown, the hearing board shall serve such person by publication of notice once in a newspaper of general circulation published within the State of California.

39198. The hearing board in making any order permitting a variance may specify the time during which such order will be effective, in no event to exceed one year.

39199. The hearing board in administering the provisions of this article may conduct investigations and hearings pursuant to Article 2 (commencing with Section 11180), Chapter 2, Part 1, Division 3, Title 2 of the Government Code.

39200. After each hearing for a variance under proceedings held pursuant to this article, the hearing board shall make written findings of fact based upon the evidence and shall render a written decision. Such findings and written decision shall contain a detailed description of all testing data and testing procedures used in connection with the evidence submitted to the hearing board. Each written decision, accompanied by the findings shall be transmitted to the Legislature forthwith. Nothing in this section shall require or authorize the disclosure of any trade secret privileged under Section 1060 of the Evidence Code, or of any information not a part of the public record the disclosure of which is prohibited by Section 11183 of the Government Code.

39201. The hearing board created by this article shall not exercise or undertake any duty, power, responsibility or jurisdiction vested in the hearing board by this article unless, and until, the State Air Resources Board determines that the Secretary of Health, Education and Welfare will not waive application to California of Section 208 of the National Emission Standards Act. In the event of such a determination by the State Air Resources Board then and then only shall Sections 39192 to 39200, inclusive, of this article become operative.

Sec. 9. Section 14808.1 is added to the Government Code, to read:

14808.1. In establishing bid specifications for the purchase of motor vehicles and in determining the lowest responsible bidder, consideration shall be given by the state to the low emission test results of such vehicles as determined by the State Air Resources Board pursuant to Section 39052 of the Health and Safety Code. The state shall purchase low emission test vehicles insofar as the cost of those vehicles do not exceed the cost of vehicles which would otherwise be purchased for state use by 10 percent, except for the following vehicles:

- (a) Vehicles used by the Department of the California Highway Patrol as patrol cars.
- (b) Vehicles which are used in other special ways so as to render the low emission requirements impractical.

Sec. 10. Section 2814 of the Vehicle Code is amended to read:

2814. Every driver of a passenger vehicle shall stop and submit the vehicle to an inspection of the mechanical condition and equipment of the vehicle at any location where members of the California Highway Patrol are conducting tests and inspections of passenger vehicles and when signs are displayed requiring such stops.

The Commissioner of the California Highway Patrol may make and enforce regulations with respect to the issuance of stickers or other devices to be displayed upon passenger vehicles as evidence that the vehicles have been inspected and have been found to be in safe mechanical condition and equipped as required by this code and equipped with certified motor vehicle pollution control devices as required by Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code which are correctly installed and in operating condition. Any sticker so issued shall be placed on the windshield within a seven-inch square as provided in Section 26708.

If, upon such an inspection of a passenger vehicle, it is found to be in unsafe mechanical condition or not equipped as required by this code and the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code, the provisions of Article 2 (commencing with Section 40150) of Chapter 1 of Division 17 of this code shall apply.

Sec. 11. Section 4000 of the Vehicle Code is amended to read:

4000. (a) No person shall drive, move, or leave standing any motor vehicle, trailer, semitrailer, pole or pipe dolly, logging dolly, or auxiliary dolly upon a highway unless it is registered and the appropriate fees have been paid under this code.

No person shall drive, move, or leave standing any motor vehicle upon a highway which has been registered in violation of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code.

(b) The provisions of this section shall not apply, following payment of fees due for registration, during such time that registration and transfer is being withheld by the Department of Motor Vehicles pending the investigation of any use tax due under the provisions of the Revenue and Taxation Code.

(c) When a vehicle is towed by a tow car on order of a sheriff, marshal, or other official acting pursuant to a court order or on order of a peace officer acting pursuant to the provisions of Chapter 10 (commencing with Section 22650) of Division 11, the provisions of subdivision (a) of this section shall not apply.

Sec. 12. Section 4000.1 of the Vehicle Code is amended to read:

4000.1. (a) On and after December 1, 1965, the department shall require upon transfer of ownership and registration of any motor vehicle subject to Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code, a valid certificate of compliance from a licensed motor vehicle pollution control device installation and inspection station indicating that such vehicle is properly equipped with a certified device or devices which are in proper operating condition and which are in compliance with the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code.

(b) The State Air Resources Board established under Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code may exempt designated classifications of motor vehicles from the provisions of subdivision (a) as they deem necessary, and shall notify the department of such action; provided, however, that no exemption shall be granted to those vehicles subject to the provisions of subdivision (g) of Section 39129 of the Health and Safety Code, except as provided therein.

Sec. 12.5. Section 4000.1 of the Vehicle Code is amended to read:

4000.1. (a) On and after December 1, 1965, the department shall require upon transfer of ownership and registration of any motor vehicle subject to Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code, a valid certificate of compliance from a licensed motor vehicle pollution control device installation and inspection station indicating that such vehicle is properly equipped with a certified device or devices which are in proper operating condition and which are in compliance with the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code.

A certificate of compliance issued ~~for any~~ motor vehicle shall serve as proof of compliance with Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code upon any subsequent transfer of ownership and registration at any time between the husband and wife.

(b) The State Air Resources Board established under Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code may exempt designated classifications of motor vehicles from the provisions of subdivision (a) as they deem necessary, and shall notify the department of such action; provided, however, that no exemption shall be granted to those vehicles subject to the provisions of subdivision (g) of Section 39129 of the Health and Safety Code, except as provided therein.

Sec. 13. Section 4750 of the Vehicle Code is amended to read:

4750. The department shall refuse registration or renewal or transfer of registration upon any of the following grounds:

- (a) That the application contains any false or fraudulent statement.
- (b) That the required fee has not been paid.

(c) That the registration or renewal or transfer of registration is prohibited by the requirements of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code.

Sec. 13.5. Section 4750 of the Vehicle Code is amended to read:

4750. The department shall refuse registration or renewal or transfer of registration upon any of the following grounds:

- (a) That the application contains any false or fraudulent statement.
- (b) That the required fee has not been paid.

(c) That the registration or renewal or transfer of registration is prohibited by the requirements of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code.

(d) That the department has been notified pursuant to sub-division (c) of Section 40008 that the owner or lessee of the vehicle has failed to pay a fine, and such fine has not subsequently been paid.

Sec. 13.6. Section 12300 of the Vehicle Code, as added by Assembly Bill No. 1320, as enacted at the 1968 Regular Session is amended to read:

12300. As used in this chapter:

(a) "Motor vehicle pollution control device" and "certified device" shall be construed as defined in Sections 39093 and 39094 of the Health and Safety Code.

(b) "Station", "licensed station", "licensed installer," and "licensed adjuster" shall be construed as defined in Chapter 2.5 (commencing with Section 2500) of Division 2 of this code.

Sec. 13.7. Section 12302 of the Vehicle Code, as added by Assembly Bill No. 1320, as enacted at the 1968 Regular Session, is amended to read:

12302. Any person may install a motor vehicle pollution control device; however, no person who is not a licensed installer shall install such a device for compensation. No such device shall be deemed to meet the requirements of this code or of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code and the rules and regulations of the State Air Resources Board unless it has been inspected by a licensed installer in a licensed station and a certificate of compliance has been issued by such licensed station.

Sec. 13.8. Section 12303 of the Vehicle Code as added by Assembly Bill No. 1320, as enacted at the 1968 Regular Session, is amended to read:

12303. Whenever a licensed installer in a licensed station, in conformity with the instructions of the commissioner installs, inspects, or repairs a motor vehicle pollution control device, and determines that the device conforms with the requirements of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code, and the rules and regulations of the State Air Resources Board, a certificate of compliance shall be issued to the owner or driver of the vehicle. The commissioner, for a fee of ten cents (\$.10), shall furnish to the licensed station the certificate of compliance to be issued. The certificate of compliance shall contain provisions for the date of issuance, the make and registration number of the vehicle, the name of the owner of the vehicle, and the official designation of the station. It is unlawful for any person, other than a licensed installer in a licensed station, to sign or issue a certificate of compliance required by this chapter.

Sec. 14. Section 24007. of the Vehicle Code is amended to read:

24007. (a) No dealer or person holding a retail seller's permit shall sell a new or used motor vehicle with is not in compliance with the provisions of this code and department regulations adopted pursuant to this code unless the vehicle is sold to another dealer or for the purpose of being wrecked or dismantled or is sold exclusively for off-highway use.

(b) No dealer shall sell a new or used motor vehicle subject to the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code which is not in compliance with the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code and the rules and regulations of the State Air Resources Board, unless the vehicle is sold to another dealer or for the purpose of being wrecked or dismantled. The dealer shall, with each application for transfer of registration of every 1955 or later year model motor vehicle subject to Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code, transmit to the Department of Motor Vehicles a valid certificate of compliance from a licensed motor vehicle pollution control device installation and inspection station indicating that such vehicle is properly equipped with a certified device or devices which are in proper operating condition and which are in compliance with the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code.

Sec. 15. Section 27153.5 is added to the Vehicle Code, to read:

27153.5. (a) No motor vehicle first sold or registered as a new motor vehicle on or after January 1, 1971, shall discharge into the atmosphere at elevation of less than 3,000 feet any air contaminant for a period of more than 10 seconds which is:



(1) As dark or darker in shade as that designated as No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines, or

(2) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in paragraph (1) of this subdivision.

(b) No motor vehicle first sold or registered prior to January 1, 1971, shall discharge into the atmosphere at elevation of less than 3,000 feet any air contaminant for a period of more than 10 seconds which is:

(1) As dark or darker in shade than that designated as No. 2 on the Ringelmann Chart, as published by the United States Bureau of Mines, or

(2) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in paragraph (1) of this subdivision.

Sec. 16. Section 28500 of the Vehicle Code is amended to read:

28.00. As used in this chapter:

(a) "Motor vehicle pollution control device" and "certified device" shall be construed as defined in Sections 39093 and 39094 of the Health and Safety Code.

(b) "Station" means a motor vehicle pollution control device installation and inspection station.

(c) "Licensed station" means a station licensed by the department pursuant to this chapter.

(d) "Licensed installer" means a person licensed by the department for installing, repairing, inspecting, or recharging motor vehicle pollution control devices in licensed stations.

Sec. 17. Section 28002 of the Vehicle Code is amended to read:

28002. (a) The department shall license stations and shall designate, furnish instructions to, develop regulations for, and supervise licensed stations for installing, repairing, inspecting, or recharging motor vehicle pollution control devices in conformity with the provisions of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code and the rules and regulations of the department. The department shall establish standards for the qualifications, including training, of licensed installers as a condition to designating and licensing the station as a licensed station.

An owner of a fleet of three or more vehicles may be licensed by the department as a licensed station, provided such owner complies with the regulations of the department.

(b) The department shall license, furnish instruction to, develop regulations for, and supervise licensed installers as a condition for installing, repairing, inspecting, or recharging motor vehicle pollution control devices in licensed stations.

Sec. 18. Section 28006 of the Vehicle Code is amended to read:

28006. Any person may install a motor vehicle pollution control device; however, no person who is not a licensed installer shall install such a device for compensation. No such device shall be deemed to meet the requirements of this code

or of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code and the rules and regulations of the State Air Resources Board unless it has been inspected by a licensed installer in a licensed station and a certificate of compliance has been issued by such licensed station.

Sec. 19. Section 28508 of the Vehicle Code is amended to read:

28508. Whenever a licensed installer in a licensed station, in conformity with the instructions of the department, installs, inspects, repairs, or recharges a motor vehicle pollution control device, and determines that the device conforms with the requirements of Chapter 4 (commencing with Section 39080) of Part 1 of Division 26 of the Health and Safety Code, and the rules and regulations of the State Air Resources Board, a certificate of compliance shall be issued to the owner or driver of the vehicle. The department, for a fee of ten cents (\$0.10), shall furnish to the licensed station the certificate of compliance to be issued.

The certificate of compliance shall contain provisions for the date of issuance; the make and registration number of the vehicle; the name of the owner of the vehicle; and the official designation of the station.

It is unlawful for any person, other than a licensed installer in a licensed station, to sign or issue a certificate of compliance as provided for by this chapter.

Sec. 20. Section 12.5 of this act shall become operative only if Assembly Bill No. 1989 is enacted by the Legislature at its 1968 Regular Session, and as enacted amends Section 4000.1 of the Vehicle Code, and in such case at the same time as Assembly Bill No. 1989 takes effect, at which time Section 4000.1 of the Vehicle Code as amended by Section 12 of this act is repealed.

Sec. 21. Section 13.5 of this act shall become operative only if Assembly Bill No. 1118 is enacted by the Legislature at its 1968 Regular Session, and as enacted amends Section 4750 of the Vehicle Code, and in such case at the same time as Assembly Bill No. 1118 takes effect, at which time Section 4750 of the Vehicle Code as amended by Section 13 of this act is repealed.

Sec. 22. Sections 13.6, 13.7, and 13.8 of this act shall become operative only if Assembly Bill No. 1320 is enacted by the Legislature at its 1968 Regular Session, and as enacted it adds Sections 12300, 12302, and 12303 to the Vehicle Code, and in such case at the same time as Assembly Bill No. 1320 takes effect, at which time Sections 28500, 28502, 28506, and 28508 as amended by Sections 17, 18, 19, and 20 of this act are repealed.

## STATE OF CALIFORNIA, AIR RESOURCES BOARD—SUMMARY OF AMBIENT AIR QUALITY STANDARDS

## 1. DEFINITIONS

(a) *Ambient Air Quality Standards*.—Ambient air quality standards are specific concentrations and durations of air pollutants which reflect the relationship between the intensity and composition of pollution to undesirable effects.

(b) *Conditions*.—"Conditions", as they appear in the fourth column of the Table of Ambient Air Quality Standards specify the applicability or interpretation of the associated standard.

(c) *Most Relevant Effects*.—"Most Relevant Effects", shown in the fifth column of the Table of Ambient Air Quality Standards are the effects which the standards are intended to prevent or abate.

(d) *Parts Per Million (ppm)*.—Parts per million is a volumetric unit of gas concentration, which is numerically equal to the volume of a gaseous contaminant present in one million volumes of air.

(e) *Micrograms Per Cubic Meter ( $\mu\text{g}/\text{m}^3$ )*.—Micrograms per cubic meter is a unit of concentration which is numerically equal to the mass of a contaminant (in micrograms) present in a one cubic meter sample of air, measured at standard conditions.

(f) *Equivalent Method*.—"Equivalent Method" is any procedure for measuring the concentration of a contaminant, other than that specified in the air quality standard for the contaminant, which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard.

(g) *Prevailing Visibility*.—"Prevailing Visibility" is the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors. Prevailing visibility is determined by the procedure given in "Manual of Surface Observations" U.S. Weather Bureau, Army and Navy.

(h) *Oxidant*.—Oxidant is a substance that oxidizes a selected reagent that is not oxidizable by oxygen under ambient conditions. For the purposes of this section, it includes ozone, organic peroxides, and peroxyacyl nitrates, but not nitrogen dioxide. Atmospheric oxidant concentrations are to be measured by the neutral potassium iodide method, corrected for nitrogen dioxide, or by an equivalent method.

(i) *Carbon Monoxide (CO)*.—Carbon Monoxide is a colorless gas, odorless under atmospheric conditions, having the molecular form CO. Atmospheric carbon monoxide concentrations are to be measured by the nondispersive infrared method, corrected for interferences of carbon dioxide and water vapor, or by an equivalent method.

(j) *Sulfur Dioxide (SO<sub>2</sub>)*.—Sulfur dioxide is a colorless, irritating gas under atmospheric conditions, having the molecular form SO<sub>2</sub>. Atmospheric sulfur dioxide concentrations are to be measured by the conductimetric method, or an equivalent method.

(k) *Suspended Particulate Matter*.—Suspended particulate matter refers to atmospheric particles, solid and liquid, except uncombined water. Atmospheric suspended particulate matter is to be measured by the high volume sampler method, or by an equivalent method.

(l) *Visibility Reducing Particles*.—Visibility reducing particles are atmospheric particles in the light scattering size range. The effect of these particles on prevailing visibility is to be determined by direct observation, or an equivalent method.

(m) *Hydrogen Sulfide (H<sub>2</sub>S)*.—Hydrogen sulfide is a colorless gas having the molecular form H<sub>2</sub>S. Atmospheric hydrogen sulfide concentrations are to be measured by the cadmium hydroxide-STRactan method.

(n) *Nitrogen Dioxide (NO<sub>2</sub>)*.—Nitrogen dioxide is a red-brown gas, odorless under atmospheric conditions, having the molecular form NO<sub>2</sub>. Atmospheric nitrogen dioxide concentrations are to be measured by the Saltzman Reagent method, or an equivalent method.

## 2. GENERAL STATEMENT OF POLICY AND SCOPE

Ambient air quality standards are not intended to provide a sharp line dividing air of satisfactory quality from air of unsatisfactory quality. However, pollution levels below those shown in the standards should not ordinarily produce the associated effects.

The objective of ambient air quality standards is to provide a basis for preventing or abating the effects of air pollution, including effects on health, esthetics and economy. Since their objective is to improve air quality, the standards should not be interpreted as permitting, encouraging, or condoning degradation of present air quality in any air basin which now has an air quality superior to that stipulated in the standards.

In determining compliance with the standards through air monitoring, the sites and conditions of air sampling should be so chosen as to realistically represent the exposures of people, animals, vegetation and materials.

Ambient air quality standards will be reviewed annually in the light of new information and experience to consider whether existing standards need to be revised, or additional standards established.

## 3. AMBIENT AIR QUALITY STANDARDS TO BE APPLICABLE IN ALL AIR BASINS OF THE STATE—Continued

Substance	Concentration and method 1	Duration of averaging period	Conditions	Most relevant effects	Comment
Oxidant, including ozone	0.1 p.p.m., neutral KI (corrected for nitrogen dioxide).	1 hr.	The standard will be said to be exceeded in the basin when 0.1 p.p.m. or more of oxidant, including ozone, occurs 7 or more days in 90 consecutive days, or 3 or more consecutive days.	(a) Index of eye irritation. (b) Possible impairment of lung function in persons with chronic pulmonary disease.	These effects are not thought to be due to ozone but are associated with its presence in the atmosphere.
Carbon monoxide	20 p.p.m., NDIR method	8 hrs.		Prolonged exposures to such ambient concentration can produce an increase of more than 2 percent COHb in nonsmokers and higher levels in smokers. These amounts may produce impaired CNS function and interfere with oxygen transport by blood.	There is some evidence suggesting a more stringent standard and current work is likely to require an early reevaluation.
Sulfur dioxide	0.04 p.p.m. (114 $\mu\text{g}/\text{m}^3$ ), conductimetric method.	24 hrs.	Applicable only in locations where the ambient air quality standard for suspended particulate matter is exceeded.	(a) With particulate matter, annual average of 0.05 p.p.m. may be associated with increase in chronic respiratory disease on long term exposure. (b) 0.2 p.p.m. averaged for 24 hrs., with particulate matter, may exacerbate cardiorespiratory conditions.	
Visibility-reducing particles	0.5 p.p.m. (1430 $\mu\text{g}/\text{m}^3$ ), conductimetric method.	1 hr.	Applicable regardless of the suspended particulate matter level.	(a) Alteration in lung function. (b) Odor.	Alteration in lung function at this level has been reported by one study. Other studies concluded that a greater concentration is required for this effect. This level is also the approximate odor threshold.
Hydrogen sulfide	In sufficient concentration to reduce the prevailing visibility <sup>2</sup> to 10 miles, when relative humidity is less than 70 percent. 0.03 p.p.m., cadmium hydroxide Stractan method.	2 successive observations 1 hr. apart.  1 hr.	This standard is said to be exceeded when prevailing visibility of 10 miles or less occurs 7 or more days in 90 consecutive days, or 3 or more consecutive days.	Visibility impairment on days when relative humidity is less than 70 percent.  Exceeds the odor threshold.	

3. AMBIENT AIR QUALITY STANDARDS TO BE APPLICABLE IN ALL AIR BASINS OF THE STATE—Continued

Substance	Concentration and method <sup>1</sup>	Duration of averaging period	Conditions	Most relevant effects	Comment
Nitrogen dioxide	0.25 p.p.m., Saltzman	1 hr.		(a) At slightly higher dosage, effects are observed in experimental animals, which imply a risk to the public health. (b) Produces atmospheric discoloration.	

<sup>1</sup> Any other procedure which can be shown to the satisfaction of the Air Resources board to give equivalent results at or near the level of the air quality standard may be used. <sup>2</sup> Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

AMBIENT AIR QUALITY STANDARDS TO BE APPLICABLE IN THE SAN FRANCISCO BAY AREA BASIN AND THE SOUTH COAST BASIN

Substance	Concentration and method <sup>1</sup>	Duration of averaging period	Conditions	Most relevant effects	Comment					
Suspended particulate matter.	<table border="0"> <tr> <td rowspan="2" style="vertical-align: middle;">{</td> <td>60 ug/m<sup>3</sup>, high-volume sampling.</td> </tr> <tr> <td>100 ug/m<sup>3</sup>, high-volume sampling.</td> </tr> </table>	{	60 ug/m <sup>3</sup> , high-volume sampling.	100 ug/m <sup>3</sup> , high-volume sampling.	<table border="0"> <tr> <td>24-hour samples, annual geometric mean.</td> </tr> <tr> <td>24-hour sample</td> </tr> </table>	24-hour samples, annual geometric mean.	24-hour sample	This standard applies to suspended particulate matter in general. It is not intended to be a standard for toxic particles such as asbestos, lead, or beryllium.	Long continued exposure may be associated with increase in chronic respiratory disease. Exposure with SO <sub>2</sub> may produce acute illness.	Size distribution of particulate matter influences its effects on health. Commonly used methods of sampling do not segregate particles by size. The standard will be re-evaluated when suitable particle size equipment is available.
{	60 ug/m <sup>3</sup> , high-volume sampling.									
	100 ug/m <sup>3</sup> , high-volume sampling.									
24-hour samples, annual geometric mean.										
24-hour sample										

<sup>1</sup> Any other procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.

## STATEMENT OF SOUTHERN CALIFORNIA EDISON CO.

Southern California Edison Co. is pleased to present its comments concerning S. 3546, the proposed "National Air Quality Standards Act of 1970" and S. 3466 (H.R. 15848), the proposed "Air Quality Improvement Act," which propose amendments to the Clean Air Act, as amended. We are not offering comments concerning the new proposals dealing with the control of air pollution produced by motor vehicles.

Edison is a California corporation engaged as a public utility in the production, transmission and distribution of electric energy in portions of central and southern California. Its service area covers about 50,000 square miles, with an estimated population of over 7 million people dependent upon its electric service. In 1969 the Edison system had thermal resources of 8,515 MWE and hydro resources of 1,119 MWE. It is currently estimated that Edison will require an additional 11,110 MWE of generating capacity in the next decade and another 26,500 MWE in the decade of the 1980s. In view of its large existing system and its future growth prospects, Edison has been and is, of course, extensively involved in the subject of air pollution control.

### BACKGROUND—EDISON ACTIVITIES

Over 15 years ago Edison recognized the critical air pollution control problem which exists in the Los Angeles area and has taken constructive steps to reduce powerplant emissions of air contaminants. Here are some of the steps that we have taken:

1. We began an extensive air pollution research program in the early 1950s and we believe our company has spent more time, money and effort on air pollution research than any utility in the United States.

2. We worked for over 10 years in a project involving expenditures of millions of dollars in an attempt to bring additional supplies of natural gas into this area to fuel our electric generating plants. Many of the leaders in the fight against air pollution supported our efforts to get more natural gas. Nevertheless, after extensive hearings before the Federal Power Commission in Washington, D.C. and Federal court appeals, we were defeated.

3. Having lost this effort, Edison took leadership in getting a Federal import quota exception which allows importation of low sulfur, low ash oil from Indonesia to aid in air pollution control. Edison powerplants burn natural gas or low sulfur oil on a year-round basis. This year-round burning of natural gas or low sulfur oil has enabled us to reduce materially emissions of particulates and sulfur compounds from our fossil-fueled powerplants in this area; and these powerplants are not now significant contributors of these emissions. However, oil import quotas must continue to be extended to permit us to use Indonesia oil as a boiler fuel.

4. Over 12 years ago Edison began extensive research on nitrogen oxide emissions from fossil-fueled powerplants. This pioneering effort by Edison and Babcock and Wilcox Co. led to the two-stage combustion process in fossil-fueled powerplant boilers which markedly reduced nitrogen oxide emissions from powerplants. Within the last year a further refinement in this process has been developed and is

now being incorporated in Edison powerplants in this area. As a result,  $\text{NO}_x$  emissions by Edison plants will be reduced to almost half their previous levels.

5. Edison was one of the first utilities in the United States to build a large-scale nuclear plant. Our San Onofre Nuclear Generating Station south of San Clemente was the largest commercial atomic powerplant in the United States when it went on the line nearly 2 years ago and today it is still the second largest operating nuclear station in the country.

We are submitting for the information of the committee a comprehensive statement entitled "A History of Southern California Edison Company Research and Development on Protecting the Quality of the Environment." This statement was presented on February 25, 1970, to the Joint Committee on Atomic Energy hearings on "Environmental Effects of Producing Electric Power," part 2. It contains a detailed review of the things Edison has done and is doing to make its facilities more attractive, to minimize its adverse effects on the environment, to enhance the environment where possible, and to meet the electric needs of its customers.

#### LOS ANGELES BASIN AIR PROBLEMS

May we review briefly the major air pollutant emissions in the Los Angeles area and the relative contribution of powerplants. The five major pollutants are carbon monoxide, sulfur compounds, nitrogen oxides, hydrocarbons and particulates. Automobiles emit, at ground level where people live and breathe, carbon monoxide, hydrocarbons, nitrogen oxides and some particulates and sulfur compounds. The interaction of hydrocarbons and nitrogen oxides in the sunlight is considered to be responsible for the eye irritating smog prevalent in this area. Automobiles are responsible for about 88 percent of the total air pollutants emitted in this area. Powerplants emit at relatively high elevations above ground level nitrogen oxides and some sulfur compounds and particulate matter, but almost no hydrocarbons or carbon monoxide. All powerplants, including those publicly and privately owned, are responsible for less than 2 percent of the total pollutant emissions in this area. We believe that even if it were possible to close down every powerplant in this area, there would not be any difference in our air pollution problem. Until automobile emissions are drastically reduced and controlled, there will not be any significant improvement in the quality of our air.

#### BACKGROUND—AIR QUALITY ACT OF 1967

Edison supports the principal purposes and approach of the Air Quality Act of 1967 (Public Law 90-148), that control of air pollution should be developed on the basis of air quality control regions in accordance with air quality standards and enforcement plans developed by the States. State standards and enforcement plans are to be consistent with air quality criteria and control technology data issued by the Secretary of HEW. State action to abate air pollution is not to be displaced by Federal enforcement action, unless (i) the State fails to take reasonable action to enforce air quality standards (including the



enforcement plan), (ii) interstate air pollution is involved, or (iii) a State has not acted to abate a pollution source presenting an imminent and substantial endangerment to the health of persons. The Secretary of HEW is also empowered to initiate action to assure setting and enforcement of ambient air quality standards and enforcement plans if a State fails to take reasonable action to achieve these purposes. Proper implementation of the Air Quality Act of 1967 would, we believe, result in the development of a technically sound and rational plan by which pollution sources would be controlled primarily by State and local enforcement agencies in accordance with air quality criteria and detailed control technology developed and issued by the Secretary of HEW.

S. 3546 and S. 3466 both depart significantly and in differing respects from the approach of the Air Quality Act of 1967. We believe these departures are not in the total public interest, since they abandon the approach of section 108(c) (4) of the existing act which permits the Federal court in acting on suits brought under section 108(c) (4) to enforce State standards or to abate pollution, to give due consideration to the practicability and to the technological and economic feasibility of complying with such standards, and to enter such judgment or orders as the public interest and equities of the case may require. We interpret this provision to permit the court to weigh and reconcile the public needs for protecting the environment from air pollution and for obtaining adequate, reliable, and economic electric energy.

#### COMMENTS ON PENDING BILLS

We submit the following detailed comments concerning S. 3546 and S. 3466.

##### *1. Secretary's designation of air quality control regions*

###### *Analysis*

Under section 107(a) (2) of the Clean Air Act, "the Secretary, after consultation with appropriate State and local authorities shall, to the extent feasible, within 18 months after November 21, 1967, designate air quality control regions based on jurisdictional boundaries, urban-industrial concentrations, and other factors including atmospheric areas necessary to provide adequate implementation of air quality standards." Section 2 of S. 3546 would require the Secretary to "designate immediately all air quality control regions pursuant to section 107, without any consultation with State and local authorities. S. 3466 would eliminate the concept of air quality control regions by deleting section 107(a) (2).

###### *Comments*

We believe that section 107(a) (2) should be retained so that the States can continue to set ambient air quality standards and enforcement plans for the air quality regions designated by the Secretary. Also, we submit that the Federal-State consultative process should be retained so as not to deprive the States of a voice in the selection and designation of air quality control regions. This process will best permit appropriate consideration to be given to different features of proposed regions.

## 2. Secretary's development of air quality criteria

### *Analysis*

Under section 107(b) of the Clean Air Act, the Secretary shall, after consultation with appropriate advisory committees and Federal departments and agencies, but as soon as practicable, develop and issue to the States criteria of air quality. S. 3546 retains section 107(b), but S.3466 eliminates it entirely.

### *Comment*

Under the approach of S.3466, the issuance of air quality criteria would be avoided since the Secretary would proceed immediately to establish "nationally applicable standards of ambient air quality." The States would therefore lose their present function under section 108(c) of adopting ambient air quality standards applicable to a designated air quality control region established by the Secretary.

## 3. Secretary's issuance of information on pollution control techniques

### *Analysis*

Under section 107(c) of the Clean Air Act, the Secretary shall, after consultation similar to that for air quality criteria, issue to States and their enforcement agencies "information on recommended pollution control techniques the application of which is necessary to achieve levels of air quality" set forth in the criteria. The information shall include technical data relating to the technology and costs of emission control, and data on the latest available technology and economic feasibility of alternative methods of prevention and control of air contamination, including cost-effectiveness analyses. S. 3546 does not change section 107(c). S. 3466 amends section 107(c) by relating the techniques to the achievement of standards of ambient air quality established by the Secretary. In addition, S.3466 eliminates the requirement of including "cost-effectiveness analyses" of prevention and control methods.

### *Comment*

We support requirement of section 107(c) that economic feasibility of control devices be a consideration in their selection. We oppose the deletion of the reference to "cost-effectiveness analyses" because it represents a step away from the consideration of the economic feasibility of control devices, and therefore from the goal of balancing all public values in achieving control of air pollution. We believe that this goal is necessary in the overall public interest.

## 4. Air quality standards

### *Analysis*

Section 108 of the Clean Air Act places a very high degree of reliance on action by State governments. The States are required to adopt air quality standards and enforcement plans for each type of air pollutant for which the Secretary publishes air quality criteria and control technology data. Standards would be set for each designated air quality control region or portion thereof lying within the State. Standards are subject to approval of the Secretary. The Secretary promulgates standards only where a State fails to take proper action under section 108.

S. 3546 still places initial reliance on State adoption of standards under an accelerated schedule. It also provides specifically that the implementation plan shall include "compliance schedules and emission requirements" necessary to enforce air quality standards. Among other things, the Secretary's approval of the standards may be based on his determination that the plan includes a procedure to assure that proposed new sources of emissions will not cause violation of the standards. However, under a provision of Section 4(b) of S. 3546, which would establish a new section 108(c) (4) of the Clean Air Act, the Secretary may promulgate and impose his own air quality standards if he "finds it necessary to achieve the purposes" of the Clean Air Act.

Under S. 3466, the Secretary establishes "nationally applicable standards of ambient air quality for any pollutant or combination of pollutants" that may endanger the public health or welfare. The States retain only a possible consultative role in this process. The States would be required to adopt a plan for the implementation, maintenance, and enforcement of the Secretary standards of air quality. The Secretary would approve the State's plan if he determines, among other things, that the plan includes emission standards, means of enforcement, and provisions for revision thereof.

S. 3466 contains a proposed new section 112 of the Clean Air Act, under which the Secretary shall, by regulation, after considering technological feasibility, "establish standards with respect to emissions from classes or types of stationary sources which (1) contribute substantially to endangerment of the public health and welfare, and (2) can be prevented or substantially reduced." Parenthetically, we repeat the statement in the second preceding paragraph that the Secretary may assume a similar role under S. 3546 merely if he "finds it necessary to achieve the purpose" of the Clean Air Act.

#### *Comment*

The functions and authority of the States in the control of air pollution as now provided for in the Clean Air Act will to a large degree be superseded by the new roles assigned under both bills to the Secretary. In the course of this statement, we indicate our support for the purposes and approach of the existing Clean Air Act. We are not so concerned if Congress wishes to provide for the adoption of national ambient air quality standards. However, we believe that the most effective way to achieve desired ambient air quality is to have emission standards (applicable to the generation of electric energy by fossil fuels) which reflect differences in weather conditions, topographical conditions, other pollution sources, hours and time of operation, operating conditions and stack heights. Recognition of these distinctions would be in the national interest, since more effective means could be achieved for balancing the public's needs for adequate, reliable, and economic electric power with its needs for protecting the environment from air pollution. This balancing of public values could be accomplished best if emission problems are examined on a region-by-region basis, with appropriate consideration being given to each region's power needs and all factors contributing to or tending to reduce the effects of air pollution in the region. Any scheme for Federal imposi-

tion of uniform national emission standards would not only circumvent the role of the States, but would also prevent the most realistic development of emission standards suited to the individual needs of each air quality control region.

### *5. Enforcement of air quality standards*

The present enforcement role of the States under existing section 108 of the Clean Air Act is effectively superseded by a preemptory Federal enforcement role under S. 3546. Under S. 3466, the initial enforcement role would in general remain with the States.

#### *A. Enforcement of emission requirements under S. 3546*

##### *Analysis*

S. 3546 gives the authorized representative of the Secretary authority to order any person who violates an emission requirement to abate the violation within a prescribed time, which shall not exceed 72 hours. The order is final and in force when issued, and remains in effect until the Secretary's representative determines that the violation no longer exists, unless on appeal the U.S. court of appeals "determines that the interests of the public are best served by staying such order." The abatement order "shall contain a detailed description of the conditions or practices which cause or constitute the violation." The only remedy of the person to whom the order is issued is to petition for judicial review by the U.S. court of appeals.

##### *Comment*

We submit that this enforcement procedure represents an unconstitutional violation of due process. A person ordered to abate has no recourse whatsoever other than to the court of appeals. There would be no record on appeal, no opportunity for the person to prove that he is not in violation of the emission standard. We conclude that the only appeal record provided for in S. 3546 is the representative's "detailed description" contained in the order—and this is no appeal record at all. Certainly fairplay would call for a public hearing before the Secretary to review the abatement order, with right of appeal from the Secretary's decision. S. 3546 extends this type of review procedure to orders to abate other types of violations, but not to those of emission requirements.

In addition to our fundamental objections to the emission violations abatement procedure of S. 3546, we submit that the procedure is very much against the national interest in general, and the interests of electric consumers in particular. This assertion can be illustrated by a hypothetical example.

Let us assume the following: During a time of maximum power demand on a utility's system, such as was experienced on several occasions in the East in 1969, the efficiency of an electrostatic precipitator on a large coal-fired generating plant is impaired because of an equipment malfunction so that plant emissions fall below the emission standards. An immediately effective abatement order is issued to the utility operator under S. 3546. Loss of the unit in compliance with the

abatement order would cause a critical power shortage, and require massive service interruptions. To violate the order would subject the utility to extremely high fines and to prison sentences for its employees. Yet the utility would have no practical means to stay the order in a timely manner, even where no danger to the public health is involved if the plant continues to operate.

We agree that stationary source emissions should be acted against promptly if they are extremely hazardous to public health. The Secretary can now act effectively against contributors to such pollution where pollution originates in one State and affects another State, or where there is presented an imminent and substantial endangerment to the health of persons, and State authorities refuse to act. In cases where the pollution might affect the health of persons only in the State where the discharge originates, the State properly remains the primary abatement authority.

However, where no health hazard is presented despite the violation of an emission standard by an electric generating plant, enforcement authorities should be empowered to consider all aspects of the public interest, including the need for electricity, in determining the speed with which abatement procedures are enforced.

### *Analysis*

S. 3546 also would amend section 108 to require any person constructing or installing a facility subject to an air quality standard to install, use, and maintain the latest available pollution control techniques in accordance with regulations issued by the Secretary, and before construction, to receive certification of compliance with such regulations from the Secretary or, as appropriate, the State pollution control agency. The techniques contained in the regulations shall be consistent with the information developed pursuant to section 107(c). The technique certified must implement the emission requirements of the Clean Air Act, as amended.

### *Comment*

We submit that this new provision has a number of undesirable features:

(i) No procedure is prescribed for obtaining certification. There is no time limit by which the Secretary must act on an application.

(ii) The meaning of certification by the State agency "as appropriate" is wholly unclear.

(iii) It would appear that certification would be achieved at the cost of unnecessary and harmful delays in the completion of essential new generating units.

(iv) There is no procedure prescribed for appealing from the Secretary's denial of certification.

However, we do support the requirement that techniques contained in the regulations be consistent with section 107(c) for the same reasons described in our comments.

*Analysis*

Section 4 of S. 3546 would add a new section 13 to Section 108(c) of the Clean Air Act. This provision would give the United States district courts original jurisdiction over civil actions brought by one or more persons on behalf of themselves or of any other persons similarly situated within any designated air quality control region against any person, including a governmental instrumentality or agency, for declaratory and equitable relief or any other appropriate order to abate a violation of any applicable air quality standard, plan for implementation or emission requirements. S. 3546 also contains provisions that would prohibit discrimination against any employee who brings such an action.

*Comment*

We believe that enactment of this provision would result in a multiplicity of abatement actions brought by private individuals, and harassment of defendants which would be contrary to the public interest. The parties involved would incur enormous costs, as would the public in connection with the administrative costs of the district courts involved. We do not think that the result would be a gain in effective enforcement of the air pollution regulations, since adequate enforcement can be carried out by the regulatory agencies involved, utilizing the remedies provided by existing Federal and State law.

*Analysis*

Finally, S. 3546 would add new section 111 to the Clean Air Act, as amended. Briefly paraphrased, section 111 would require that beginning after July 1, 1972, (1) no Federal department or agency shall issue a license or permit to an electric utility for the installation or operation of a generating facility, or (2) shall purchase electricity from any electric utility in the United States, unless it is found that matter is discharged into an air quality region in compliance with air quality standards including emission requirements applicable to the region, and the utility files such statement of such finding with such department or agency. These provisions would apply similarly to all other persons who might discharge matter into the air.

*Comment*

We seriously question the practicality or wisdom of this requirement. First, it is not clear who makes the finding of compliance, or procedurally how the finding is made. Second, there is no time frame specified within which to measure the "matter \* \* \* being discharged into the air." Third, for any utility serving a Federal department or agency, a finding of compliance would have to be made that every generating plant on the utility's system complies with prescribed air quality standards, including emission requirements. Presumably this includes publicly and privately owned facilities. For the country, this would require the individual measurement of some thousands of generating units. If all of the utility's generating units are not found to comply, the Federal department or agency could not continue to

purchase electricity from the utility. Unlike most items procured by the Government, there would be no alternative source of electricity in almost all instances. A ridiculous situation would thus develop, because it is inconceivable that any Federal department or agency could function without electricity. We submit that satisfactory achievement of air pollution control can better be achieved by methods of direct enforcement of pollution control laws, not by indirect or collateral methods such as this.

*B. Enforceful of emission requirements under S. 3466*

*Analysis*

For stationary source emissions that are "extremely hazardous to health," the Secretary's regulations established in accordance with proposed section 112 (see analysis on page 1362 hereof) are required to provide that no new source of such emissions shall be constructed or operated except with specific approval of and under conditions prescribed by the Secretary; and any existing source of such emissions must retrofit to meet the emission standards. All other stationary emission sources subject to regulation under said section 112 would have to fall in the category designed to cover sources which "would contribute substantially to endangerment of the public health and welfare." For this latter category, new sources of such emissions must install control devices "to the fullest extent compatible with available technology as determined by the Secretary."

*Comment*

Power generating facilities would not normally constitute sources of emissions which would contribute substantially to endangerment of the public health and welfare. For the Edison system this conclusion is fully documented and supported in appendix D of the separate statement submitted herewith. At the very most, power generating facilities should only fall within the less hazardous of the two categories of facilities, and thus should not require specific approval of the Secretary prior to construction and operation.

We think it is unnecessary to categorize all fossil-fired generating facilities as contributors to endangerment of the public health and welfare in order to regulate their emissions, since this categorization is normally just not accurate. If the Congress wishes to regulate the emissions from these facilities, we do not object to a requirement that new facilities have control devices installed to the fullest extent compatible with available commercially proven technology; provided, that such control devices are really needed to protect the public health and safety; and provided, further, that the economic feasibility of control devices remains a consideration in their selection (as now contemplated by section 107(c) of the Clean Air Act). To make this latter point clear, we again recommend the addition of a requirement that "available technology as determined by the Secretary" be consistent with information developed pursuant to existing section 107(c) of the Clean Air Act, under which "economic feasibility" is a factor

required to be considered. Finally, we also support the provisions of this proposed new section 112 that call for initial enforcement of these emission standards by the States or interstate control agencies, with Federal enforcement only where the State or interstate agency fails to act.

### *Analysis*

General Federal enforcement of the Clean Air Act is provided for under proposed new section 113. If the Secretary, after reasonable notice and opportunity for hearing, determines (1) "that the ambient air quality of any area fails to meet the air quality standards" established under section 107, or any person is violating the section 112 emission standards, and (2) that such failure or violation results from the failure of a State or interstate agency to enforce air quality standards, including enforcement plans, the Secretary shall notify the State or interstate agency and the persons contributing to the lowering of the air quality or to the violation of such standards, and shall specify the remedial action to be taken. Action must be taken within a specified time, not to exceed 60 days. If action is not taken within such time, suit may be brought in the U.S. district court to enjoin the failure to take remedial action. The court may consider the practicability and physical feasibility of taking necessary remedial action, and may take such action as the "public interest and equities of the case may require."

### *Comment*

While we support the present enforcement provisions of the Clean Air Act, if expanded Federal enforcement is to be provided for, we support the new Federal enforcement provisions of S. 3466. We interpret these provisions to permit the courts to balance the public needs for protecting the environment from air pollution and for obtaining adequate and reliable electric energy. Reasonable hearing procedures are also provided for. In the case of a serious health hazard, the Secretary would continue to be able to act quickly under section 107(k) of the Clean Air Act.

### GENERAL CONCLUSIONS

1. In order to clarify the fact that the provisions of the Clean Air Act are not intended to cover the release of radioactive emissions from nuclear production or utilization facilities, now fully and adequately regulated by the Atomic Energy Commission, we recommend that the Clean Air Act be amended to so indicate.

2. Any procedure for certification of pollution-control facilities should relate to demonstrated techniques commercially available at the time the equipment must be ordered, so that construction schedules can be met and the utility can rely on its ability to operate its new plant when it is completed.

3. Even if national emission standards are adopted, the States should be given reasonable flexibility to modify the standards up or down, in order to reflect differences in local conditions.

4. Fossil-fired generating plants emit relatively small percentages of the total volume of air pollutants in the Los Angeles area. Considered alone, their emissions do not represent a danger to the public health



and safety. Therefore, under these conditions, any scheme of regulation of powerplant emissions should permit and direct the enforcement agency in regulating such emissions, to weigh and reconcile the public needs for protecting the environment from air pollution and for obtaining adequate, reliable, and economic electric energy.

5. We support the enforcement of air pollution control regulations by State and local agencies in the manner contemplated in the Air Quality Act of 1967. The southern California County air pollution control agencies have been extremely diligent and effective in enforcing strict local regulations. We do not think that a new Federal enforcement mechanism would add anything to the effectiveness of this local enforcement. Effective State and local enforcement is also being developed in the States of Nevada, Arizona, and New Mexico. We are proud of our record of air pollution control and of cooperation with air pollution control officials. In this connection, we would like to call your attention to the attached letter dated March 23, 1970, from Louis J. Fuller, air pollution control officer of Los Angeles County, on the occasion of his retirement after completion of 15 years of service.

6. We believe that a State regulatory mechanism for plant siting, which would provide for review at the State level of any local air pollution control decisions, should have a coordinated, systematic review by a single agency with expertise in the utility field and with the ability to weigh all factors necessary to make a wise decision. Such a decision should consider the interests and needs of all of the citizens of the State—the total public interest. The principal factors to be considered would include the following:

- A. The need for a new power-supply source.
- B. Its impact upon the environment.
- C. The reliability of the proposed project.
- D. The relation of the project to other new power projects being considered in the region.
- E. The cost of the project.
- F. Available alternatives.

As reviewed more fully in appendix I of the separate statement submitted herewith, we believe that the California Public Utilities Commission is the agency best equipped to perform these functions in California.

Thank you for the opportunity to present this statement.  
(The letter included with statement follows:)

LOS ANGELES COUNTY,  
AIR POLLUTION CONTROL DISTRICT,  
*Los Angeles, Calif., March 23, 1970.*

MR. HOWARD P. ALLEN,  
*Vice President, Southern California Edison Co.,  
Los Angeles, Calif.*

DEAR MR. ALLEN: On March 27, 1970, I will retire from the position of Air Pollution Control Officer of Los Angeles County. During my 15 years with the District I have had occasion to work closely with nearly all industrial and commercial operations in the County.

I would be remiss if I did not express my sincere appreciation for the excellent cooperation that I have received from the Edison Company. In every instance Edison has supported efforts of the District to reduce and control air pollution from stationary sources. This has been particularly true with respect to the operations of electric generating facilities.

The research which your company has pursued over the years has produced measurable results in the reduction of power plant emissions. At meetings of our technical staffs your company's suggestions have been constructive and the exchange of information between Edison and the District has always been productive and certainly in the public interest. Edison's record in the control of air pollution has been an outstanding example of a company which places the health and well-being of citizens before any other factor.

It has been a very rewarding experience for me to have worked closely with your company.

Sincerely,

LOUIS J. FULLER,  
*Air Pollution Control Officer.*

**STATEMENT OF RICHARD S. GAINES, MEMBER, NATIONAL AIR CONSERVATION COMMISSION, AND DIRECTOR OF AIR CONSERVATION AND ENVIRONMENTAL HEALTH PROGRAMS FOR THE SOUTHERN COUNTIES PLANNING COUNCIL**

Mr. GAINES. Mr. Chairman and members of the U.S. Senate Subcommittee on Air and Water Pollution, I am Richard Gaines, director of air conservation and environmental health programs for the eight tuberculosis and respiratory disease associations of Southern California and a member of the National Air Conservation Commission.

The Southern Counties Planning Council consists of the following organizations: Long Beach Tuberculosis and Health Association, Inc.; Tuberculosis and Respiratory Disease Association of Los Angeles County; Tuberculosis and Respiratory Disease Association of Orange County; Pasadena Tuberculosis Association; Tuberculosis and Respiratory Disease Association of Riverside County; Tuberculosis and Respiratory Disease Association of San Bernardino County; Tuberculosis and Health Association of San Diego County; Tuberculosis and Respiratory Disease Association of Ventura County; Tuberculosis and Respiratory Disease Association of California.

On behalf of the several hundred thousand families in the Los Angeles metropolitan air quality control region, whose Christmas Seal donations support the fight against air pollution, I wish to thank you for the invitation to discuss the air pollution legislation pending before your subcommittee. The final form of this legislation, which will ultimately be adopted by the Congress, will determine for many years to come the effectiveness of air pollution control programs in this country. Strong measures are necessary if we are to convert our atmosphere from the waste disposal system it has become back into the life support system it was intended to be.

The purposes of this hearing will be best served by recommendations of a positive nature, directed at the important provisions of the legislation, rather than by criticism of the specific wording of each bill. With this in mind, the following remarks will be concerned with such provisions, but not in any order of priority from the air pollution control point of view.

APPROPRIATIONS FOR AIR POLLUTION CONTROL RESEARCH AND DEVELOPMENT  
AND FOR SUPPORT OF THE NATIONAL AIR POLLUTION CONTROL  
ADMINISTRATION

Specific sums of money should be authorized by Congress for at least 3 years for research, development, and the support of the NAPCA. This is the responsible fiscal approach because it assures scientists, engineers, control officials and the public that the funds will be available without lengthy additional debate. Furthermore, it is the only sound basis on which a Federal agency or department can plan its budgets for future control programs.

In view of the complexity of the air pollution problem, the proposed Federal spending seems inadequate. Surely our priorities can be re-evaluated so that this Nation can spend as much for breathable air as we plan to spend for ABM or other weapons systems. If we suffocate in our own garbage, we shall need no defense against real or hypothetical enemies.

It is also time to unshackle some of the now dormant scientific talent which may or may not be employed by the industrial giants. This might be accomplished by removing the restrictions on the amount of money that can be awarded for any single grant. One and one-half million dollars is unlikely to ever produce meaningful results in low emission vehicle research. This subcommittee should invite experts to discuss with you realistic funding for this type of research and development.

COMPLIANCE TESTING OF VEHICLES AND ENGINES

The motor vehicle pollution control program should be strengthened by requiring the testing of randomly selected, production line vehicles in sufficient number and variety that the results would be valid if they were statistically extended to represent the entire universe of vehicles produced by the manufacturer. To carry out such testing, Federal officials should be authorized to enter manufacturing facilities without prior notice.

Provisions should be made for continual surveillance of test vehicles, either after they are in private use or under test conditions which simulate typical private use to obtain data on the durability of pollution control systems. Durability studies should not, however, become a substitute for action. Manufacturers should be required to warranty all air pollution control systems for a minimum of 25,000 miles under normal driving conditions and with normal maintenance (that is, 10,000-mile electrical system tuneup consisting of points, plugs, condenser, et cetera).

The provisions of the National Emission Standards Act should be extended to cover all moving sources of air pollution such as ships, trains, and aircraft. Air pollution can be an international, national, regional, or a local problem. For the homeowners or shopkeepers directly under the flight patterns of jet aircraft, the heavy black particulates are a serious local problem; however, proper regulation rests with the Federal Government. While I advocate extension of the act to all types of moving sources, I wish to make it clear that the States should have the power to adopt more stringent standards.

The bills before you propose vastly different size fines as penalties for violation of the standards. There seems to be no evidence that \$1,000 per day fines have been assessed with any degree of frequency nor that such fines have any real effect on preventing pollution. I am not sure that the experience with water pollution fines applies to the air pollution problem. In the latter case, it is far more difficult to pinpoint all of the offenders; there are over 10 million cars in California.

It is doubtful that increasing the fines to \$10,000 would really make a difference. What must be done is to revoke the right to sell or prevent the sale of any product which causes air pollution, unless that product meets acceptably stringent standards. Manufacturers understand the risk of losing a large market. A bill to ban the internal combustion engine in California by 1975 passed the California Senate in 1969, causing reverberations in Detroit. Although such legislation is impractical, its near passage in California let the auto industry know that we intend to get clean air. In the final analysis, the purpose of sanctions is air pollution control, not the raising of revenue.

#### ESTABLISHMENT OF STANDARDS FOR FUELS AND FUEL ADDITIVES

Regarding standards for fuel composition, the Federal Government should require the preregistration of all fuels and fuel additives used in any form of combustion, for any purpose if such use results in the discharge of contaminants into the atmosphere. The sale of any fuel or fuel additive not so preregistered should be prohibited by law with adequate sanctions for enforcement.

Preregistration of fuels and additives is, however, only a half-measure. Standards should be adopted, after public hearings, for fuel composition, including fuel additives, which will protect the health of the most susceptible population as well as plants, animals, and the total environment. As in the case of emission standards, the States should have the right to pass stricter regulations. The sale of fuels or additives which violate the standards should be prohibited.

Now, I think that it is time to establish a principle in air pollution control that is being established in the regulation of drugs. The safety of a product must be demonstrated prior to its approval for sale in the United States. No new additive should be permitted to be used in fuels until the manufacturer or processor can prove to the Secretary of HEW that such additives will not add new or increased pollutant emissions to the atmosphere or cause chemical reactions in the atmosphere which produce new or increased undesirable contaminants. We should not repeat the lead problem we have today with some new, equally toxic additive in the future. The burden of proof that new additives are environmentally safe should rest with the manufacturer, and safety should be established before sale is permitted.

#### NATIONAL AMBIENT AIR QUALITY STANDARDS

The designation of air quality control regions and the adoption of ambient air quality standards for these regions should be continued. The process, however, should be expedited with each State being required to designate regions for all portions of the State not already so designated. This process is desirable since State and local air pollu-

tion authorities, with consultation from scientific experts on their home grounds, are in the best position to know what the boundaries of an air shed should be.

The Secretary of HEW should be required to continue to issue criteria (effects) and control technology documents for specific pollutants. These documents should serve as the basic guidelines to the States in adopting ambient air quality standards. I cannot overstress the importance of this step: California is an example of a State whose standards are more stringent partly as a result of these criteria documents.

Public hearings must be mandated at both the Federal and State levels as a part of the process of setting standards and adopting plans for implementation. You must give the people an opportunity to be heard along with the commercial interests. Again California serves as an example of their importance of this concept. Table I dramatically illustrates how both the criteria documents on particulates and sulfur oxides and the public hearings resulted in stronger California ambient air standards.

Compare the standards recommended by the California Technical Advisory Committee on June 13, 1969, with their recommendations on November 19, 1969 following a public hearing on September 17, 1969. At that public hearing, the California Air Resources Board was informed by an NAPCA official that the recommended standards would exceed the criteria issued by HEW. Now, compare the November recommendation with the standards adopted on the same date. Those adopted are significantly more stringent than either the recommended standards or the standards necessary to meet the HEW criteria. Note that visibility was set at 10 miles compared with 7.5 as recommended or the 15 miles our organization requested. We intend to go back and push for 15 miles, unless we are denied that opportunity by legislation eliminating public hearings. It would be tragic, indeed, if the people would be prevented from participating in the democratic process for governing themselves. I can think of no worse time in our history for an action of this kind.

TABLE I.—COMPARISON OF CALIFORNIA PROPOSED AND ADOPTED AMBIENT AIR QUALITY STANDARDS FOR SULFUR OXIDES AND PARTICULATE MATTER

	Particulate matter	Sulfur dioxide
Technical Advisory Committee recommendations to the Air Resources Board, June 13, 1969.	(1) 100 micrograms per cubic meter (24-hour samples, arithmetic mean for 30 days).	0.1 p.p.m. for 1 hour.
	(2) Visibility reducing particles in sufficient amount to reduce the prevailing visibility to 7.5 miles.	0.5 p.p.m. for 8 hours.
Technical Advisory Committee recommendations to Air Resources Board, Nov. 19, 1969.	(1) 75 micrograms per cubic meter, annual geometric mean of 24-hour samples.	No change.
	(2) 200 micrograms per cubic meter, maximum 24-hour sample.	
	(3) Visibility reducing particles. In sufficient concentration to reduce visibility to 7.5 miles.	
Ambient air quality standards adopted by the Air Resources Board, Nov. 19, 1969.	(1) 60 micrograms per cubic meter annual geometric mean. <sup>1</sup>	0.04 p.p.m. for 24 hours.
	(2) 100 micrograms per cubic meter, 24-hour sample. <sup>1</sup>	0.5 p.p.m. for 1 hour.
	(3) In sufficient concentration to reduce visibility to 10 miles at relative humidity of less than 70 percent.	

<sup>1</sup> Applicable in the San Francisco Bay Area Air Basin and South Coast Basin (Los Angeles Metropolitan Regional Air Quality Control Region) only.

The State should be allowed to set more stringent ambient air quality standards than those established by HEW. A periodic review of the standards should be required; in California, we have asked for a 2-year review, but 5 years on the Federal level would seem adequate. It is extremely important to provide a mechanism for intrastate establishment and enforcement of air quality standards by the Federal Government. Air pollution knows no boundaries; it can and does flow across State lines. The National Government should be empowered to act when States refuse to do so.

The proposed Federal legislation should be amended to add a section on nondegradation. We must commence the protection and conservation of our air resources; it should not be necessary to clean up dirty air. We must keep the patient well rather than trying to cure him. To accomplish this end, the Federal legislation should prohibit the construction of any significant, new, uncontrolled source of emissions in any region if such emissions will cause a degradation of the air quality. Air quality control regions which have air of superior quality should not be faced with a gradual degradation of that quality simply because the ambient air quality standards are designed to improve the air in regions with dirty air. The standards for Monterey Bay or San Diego should be for quality at least as good as at present; certainly they should not be set for Los Angeles levels.

This proposal for a nondegradation section in the law is not intended to prevent economic growth in all regions of the country which presently have good air quality. It is recognized that some regions must and will have industrial development; however, such development should be carefully planned to protect the air resources. There are some regions (the coastal Redwoods of California, the national parks, i.e.: The Everglades, Yellowstone, et cetera) which should have absolute protection.

#### NATIONAL STATIONARY SOURCE EMISSION STANDARDS

The promulgation of national stationary source emission standards is an essential part of the overall control strategy which must be adopted. Such national standards are important for two reasons: (1) air pollution is a national and international problem, and (2) industrial sources of air pollution, including electrical power facilities, must be required to use the latest available control technology even when such technology is not required by the States.

States, air quality control regions, or air pollution control districts must remain free to establish more restrictive stationary source emission standards. This is vitally important if the more restrictive air quality standards, set by States, like California, are to be achieved. This type of waiver policy should apply to all regions and not be restricted to a particular region as has been the case with the motor vehicle emission standards.

We must oppose legislation setting national emission standards or ambient air quality standards on the basis that such emissions "contribute substantially to endangerment of public health or welfare." A fair interpretation of such wording would be that it is alright to endanger public health as long as the endangerment is not substantial.

Exactly what does the term "substantially" mean in the context of the proposed legislation? The courts would be likely to find the definition difficult, making air pollution control nearly impossible.

Of equal concern is the proposal that standards only be set for stationary sources which "can be prevented or substantially reduced." Once more we encounter vague language, such as "substantially," which will hamper legal enforcement. Inherent in the philosophy of this wording is the concept that business as usual, including the pollution of our vital air resources, is acceptable if such pollution cannot be "prevented or substantially reduced." Most Americans will take issue with this concept: we are a Nation of problem solvers.

A very dangerous precedent would be set by the proposal which would allow the Secretary of Health, Education, and Welfare to make specific exemptions with respect to construction or operation of stationary sources (sec. 112, (b) (1) (a) of S. 3466). One of the major reasons why current air pollution control programs are inadequate at the local level is the policy of granting variances. It is very difficult for local control officials to institute compliance actions against violators of emission standards when the violators know that they will be granted variances by the politically appointed hearing boards. This procedure should not be instituted at the Federal level.

#### ENVIRONMENTAL MANAGEMENT

Several aspects of the proposed legislation before this subcommittee deserve further comment under the heading of total environmental management. Of particular concern is the use of health effects as the sole basis for decisionmaking in the setting of standards. At a symposium on the development of air quality standards, sponsored by the Christmas Seal Associations, the National Air Conservation Commission and the University of Southern California Air Pollution Control Institute in October 1969, it was agreed that health is only one of several criteria that must be considered in any rational system.<sup>1</sup>

In addition to the social, economic, and legal criteria, human behavioral responses to air pollution and esthetics should be part of the input into the system for setting air quality standards. The total quality of life, including but not limited to health, should be the priority criteria. Americans are now awakening from their deep sleep, a period in their history when they were anesthetized to the plastering over of our land with concrete, asphalt, cheap housing, gas stations, parking lots, and the freeways. Americans are beginning to recognize that there is a better way, that other alternatives exist, that the other alternatives can enhance the quality of life. While biological survival may be of prime importance, mere survival in a land of ugliness, devoted to the pursuit of consumerism, presents a bleak future.

As decisionmakers, you are urged to consider the various strategies for environmental management which will enhance the quality of human life. The current strategy is the abatement approach: that is, control source emissions. This strategy is an essential interim approach, but it is doomed to ultimate failure as an environmental management solution for the problem. It fails to deal with the growing urban crisis

<sup>1</sup> Symposium on the Development of Air Quality Standards, to be published by Environmental Resources, Inc., Riverside, Calif.

which is a "people" problem, not a "thing" problem. It ignores the basic issue that America is an urban nation today, not a rural one.

A true environmental management strategy will utilize the basic tools available to enhance the environment. These are land, transportation, water, and energy. Intelligent use of these tools can affect our No. 1 pollution problem, population growth. Through appropriate land use, development and location of mass transportation systems, delivery or withholding of water, and siting of energy source, we can learn to control and distribute population without any loss of our basic freedoms.

If southern California is now over populated and its resources can no longer support additional people, then it is pure folly to encourage more growth by building a water system from the north to the south. That our air resources cannot support additional people is best illustrated by the fact that our schools must restrict the physical activities of children on certain days of the year when the oxidant level reaches 0.35 parts per million. During these smog episodes, our atmosphere has little room left for more aerial garbage.

The control of motor vehicle emissions may enhance air quality, but it doesn't enhance the quality of life. Bumper-to-bumper freeway traffic, morning and night for commuters, is certainly not a desirable way to get from home to work and back. It is ludicrous that the primary transportation system of space age America is based on the gasoline powered internal combustion engine developed by Jean Lenoir and first used in 1863. Surely our technology can find a way to move masses of people rapidly, safely (without killing 55,000 annually) and without pollution in urban America.

Neither space nor time permits further elaboration of examples of environmental management to enhance the quality of life. What is now needed is genuine commitment by the Federal Government to this concept. This commitment can be demonstrated by the establishment of an environmental management department with the authority to review and, perhaps, to even veto any or all activities which might be detrimental to the environment and hence to the quality of life.

Management of the environment can no longer be piecemeal, one aspect under Interior, another under Health, Education, and Welfare, still another under Defense. It must be brought together as a whole entity. Air pollution control, water purity, open spaces, wilderness protection, all belong together. We can no longer afford the luxury of the Army Corps of Engineers deciding to authorize drilling by Humble Oil Co. 6 miles offshore from Santa Barbara. In light of the Union Oil Co. oil spill and the more recent Chevron Oil leak disaster in the gulf, this decision reflects the worst kind of arrogance by the Corps of Engineers. But arrogance is not the issue; the truth is that there is no one over the Corps of Engineers to say no.

This decision would have been preventable if a department of environmental management with its own secretary had the responsibility for considering the effects of oil drilling.

In the final analysis, a democracy can function well only to that extent that its citizens can assess the responsibility for both the good and bad decisions. Congress must now focus responsibility for the environment in one place where the American people can determine who is responsible for the decisions affecting the quality of their lives.

Thank you for the privilege of presenting this testimony.



STATEMENT OF MICHAEL TRESHOW, PROFESSOR OF BIOLOGY,  
UNIVERSITY OF UTAH, SALT LAKE CITY, UTAH

Mr. TRESHOW. More and more, standards are being based on citizen pressure and emotion rather than scientifically established threshold concentrations of effects; each State is trying to outdo its neighbors in setting lower standards. Alarmists and foresayers of doom are pressing for complete removal of pollutants, and recommended standards for almost every pollutant are approaching zero. While a zero pollution level is a noteworthy goal, it rarely provides a realistic standard.

Some States (for example Oregon) have adopted a plan of developing desired air quality goals to supplement the standards. Hopefully standards would be realistic and could be met using today's technology. Goals provide a long-term ideal to be sought and achieved as more effective technology becomes available in the future.

Approaches to setting air quality standards, and the standards themselves, are almost as numerous as the States developing them. Nearly every State is developing different standards and basing them on different criteria. This inconsistency in standards is confusing to control officials but is still more disturbing to the general public who don't know what to believe. The confusion is particularly critical near State boundaries where air regions overlap boundaries, and standards differ within the same airmass.

Such confusion can only be resolved by establishing Federal standards to be met by all the States. Resolving the inconsistencies among State air quality standards is vital to an effective nationwide air quality program.

Senate bills S. 3229, S. 3466, and S. 3546, the Air Quality Improvement Act, the Clean Air Act Amendments of 1970, and the National Air Quality Standards Act of 1970 should adequately unify air quality standards across the country and minimize the existing confusion.

Legislatively, the needs for air quality standards were most recently established in the Clean Air Act of 1967. But placing the authority for establishing standards with the States was a mistake.

In the first place, few States possess the expertise essential to developing realistic standards even with help of the Federal air quality criteria. Many States are even so naive as not to know who to contact for help. Utah's Air Conservation Committee, for instance, in developing sulfur dioxide standards, called on only five "experts"—all from industry and all with questionable qualifications to discuss the subject.

On still more obvious weakness in State standards lies in the pressure large industries may be capable of exerting, and the influence they can wield in setting standards. The importance of major industry to a State's tax base cannot be underestimated. No rational State government is likely to jeopardize this base regardless of the hazards the pollutants from the industry might impose on the environment. Concerned industry may cooperate to the extent of moral obligation or economic feasibility, but is not likely to go much beyond this if its competition across the State line is spared the expense of maintaining a stringent control program.

Too often State air pollution control officials are too naive or too oblivious to demand stringent controls on new facilities even if backed by

adequate laws. A current case in point is the power generating plants under construction near Page, in northern Arizona. Proposed control facilities are inadequate, and over 700 tons of  $\text{SO}_2$  and 200 tons of fly ash will be deposited on the surrounding desert biome each day. Stacks 700 to 800 feet high are planned which will simply disperse the wastes over a wider area. The sensitivity of desert species to  $\text{SO}_2$  is not known, but the bulk of the emissions will drift over and into Glen Canyon creating first an esthetic insult to the thousands of boaters hoping to enjoy the pristine majesty of this remote national recreation area. Secondly, pollution of Lake Powell itself is inevitable. The seriousness of this to the stability and productivity of the lake isn't known, but the sulfates will add measurably to the already saline waters, and the increased acidity may have a serious impact on the aquatic biota as demonstrated in smaller bodies of water subjected to far less pollution.

Regrettably, Arizona is accepting these powerplants without demanding maximum control emissions. If S. 3466 were in effect, boaters, campers, fisherman, sightseers, and the public at large would not have to be concerned with the impending desecration of the Lake Powell recreation area.

Such areas are for the enjoyment of the entire Nation, not just the citizens of a small corner of one State. It is imperative that our natural areas be protected: it is the responsibility of us all to see they are!

Powerplants and other major sources of pollution are being constructed in many parts of the country. Each contributes its share of wastes into regional air sheds oblivious to State boundaries. Where the State is remiss in its obligations by not demanding maximum emission control, excessive wastes are dispersed into neighboring air sheds where they may violate the air quality standards of that State.

Uniformity in standards, as can be attained only through Federal standards, is needed to uniformly protect the natural ecosystems of the country to say nothing of the agricultural crops, recreation areas, parks, and home landscapes. Such standards must not be set loosely at concentrations expedient to industry but failing to provide adequate protection to the land. Nor must they be based on the unqualified emotions of a few alarmists, and set so stringent that present technology does not enable compliance. Such a situation either forces violating industries to shut down, to be granted variances, or the law to be ignored—all situations no one wants. Yet, such situations exist now due to inadequate deliberation and consideration given prior to establishing air quality standards.

Finally, States and air quality regions are duplicating each others efforts. Many lack the capability or competence to develop realistic standards. Federal air quality standards, developed in accordance with recommendation of the most knowledgeable experts in the country, must be provided. Standards for major pollutants must be established rapidly but sagaciously. Only then can our health and esthetics be adequately protected, and our natural and cultivated lands receive the uniform protection needed for their preservation.

**STATEMENT OF MRS. JEAN SOMERS, CHAIRMAN, STAMP OUT SMOG, ORANGE COUNTY CHAPTER, GARDEN GROVE, CALIF.**

Mrs. SOMERS. Mr. Chairman and members of the subcommittee; I am Mrs. Jean Somers, chairman of Stamp Out Smog, Orange County chapter. I would like to share with this committee some of the thoughts that concern many Orange County residents about air pollution.

We are afraid that the agencies who could act, the elected officials who could direct priorities, and the legislators who are in the position to create the legal means to end pollution, will take such necessary action too late. Too late to save the elderly from suffering the fright and despair that comes with worry about the fate of their children. Too late to prevent our impatient youth and indeed even others, from taking regrettable acts of violence against the industries, powerplants, and automobile manufacturers, that are poisoning the air. We fear the bombing of pollution sources. We fear the laying siege of freeways.

Mothers and fathers in our county call Stamp Out Smog everyday to get involved with our citizens effort to end air pollution. These good folks are up tight and extremely eager to do all that is possible. Often I feel discouraged that I haven't got a magic button to change the smoggy sky to blue. While a "shutoff" button may be an oversimplification for solving our dilemma, it can serve to remind us that it is tiresome to hear how complicated and complex the elimination of pollution from the environment will be. We consider this propaganda and ask you, and all concerned, to direct your actions to the problems dealing with pollution, rather than the complexities of industry as it attempts to squeeze out the last minute of profit at our expense.

We also ask lawmakers to coordinate information, not from economist, but from doctors of physics, biologists, and all scientists who will define the present urgent pollution problem.

We ask then, that the medical teams work in close association with the data emanating from the scientists task force, and that they document precisely how severely our health is affected.

We ask then, that the legislators adopt laws to end the violence. And we ask that the engineers be brought in to see if they can help avoid the possible future technological errors. Then we feel we should get busy training teachers with environmental ecology to assure some hope that the future generations benefit by our mistakes rather than repeat them.

It seems we are great when it comes to fussing and fuming because of the very serious drug addiction of our young people. It seems we also excel at being hypocrites. The perfect example of this can be pointed up in our locale. In Orange County, the Southern California Edison Co. wants to expand the present fossil fuel plant at Huntington Beach. Our County Air Pollution Control District Chief, Mr. William Fitchen, informs us that the proposed expansion would result in tripling the pollution from the powerplant. We oppose this additional pollution. Those asking us to accept that "little bit more," when already there is too much pollution in our south coast air basin, are comparable

to drug addicts asking for a little more when already they have had too much. This public solicitation by the powerplant is setting no good example for the young. Citizens who can vote, and citizens who are too young to vote reject this, and lose respect for the asking company.

Stamp Out Smog members and spokesmen from various civic and social organization that we have contacted, would appreciate a reporting of pollution cleanup costs, as they relate to the family unit, rather than reporting the total of billions upon billions of dollars. It is natural to ignore a task that requires a budget of a billion dollars or more. This is no time to discourage people's support. The average person turns off when you mention costs of a million dollars. This is not a figure he can respond to. Whatever the costs are, the price is one we are willing to pay. We do not mean pay and continue to pollute, however, we mean pay and end pollution.

We feel it is preposterous to think we can go on breathing the air that kills our forests trees in San Bernadino, without ill effects. Our good sense dictates, and our elementary school children can tell us this is not possible.

There was a time when we did not generally realize that venting the products of industrial combustion and auto exhaust into our atmosphere would poison the air we breathe. We know it now. It is stupid to permit it to continue. Please take all action necessary to end the destruction of our atmosphere.

Thank you.

Senator Boggs. We will recess until the call of the Chair.

(Whereupon, at 11 :55 A.M., the subcommittee recessed, subject to the call of the Chair.

## AIR POLLUTION—1970

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FRIDAY, APRIL 17, 1970

U.S. SENATE,  
SUBCOMMITTEE ON AIR AND WATER POLLUTION  
OF THE COMMITTEE ON PUBLIC WORKS.  
*Washington, D.C.*

The subcommittee met at 10 a.m., pursuant to call, in room 4200, New Senate Office Building, Senator Thomas F. Eagleton presiding.

Present: Senators Randolph, Eagleton, Gravel, and Baker.

Staff members present: Richard B. Royce, chief counsel and staff director; M. Barry Meyer, counsel; Bailey Guard, assistant chief clerk (minority); Tom Jorling, minority counsel; Leon G. Billings and Adrian Waller, profesional staff members.

Senator EAGLETON. Good morning, ladies and gentlemen. The Subcommittee on Air and Water Pollution of the Senate Committee on Public Works is once again in session to continue its hearings on various and sundry pieces of legislation dealing with matters of pollution.

We have three witnesses scheduled this morning. There was to have been a fourth witness, Mr. Lewis Green, attorney at law from my home city of St. Louis, Mo. But regrettably, it was necessary for him to be in Federal court in St. Louis this morning. Thus, he cannot be with us.

Our first witness this morning is Dr. Eneas D. Kane, president, Chevron Research Co., San Francisco, Calif.

### **STATEMENT OF DR. ENEAS D. KANE, PRESIDENT, CHEVRON RESEARCH CO., SAN FRANCISCO, CALIF.; ACCOMPANIED BY DR. EUGENE SPITLER, MANAGER, FUELS DIVISION**

Senator EAGLETON. You may proceed, Doctor.

Mr. KANE. Thank you, Senator. My name is Eneas D. Kane. I am president of Chevron Research Co., which is a research subsidiary of Standard Oil Co. of California.

I would like to thank the subcommittee, on behalf of the Standard Oil Co. of California, for this opportunity to comment on the pending air pollution legislation you are considering. Specifically, I would like to comment on provisions relating to regulation of automotive fuel composition and fuel additives.

My associate here is Dr. Eugene Spitler, who is manager of our fuels division.

Let me first state that it is a primary goal of our company to do whatever it can to assist in the elimination of air pollution from automobiles. With that goal in mind, we have recently begun the in-

roduction of a new fuel additive package, Chevron F-310—which is a registered trademark for our polybutene amine gasoline additive—into our gasolines, which contributes to lower emissions from automobiles. With your permission, I would like to comment further on Chevron F-310 later in this presentation. We have also made a public commitment to provide motorists with unleaded gasoline just as soon as there is a requirement for such a product; this commitment was made promptly when some car manufacturers recently stated that unleaded fuels would be needed for cars designed to meet ultimate Government emission standards.

As a general comment, we believe that the Government's role in automotive pollution control should focus on setting standards for vehicle emissions rather than attempting to regulate fuel composition. The oil industry and the automotive industry have the strongest possible incentives to find the best ways to meet emission standards and at the same time provide the public with the vehicles they will want to buy and operate. I am confident that our industry, operating under a freely competitive economic system, will provide the fuels needed to match reasonable Federal emission standards.

Setting appropriate emission standards will result in development and manufacture of automobiles which are not serious contributors to air pollution. I believe that this subcommittee has already received testimony that 1970 automobiles sold in California have one-fifth the hydrocarbon emissions that typical 1960 automobiles had when they were new. The magnitude of this improvement can be gaged by pointing out that if it were possible to transform every car in the Los Angeles area into a 1970 model overnight, hydrocarbon emissions from automobiles in the basin would be below 1940 levels. Significant improvements also have been made in carbon monoxide emissions, and nitrogen oxides are scheduled for control beginning in 1971 in California and for increasingly stringent limitations through 1974. I think that the lesson from these statistics is clear—setting emission standards at appropriate levels will result in achievement of acceptable air quality insofar as the automobile is concerned.

This subcommittee has also received testimony pointing out the fact that the key automotive pollutants identified today and now under control or scheduled for control—namely, unburned hydrocarbons, nitrogen oxides, and carbon monoxide—are due to the combustion process itself and are only indirectly related to the composition of the fuels used. It follows that regulation of fuel composition is not necessary to achieve the primary goal of cleaner air.

All of us concerned with these problems recognize that there is still considerable research to be done to more fully understand all aspects of air pollution. A continuation and an increase in this kind of research activity is desirable in our view. One example of the results of such research is the recent introduction of goals for particulate emissions. As more is learned about the factors affecting atmospheric visibility reduction or other pollution-related phenomena, I would anticipate that additional standards may be found desirable. Emission control standards are a flexible way to keep up with new findings from air pollution research.

In contrast, fuel composition regulations would tend to inhibit innovative approaches to solution of the automotive air pollution problem. In effect, such regulation attempts to mastermind a solution on the basis of present knowledge—which I think is the wrong approach in principle. It would narrow the scope of possible attacks on the problem too much, rather than leaving it up to the competitive genius of our economic system to devise alternate methods of achieving the primary goal—elimination of smog due to the automobile.

As you know, a registration program for fuel additives was authorized by Congress in the 1967 amendments to the Clean Air Act. Our Company and the oil industry generally have cooperated with and assisted the National Air Pollution Control Administration in surveying the industry and providing data on additive use, types of additives, and their basic chemical components. Although the Secretary of Health, Education, and Welfare has not yet designated any fuel or additive for registration, a pledge of full cooperation has been extended to the Secretary in the implementation of such a program. It is our view that disclosure of this type of information will enable the Secretary to evaluate the possible air pollution significance of fuel additives.

In the specific case of our introduction of the Chevron F-310 additive into our gasolines, we provided Government officials with a preview of information on the nature of this additive and test data on its performance. Within several weeks after it was first introduced into the Los Angeles area, we provided samples of a concentrate of the Chevron F-310 additive package to local, State, and Federal government groups; to university professors; to competitive oil companies—in fact, to anyone who had a legitimate interest in the material and who requested such a sample. I submit that the net result has been to get this significant improvement into commercial use as soon as possible. At the same time we made it possible for independent testing to be done to assure anyone interested that there were no harmful side effects possible through use of Chevron F-310—which is our own conclusion based on our own extensive research on this material.

I am also aware, of course, that some persons have argued that public health reasons favor the early reduction or elimination of lead in gasoline, and some think that fuel additive regulation is the way to control lead emissions. If responsible Government bodies are of the view that the large amount of available evidence indicates that lead at any level in gasoline is hazardous to health, then we would favor removing it completely from gasoline as rapidly as possible. If the view is, rather, that it would be prudent to begin to decrease total lead emissions into the atmosphere from the automobile, as a matter of insurance rather than to meet a clear and present danger, then an orderly reduction in lead levels on a reasonable time schedule becomes the important consideration. At least one major automotive company has said recently that, in order to meet emission standards, it will be necessary to supply lead-free fuels soon. Thus, the present emission standards will have the effect of requiring a reduction of lead levels in gasoline. This result will be accomplished without the necessity for

regulation of this particular additive.

If Government becomes convinced that lead in automotive emissions should be controlled to lower levels or removed entirely, then such standards should be written into law, to take effect with the required time table. But, in our view, it is better to approach the problem by appropriate emission standards, rather than by attempting to regulate the fuel composition or additive content.

To recap, we would urge that the language adopted with respect to fuel additive registration in 1967, and now incorporated, as I understand it, in the proposed section 210 of S-3229 and S-3546, be retained. In general, we believe that direct Government regulation of product quality is not in the public interest, because it tends to stifle competition. Government should set performance standards for motor vehicle emissions deemed necessary for protection of public health and welfare. Methods of meeting those standards should be left to the ingenuity of industry, because this will tend to encourage innovation and minimize costs.

I suggested earlier that the eventual solution of the automotive air pollution problem must come primarily from redesign of the automobile's powerplant, and that it cannot come entirely from modifications in the fuel. This is not to say that fuel modifications may not be able to contribute to lower automotive emissions. In fact, our Chevron F-310 development is a case in point, where a change in the fuel promises some worthwhile benefits in reduced emissions of certain pollutants from the automobile. I would like to explain why this is so and what Chevron F-310 is and how it functions.

Chevron F-310 is a new polybutene amine additive package which we have described as a major research breakthrough in its field. Gasolines with Chevron F-310 possess unique capabilities to keep automobile engines clean and also to clean up existing deposits in dirty engines. Most important, the gasolines thus have the capability of restoring the performance of automobile emission-control systems.

If I may, Mr. Chairman, I would like to use slides to discuss this subject.

[Slide shown.]

Mr. KANE. The first slide shows the experience with deterioration of automobile emission-control systems in service. The data are from two sources—the Health, Education, and Welfare Department of the Federal Government, and the California State Air Resource Board.

You will notice these 1966 model cars met emission standards when they were relatively new.

This is hydrocarbon in parts per million and the standard for cars of that year in California was 275 parts per million. So on the average when new, the cars in California and elsewhere of this vintage met the standard.

There is a difference in the way the cars are selected and the way the tests are conducted, so there is a difference in the slope. But the trend is unmistakable from both sets of data; an increase in hydrocarbon emissions with service.

I want to emphasize that this is not due to combustion chamber deposits, because the new cars have at least 2,000 miles of operation on



them and it is well known that in 1,500 to 3,500 miles the effect of combustion chamber deposits stabilizes.

So this deterioration continuing with service, and increasing into 30,000 miles, is due to something else.

We have a great deal of field experience obtained over many years with cars in all types of service which indicates to us that a major cause of this deterioration is the deposit buildup in critical parts of the engines, and it is these deposits that F-310 removes.

[Slide shown.]

Mr. KANE. The next slide is taken from the California ARB data. You will recall the first slide showed average data. This slide shows data at a given mileage, in this case, 30,000 miles, and involving 254 cars, shows the distribution of emissions from individual cars in this population.

Here is the standard for the year. You will notice that some of the cars at 30,000 miles are still below the standard, but more than 60 percent of them are above the standard.

You will notice some cars at 400 parts per million; some at 500 parts per million and higher. So these data show that there are large numbers of dirty cars in the car population.

A gasoline which would remove deposits in these dirty cars and restore their emission performance to the levels inherent in the basic design of the engine was our target in the F-310 development.

[Slide shown.]

Mr. KANE. I show this next slide to indicate where this deposit buildup occurs. This is a schematic of an engine. The air cleaner and carburetor section, with the throttle plate, is shown in the upper right-hand portion of this slide. It has been well known for many years that deposit accumulation in the carburetor areas will affect engine performance.

Back in 1954, Standard Oil of California introduced the first conventional carburetor detergent additive in its gasolines, called detergent action gasolines. This did a pretty good job of keeping deposits under control in this area. But F-310 is a great deal more than this. It removes deposits in the whole intake system, throughout the intake manifold, around the ports to the intake valves, off of the intake valves themselves, and, very importantly, in the area of the positive crankcase ventilation valve.

You will recall that this is the device that prevents escape of crankcase vapors to the atmosphere and, instead, regulates the flow of those vapors back into the intake system of the engine so that they can be burned rather than put out as pollutants.

F-310 also decreases sludge and varnish deposits in the downstairs portion of the engine—on the pistons, the valve train system, the oil pan, and the oil screen.

Based on data obtained from extensive testing of our own and other additives for gasoline, we believe that F-310 is the first gasoline additive to perform effectively in all the critical areas I have described.

In order to demonstrate that it performs as we say it does, we engaged the Scott Research Laboratories, Inc., which is an independent company that has conducted research and testing programs for the Federal Government, local and State agencies, automobile companies,

and others, to subject F-310 to tests showing its unique ability to clean up very dirty engines and restore the performance of their emission-control systems.

The detailed report of these tests is part of the testimony that we have given you. The results are summarized on the next slide.

[Slide shown.]

Mr. KANE. We have plotted here hydrocarbon emissions, and the data obtained by Scott on cars that were dirty, in fact, that emitted 560 parts per million hydrocarbons on the average.

You will recall that there are cars in the car population, this is 1966, 1968, and 1969 vintage, which do emit hydrocarbons at that level.

The Scott Laboratories took these cars and put gasoline containing F-310 in them, and in no case more than 2,000 miles of operation, hydrocarbon emissions from those cars were reduced to 250 parts per million.

I want to stress that these are representative of the dirtier cars in the car population, not the average car in the car population.

To get a better indication of how much effect this might have for an average car, we refer again on the right-hand portion of this slide to the California Air Resources Board data for 1966 models comparing the hydrocarbon emission performance on the average at 30,000 miles versus the new condition.

You will see there is a deterioration of about 100 parts per million or roughly a 30-percent increase in hydrocarbon emissions.

I want to stress again that these new data are for cars that had at least 2,000 miles of operation on them. So this is not a combustion chamber deposit phenomenon but, rather, relates to the phenomenon I have described here due to deposit buildup.

We do recognize there are going to be a certain number of cars in this population that will have essentially mechanical defects, like burned exhaust valves and this type of thing. Of course, F-310 is not going to cure them. But based on all of our data we would expect that it would recover a substantial percentage of this 100 parts per million average deterioration.

I have mentioned the PCV valve, and I would like to show you next data directly substantiating what I said about F-310's ability to clean up and, of course, therefore, keep clean the PCV valve.

(Slide shown.)

Mr. KANE. On six of the cars tested at the Scott Laboratory, the valves were taken out and flow tested. You will see that on the average the valves out of those cars put out less than 40 percent of the flow that the new valves put out. This is a deterioration due to deposit buildup.

After no more than 2,000 miles with F-310 you can see the flow performance of the valve was restored to essentially new condition.

This is a striking achievement for a gasoline additive package, and it is one of the keys to the ability of F-310 to perform in this manner of restoring emission control which has deteriorated due to deposit buildup.

F-310 has been the subject of much discussion within the oil industry and among air-pollution-control officials. It is being subjected to exhaustive testing by a number of independent organizations.

In Southern California, one test conducted on sheriffs' cars by the Los Angeles County Mechanical Department is complete, and I show the data on this last slide.

(Slide shown.)

Mr. KANE. These results confirm what I have told you about F-310. These cars were 1968 and 1969 models. They had mileages at the beginning of the tests ranging from approximately 30,000 miles to 60,000 miles. From 700 miles with F-310 to approximately 2,000 miles with F-310 you will notice the two pollutants, hydrocarbon emissions, were reduced in every case—this fleet had been operating previously on a competitive gasoline—and carbon monoxide emissions were reduced in every case.

On the average, these data show a 25-percent reduction in hydrocarbon emissions and a 40-percent reduction in carbon monoxide emissions.

We are confident that other tests in progress are going to produce similar results.

All of us in the Standard Oil Company of California are extremely proud of this development and of the fact that we were able to voluntarily introduce it into the marketplace as a step toward alleviation of the automotive air-pollution problem, as well as an important quality improvement offering tangible benefits to the individual motorist.

As one engaged in research on this automotive air-pollution problem, I believe it is extremely important to preserve a competitive atmosphere that provides the incentive for my company and others in the industries involved to find innovative and practical approaches toward solution of our many problems related to environmental quality.

I would like to urge that legislation should be aimed at appropriate emission standards rather than at regulation of composition or specification of fuels.

Thank you very much for the opportunity to present this information and these comments for your consideration.

(The document referred to follows:)

(The prepared portion of Mr. Kane's testimony, relating to the slides shown, and additional materials submitted, follow:)

The first slide (the slide shown) shows the experience with deterioration of automobile emission control systems in service. The data are from two sources—the Health, Education, and Welfare Department and the California State Air Resources Board. The procedures used in selecting the cars that were tested in these two programs differed, and the slopes of the curves correspondingly differ; but the upward trend in hydrocarbon emissions with service is unmistakable in both cases. These data show that on the average the controlled cars met emission standards when they were relatively new but deteriorated as mileage increased. Incidentally, this is not a lead deposit effect in the combustion chambers since the "new" car data were obtained after the cars had been driven 2000 miles. It is well known that mileages in the range of 1500 to 3500 miles will serve to stabilize combustion chamber deposits due to lead, so that no further increase in hydrocarbon emissions due to combustion chamber deposit buildup will occur. So this observed increase in hydrocarbon emissions with service, which continues an upward trend even at 30,000 miles of operation, is due to other factors. We have a great deal of field experience obtained over a period of many years with cars in all types of service which indicates to us that a major cause of this observed deterioration is deposit buildup in critical parts of the engines. And it is these deposits that F-310 removes.

The next slide (slide shown) was obtained from the California State Air Resources Board data shown in the first slide and indicates the distribution of hydrocarbon emissions for a 254-car sample, all with 30,000 miles of operation. The first slide showed the average experience. The second shows that at 30,000 miles there are some cars in the population which have emissions below the standard, some that are at the standard, but about 60% of them are higher than the standard. Note that appreciable percentages of the cars have 400 ppm hydrocarbons, 550 ppm hydrocarbons, and higher. These data show that there are large numbers of "dirty" cars in the car population. A gasoline which would remove deposits in these dirty cars, and restore their emissions performance to the levels inherent in the basic design of the engine, was our target in the F-310 development.

The next slide (slide shown) shows a schematic of an engine which I would like to use to indicate in more detail the nature of this deposit buildup problem with its accompanying effect on increased exhaust emissions. Referring first to the carburetor and its throttle plate in the upper right-hand portion of the figure, it has been recognized for many years that deposit buildup in the carburetor will affect performance of the engine. In the early 1950's, Standard of California was the first to develop a carburetor detergent for gasoline. Our "detergent-action gasolines" were introduced in 1954, and have been continuously marketed and improved ever since. Over the years, many other companies have used conventional carburetor detergents in gasolines to minimize the deposit buildup program in carburetors. While effective carburetor detergents inhibit the formation of harmful deposits in the carburetor throttle-body and venturi areas, F-310 is capable of going even further. It will clean and keep clean not only carburetors, but also intake manifolds, ports, valves, and the positive crankcase ventilation (PCV) systems. In addition, F-310 keeps lower crankcase parts, such as pistons, valve lifters, oil pump screens and oil pans significantly cleaner and freer of varnish and sludge-type deposits. Based on data obtained from extensive testing of our own and other additives for gasoline, we believe that F-310 is the first gasoline additive package to perform effectively in all the critical areas described above.

In order to demonstrate that F-310 performs as we say it does, we engaged the Scott Research Laboratories, Inc.—an independent company which has conducted research and testing programs for the Federal government, state agencies, automobile companies, and others—to subject F-310 to tests showing its unique ability to clean up very dirty engines and restore the performance of their emission control systems. The detailed report of these tests, prepared by Scott Research Laboratories, has been presented to this Subcommittee. The results of this testing program are summarized on the next slide.

The left-hand portion of the slide shows the average hydrocarbon emissions from cars which had been operated on a typical Los Angeles urban driving cycle until deposit accumulations of the type I have described caused their hydrocarbon emissions to average approximately 560 ppm (as compared to the 275 ppm hydrocarbon emission standard appropriate to these vehicles when new). After no more than 2000 miles of operation with our gasoline containing F-310, deposits had been removed in critical areas—particularly the carburetor and the PCV valve—and emissions performance was restored to an average of approximately 250 ppm.

You will recall that the California State Air Resources Board tests which I showed you earlier indicated that there are cars on the road in California which do emit more than the 560 ppm representative of these test cars at the time that they were switched to a gasoline containing F-310.

I would like to emphasize that these Scott data are for test cars which, although representative of significant percentages of cars actually on the road, were in dirtier condition than the average car of these model years would be expected to be. To get a better estimate of what the average deterioration in performance due to deposit buildup might be, the two bars at the right-hand section of the slide repeat the California Air Resources Board data obtained on several hundred 1966 cars measured when "new" and again after 30,000 miles of service. As you can see, measured deterioration is approximately 100 ppm, or roughly one-third higher than when "new." The "new" cars actually had 2000 miles of operation, so that again I emphasize that this observed deterioration is not due to combustion chamber deposit buildup since this essentially would be stabilized at 2000 miles.

We also recognize that some of this deterioration will be due to burned exhaust valves, faulty ignition systems, and other mechanical reasons; but we believe that a major portion is due to the deposit buildup phenomena I have described. We would expect that general use of F-310 in gasolines would provide a marked reduction in emissions from older cars, as well as preventing deterioration of this type in new cars.

The PCV valve, which provides the important function of preventing crankcase vapors from being released into the atmosphere as a pollutant, also accumulates deposits in service. The Scott tests illustrated that F-310 is able to clean up dirty PCV valves and keep them clean, and this is an important reason for F-310's effectiveness in reducing emissions. The next slide shows data obtained in six of the Scott tests on studies of flow through the PCV valves. The results were obtained at 16 and 18 inches mercury vacuum, which is the condition under which a plugged PCV valve can have the most adverse effect on the air-fuel ratio supplied by the carburetor and hence on exhaust emissions. In the dirty cars, the average flow rate in cubic feet per minute through the PCV valves was less than half that when the valves were new. However, after 2000 miles on Chevron F-310, the flow rates were restored essentially to **those** of the new valves. This is a striking achievement for a gasoline additive **package**.

F-310 has been the subject of much discussion within the oil industry and among air pollution control officials. It is being subjected to exhaustive testing by a number of independent organizations. In Southern California one test conducted on sheriff's cars by the Los Angeles County Mechanical Department is complete, and the results have been announced and are shown on the last slide. These results confirm what I have told you about F-310. In this fleet which had been using a competitive fuel, and which had dirty engines, F-310 reduced emissions of two pollutants—hydrocarbons by an average of about 25 percent and carbon monoxide by an average of about 40 percent after runs of less than 700 to about 2000 miles. We are confident that other tests will also produce similar results.

All of us in Standard Oil Company of California are extremely proud of this development and of the fact that we were able to voluntarily introduce it into the market place as a step toward alleviation of the automotive air pollution problem, as well as important quality improvement offering tangible benefits to the individual motorist. As one engaged in research on this automotive air pollution problem, I believe it is extremely important to preserve a competitive atmosphere that provides the incentive for my company and others in the industries involved to find innovative and practical approaches toward solution of our many problems related to environmental quality. I would like to urge that legislation should be aimed at appropriate emission standards rather than at regulation of composition or specification of fuels.

Thank you very much for the opportunity to present this information and these comments for your consideration.

#### STANDARD OIL COMPANY OF CALIFORNIA, SAN FRANCISCO, CALIF.

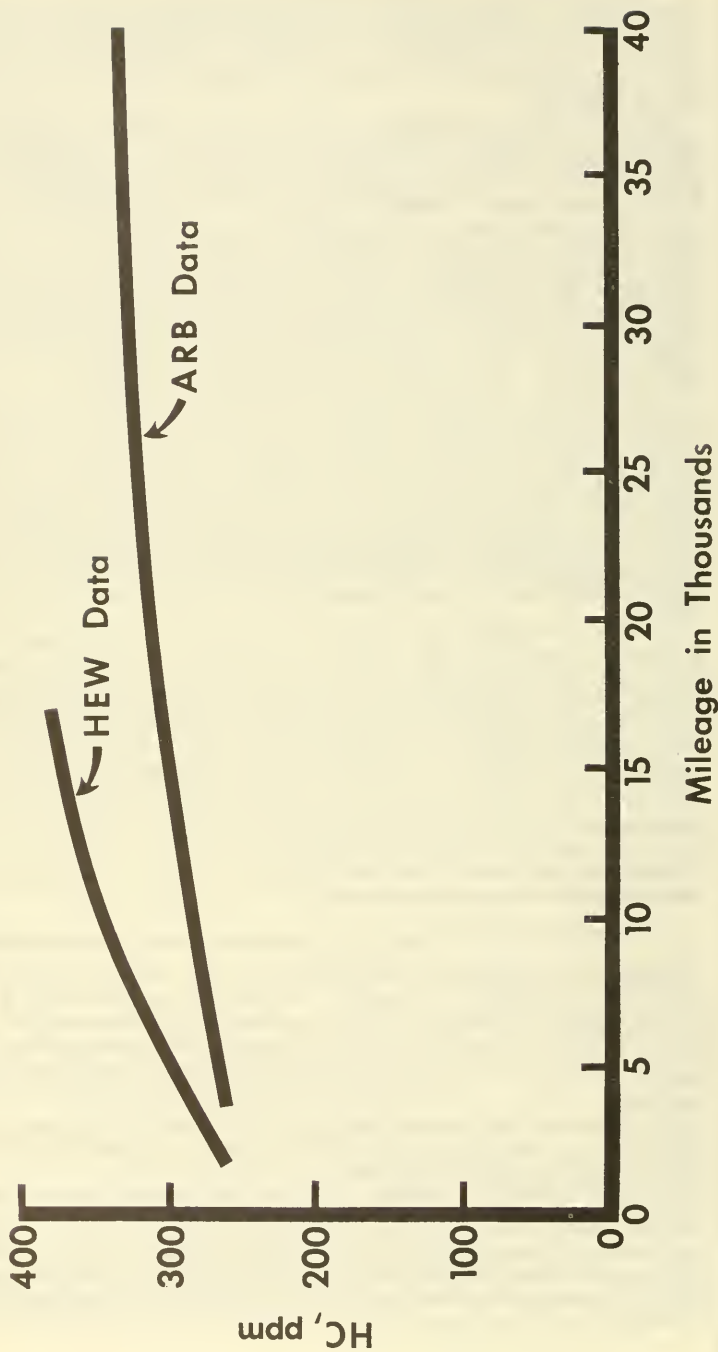
Standard Oil Company of California said today it will remove lead from its gasoline if this change is necessary to enable auto manufacturers to design and build pollution-free engines. "With the removal of lead from gasoline, there must be recognition of the need to reduce engine compression ratios, in order to avoid prohibitive refinery expenditures which would require unreasonable increases in the price of gasoline," said O. N. Miller, Chairman of Standard of California.

"Our company has advised leading members of the auto industry that unleaded Chevron gasolines will be made available for automobiles whose engines require such fuel," Miller continued.

"Standard intends to produce whatever fuels are required to assist in removing the automobile as a serious factor in the nation's air pollution problem," Chairman Miller stated. "In this connection, we have already made a significant contribution by introducing Chevron F-310 gasolines. Chevron F-310 removes and prevents critical deposit build-up in auto engines, and thereby reduces emissions of unburned hydrocarbons and carbon monoxide—two major automotive pollutants."

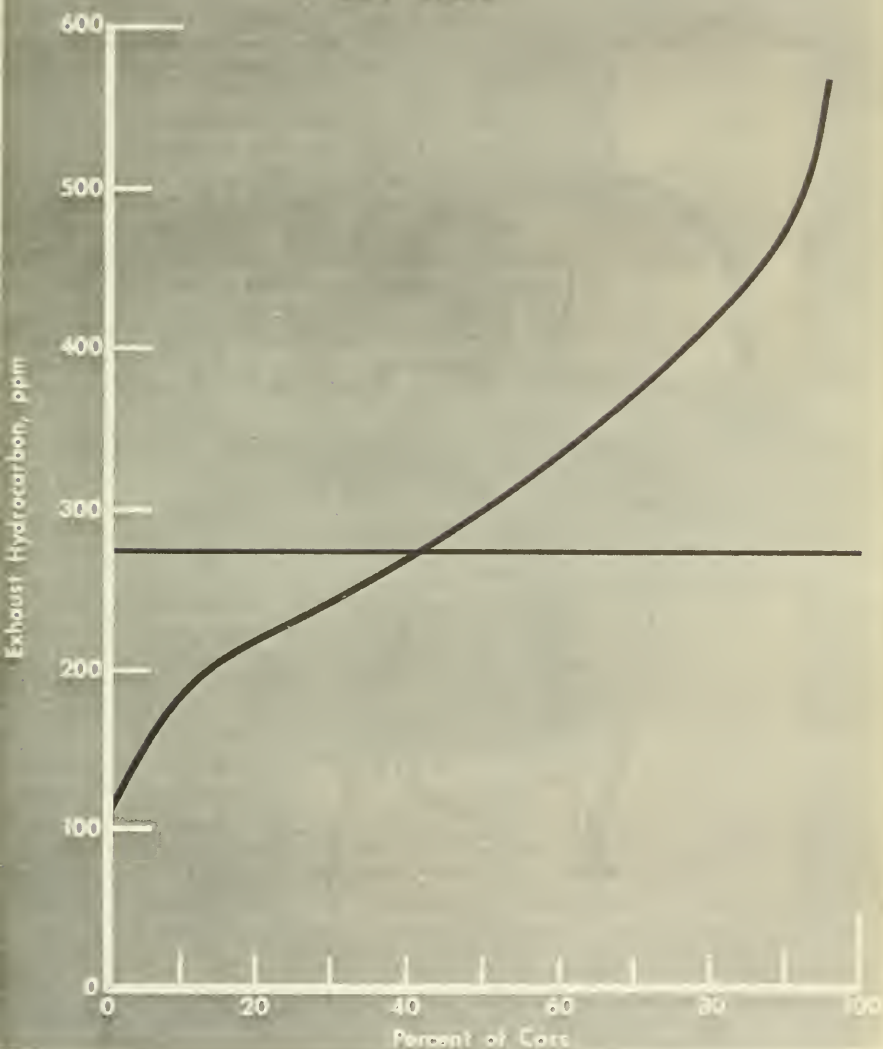
# SURVEILLANCE PROGRAMS

## 1966 MODEL CARS

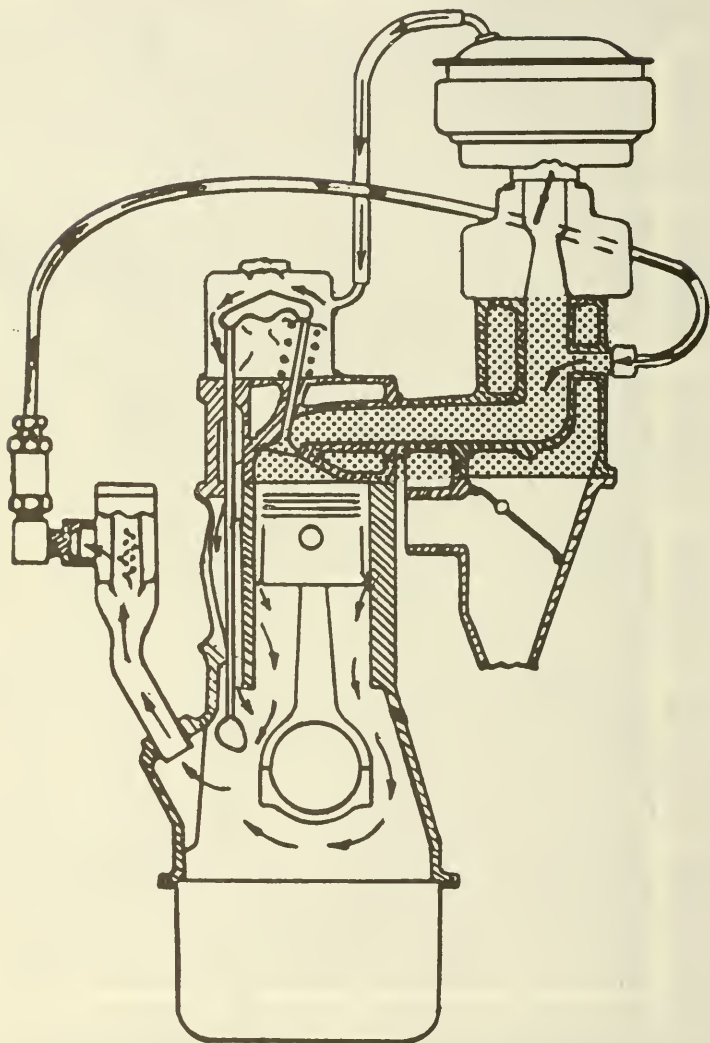


**DISTRIBUTION OF EXHAUST EMISSIONS**

1966-MODEL CARS  
AVERAGE MILEAGE - 30,000  
254 CARS



# ENGINE SCHEMATIC





## EMISSION SURVEY DATA

California  
Surveillance Program  
1966 Models

Reduction  
With F-310

Hydrocarbon Emissions, ppm

800

600

400

200

0

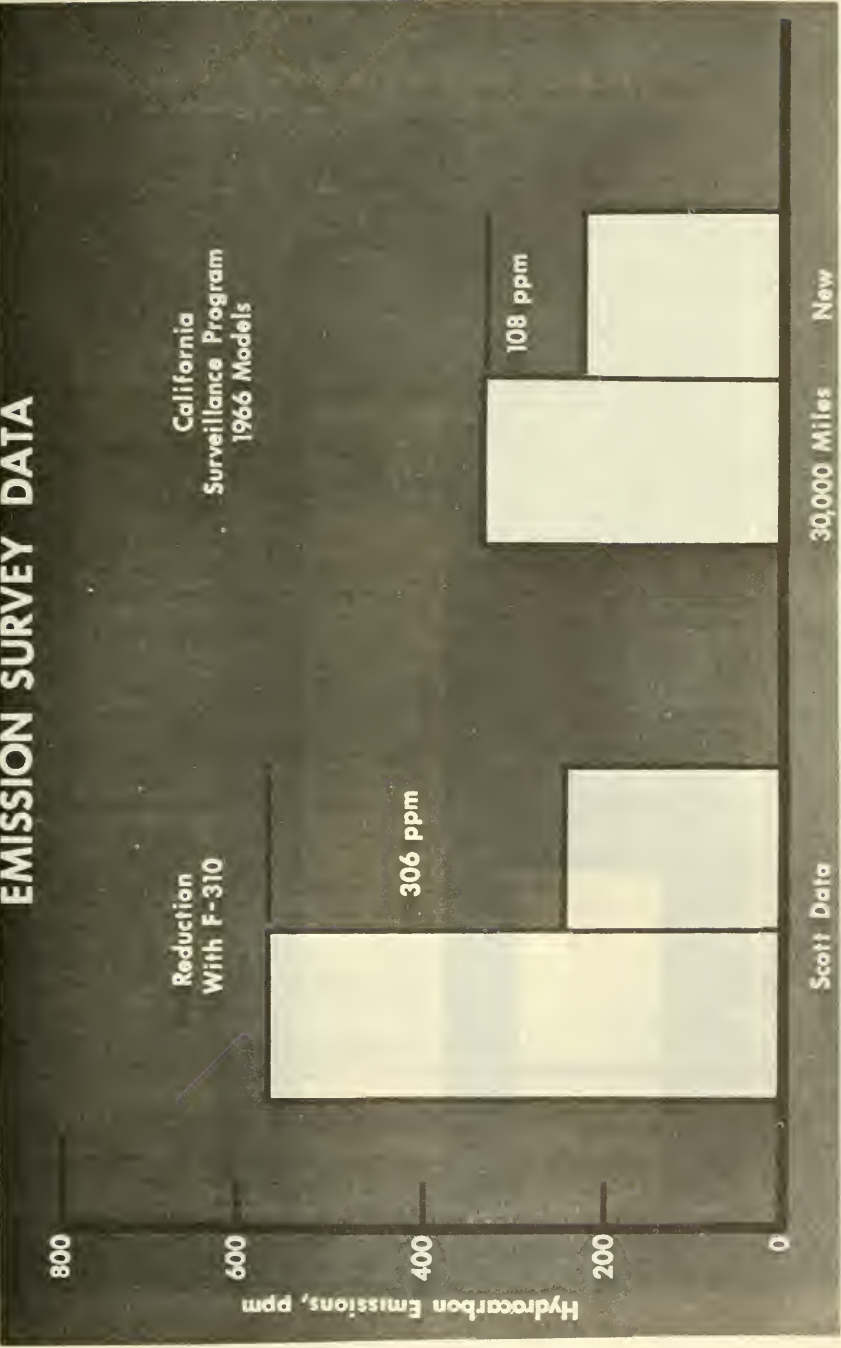
306 ppm

108 ppm

Scott Data

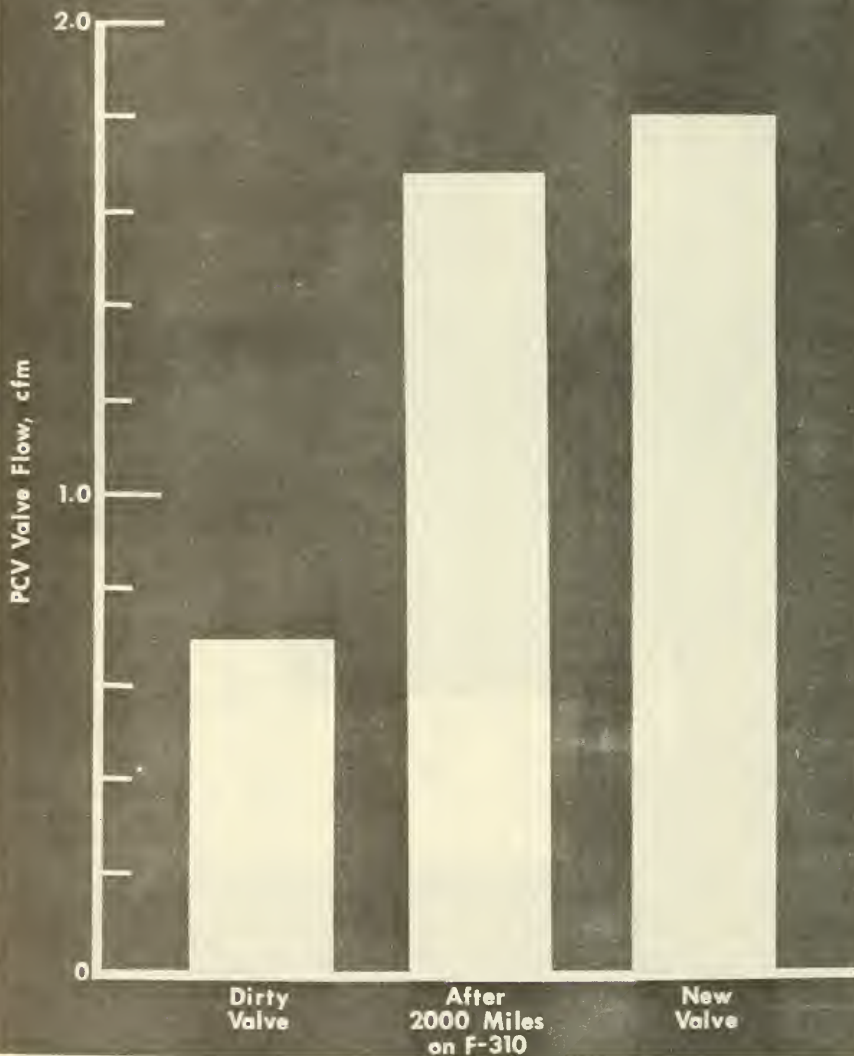
30,000 Miles

New



# EFFECT OF F-310 ON PCV VALVE PLUGGING

SIX-CAR AVERAGE  
MEASURED AT 16" AND 18" MANIFOLD VACUUM



In tests conducted independently by  
County of Los Angeles Mechanical Dept.--

# SHERIFFS' CARS CONFIRM DIRTY EXHAUST EMISSIONS "CUT APPRECIABLY" BY CHEVRON WITH F-310

"We have used six sheriff's automobiles and a definite improvement in the emissions has been shown. The hydrocarbons and the carbon monoxide have been cut appreciably."

This statement is from R. O. Sudduth, Director, Mechanical Department, County of Los Angeles. It is contained in his letter of March 5, reporting to Los Angeles County Board Supervisor Kenneth Hahn on the County-sponsored evaluation of Standard Oil Company of California's F-310\* gasoline additive.

In a press conference March 6, Mr. Sudduth explained how the tests were run. The cars were 1968 and 1969 models. Two from the Bellflower sheriff's station, two from the City of Commerce, two from East Los Angeles. This was done to make sure the cars chosen were typical of vehicles subjected to all types of driving—stop-and-go, idling, long-distance and high-speed. All cars had been driven 30,000 miles or more, and had very dirty engines.

The cars had been run on their usual gasoline. They were switched to Chevron gasoline with F-310, and driven in normal service for as little as 678 miles, and as much as 2093 miles.

Careful measurements of emission levels were made before and after the test at a federal government laboratory.

The chart at right reveals the official test data from this independent research, conducted by Mr. Sudduth. It clearly confirms that both hydrocarbon and carbon monoxide exhaust emissions were cut appreciably, in six sheriff's cars, by using Chevron with F-310. Additional test work is continuing.

Independent tests are also being conducted by other State agencies on larger numbers of cars. These data should make it possible to provide an estimate of the total improvement in automotive exhaust emissions that would result from general use of F-310.

\*F-310 Trademark For Polysulfone-Amine Gasoline Additive

## REDUCTION OF EXHAUST EMISSIONS IN SIX SHERIFF'S CARS USING F-310 ADDITIVE

VEHICLE TESTED	MILEAGE AT START OF TEST	MILEAGE AT END OF TEST	TOTAL MILES OF TEST	HYDRO CARBON EMISSIONS AT START (PARTS PER MILLION)	HYDRO CARBON EMISSIONS AT END (PARTS PER MILLION)	CARBON MONOXIDE EMISSIONS % AT START	CARBON MONOXIDE EMISSIONS % AT END
'68 FURY #41278	56,327	57,760	1,433	409	294	2.89	1.87
'68 FURY #41322	59,954	62,051	2,097	501	351	3.24	1.88
'68 FURY #41326	46,160	47,262	1,102	514	456	2.83	2.12
'68 FURY #42074	34,290	34,968	678	344	266	3.28	2.10
'68 FURY #42098	37,284	39,321	1,937	420	278	2.07	.77
'68 FURY #42146	30,006	31,768	1,762	374	299	3.06	1.29

Published as a matter of public information by

# Standard Oil Company of California




**SCOTT RESEARCH LABORATORIES INC.**


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February 27, 1970

ADDRESS REPLY TO:

 P. O. BOX 2416  
 SAN BERNARDINO, CALIFORNIA 92409  
 716 - TU 7-287

Dr. J. H. Macpherson,  
 Chevron Research Company,  
 576 Standard Avenue  
 Richmond, California 94802

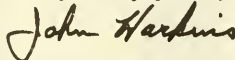
Dear Dr. Macpherson:

The enclosed report entitled "Evaluation of the Effect of Chevron F-310 Gasoline Additive Package on Exhaust Emissions and Fuel Consumption" is transmitted for the documentation of tests performed at our San Bernardino laboratories. These tests were performed in accordance to Scott's Proposal 0201-9-1768-32 and Proposal 0201-12-968-40, under our Project Number 2809 and Project Number 2849.

The report describes the test procedures used and the results of 14 tests conducted by Scott Research Laboratories for evaluating the effect of Chevron F-310 upon exhaust emissions, fuel economy, and condition of positive crankcase ventilation valve (PCV). The tests were performed over a period beginning September 1968 and ending November 1969.

It was a pleasure for Scott Research to work with Chevron Research Company on this most interesting program. Should you have further questions on this report, please do not hesitate to contact us.

Very truly yours,



John Harkins  
 Vice-President  
 Scott Research Laboratories

Encl. - report, above  
 subject and date

EVALUATION OF THE EFFECT OF  
CHEVRON F-310 GASOLINE ADDITIVE  
PACKAGE ON EXHAUST EMISSIONS  
AND FUEL CONSUMPTION



SCOTT RESEARCH LABORATORIES, INCORPORATED

FINAL REPORT

EVALUATION OF THE EFFECT OF  
CHEVRON F-310 GASOLINE ADDITIVE  
PACKAGE ON EXHAUST EMISSIONS  
AND FUEL CONSUMPTION

For

Chevron Research Company  
576 Standard Avenue  
Richmond, California 94802

February 27, 1970

By

Scott Research Laboratories, Inc.  
2600 Cajon Boulevard  
P.O. Box 2416  
San Bernardino, California 92406

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## 1.0 Introduction

This report documents the results of tests conducted at Scott Research Laboratories to evaluate the effect of the Chevron F-310 additive upon the exhaust emissions and fuel consumption of vehicles operating on the road. This program was conducted in two phases. Phase I consisted of the operation of vehicles on the road under a prescribed driving pattern representative of city and freeway driving until the deposits within the engine caused the engine to idle poorly. Phase II consisted of the operation of the same vehicles on a fuel containing the Chevron F-310 additive package over the same driving pattern.

Prior to starting Phase I, the cars were equipped with clean carburetors and new PCV valves. The cars were then operated on a fuel supplied by Chevron Research to be representative of the poorer grade gasolines commercially available in the Los Angeles Area. An intermediate quality lubricant was used with a 6000-mile oil drain period. Emission tests were run at the beginning and at regular intervals. The Phase I testing was terminated when the cars' driveability became impaired due to deposit formation in the carburetors and PCV system.

In Phase II the vehicles using a fuel containing the Chevron F-310 additive package were driven over the same prescribed test route as in Phase I. Emission and fuel consumption tests were run at the beginning of this phase and at regular intervals. The degree of plugging of the PCV valves before and after the Phase I cleanup portion of the program was measured.



This report is divided into five sections. Following the introduction, Section 2.0 describes the overall program test plan and discusses the program objectives.

Section 3.0 gives a detailed description of the test procedures employed in Phases I and II.

Section 4.0 describes the test vehicles used in the test program.

Section 5.0 presents and discusses the results of the test program.

Section 6.0 is an appendix containing the tabulated data for the emission and the fuel consumption measurements for the 14 tests.

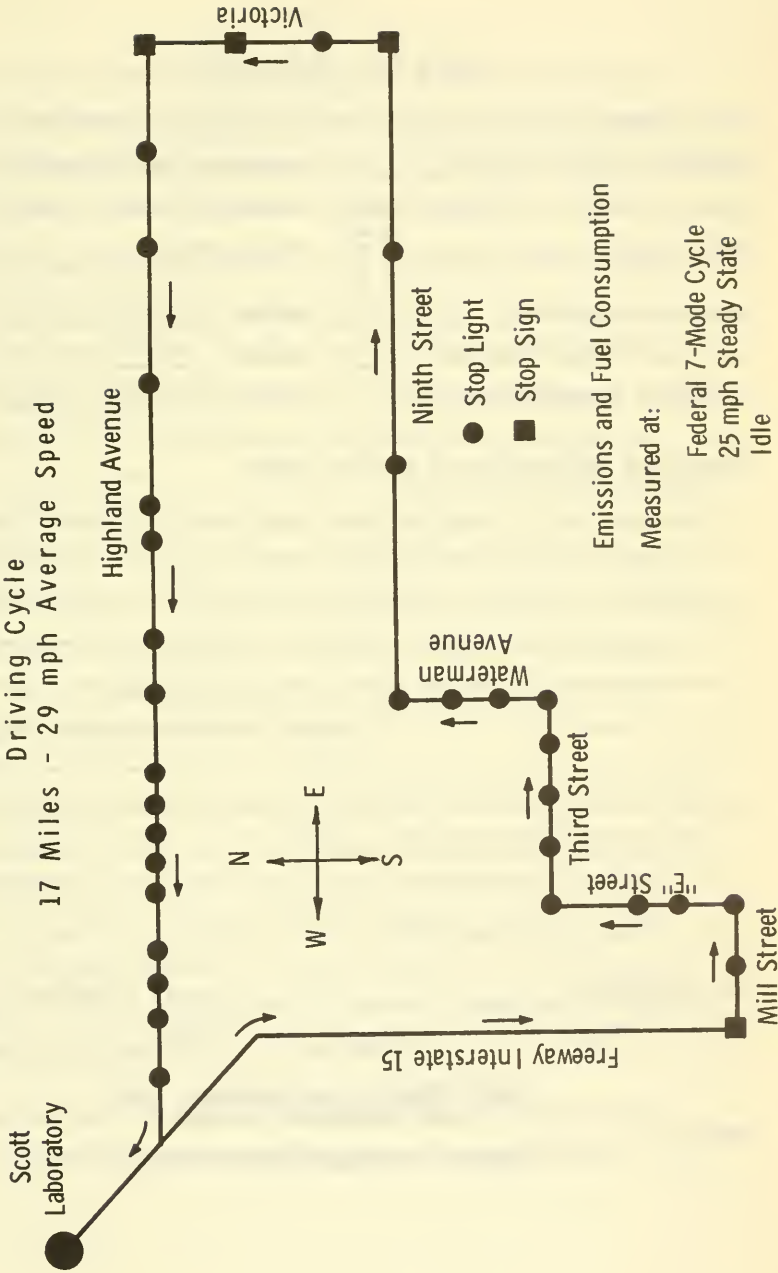
## 2.0 Program Test Plan

The objective of this program was to evaluate the effectiveness of the Chevron F-310 additive on vehicles operating under road conditions typical of urban and interurban driving. The tests were designed to evaluate the ability of the Chevron F-310 additive to clean up preformed carburetor and PCV valve deposits. In addition, one vehicle was used to evaluate the ability of the Chevron F-310 additive to keep deposits from forming in critical areas affecting emissions and fuel economy.

A test route, shown in Figure 2.1, was selected for the mileage accumulation. The route consisted of 3.2 miles of freeway driving, 1.3 miles of business driving with traffic signals set for 15 mph, 5.0 miles of residential, 7.4 miles of business arterial with speeds posted at 25-45 mph. The total route is 16.9 miles in length and was completed in 35 minutes at an average speed of 29 mph. The route contains 35 stoplights or signals which result in considerable idling during the busier times of the day and evening. The vehicles returned to the Scott parking lot after one circuit for a 10-minute hot soak. The vehicles continued driving two circuits with a subsequent 15-minute hot soak. On this schedule, the vehicles accumulated an average of 450 miles per day.

At the end of each shift period, each driver turned into the fleet supervisor a written record of mileage and service to his vehicle. A typical form is shown in Figure 2.2.

FIGURE 2.1  
MILEAGE ACCUMULATION TEST ROUTE





The test route described above meets the requirements of the California Air Resources Board for the evaluation of emission control devices and is consistent with the Automobile Manufacturers Association route published in the Federal Register.

All driving was done with the vehicles operating in a caravan with a foreman assigned to each driving shift. Each driver was required to punch a time clock at the start of each circuit and then again after the completion of the loop, approximately 35 minutes later. In addition to the time card, each driver completed a shift record on which idle speed and manifold readings (taken just before each rest stop) were recorded. Also recorded were starting and finish odometer readings, fuel and oil added, other service given, and any other pertinent information regarding the operation of the vehicle. The shift records were examined each day by the fleet supervisors and the data summarized for reporting to Chevron Research Company.

The criteria for evaluating the performance of the Chevron F-310 additive was the change in the exhaust unburned hydrocarbons and carbon monoxide, the difference in fuel consumption, and the degree of air flow restriction due to deposits within the PCV valve. These measurements were made under both steady state and the Federal 7-Mode Operating Cycle with the exception of the PCV valve, which was measured on a flow bench.

At the beginning of Phase I, the selected test vehicles were tuned in accordance with the manufacturers' specifications.

Phase I of the program was continued until a noticeable drop in engine idle speed was detected. In order to obtain a severe deposit level in the carburetor throttle body and PCV valve, the vehicles were run to the threshold of stalling. This created the maximum deposit level for the evaluation of the F-310 additive package.

Phase II of the test program was continued until the cars essentially regained the emission control previously demonstrated at the setup of the engine at the Phase I start condition.

The fuels and lubricants were supplied by the Chevron Research Company. The fuel used in Phase I of the program was identified as FR-6117. The crankcase oil used for Phase I was identified as BL-65077 and was changed at 6000-mile intervals. The fuel used for Phase II was a Chevron Supreme base with Chevron F-310. The F-310 additive package was blended into these fuels by Scott Research Laboratories. The crankcase oil used in Phase II for the first six tests was RPM Special SAE 20 and was changed at intervals of 3000 miles. In order to eliminate the possible crankcase oil effect on deposit cleanup, the same oil (BL-65077) was used in subsequent tests for both Phases I and II.

The enrichment of the air-fuel mixture with mileage is caused by deposits in both the carburetor and PCV valve. In order to evaluate the cleanup effect of F-310 on only the carburetor deposits, five of the Phase II sequences were run with new PCV valves. The tests run with and without new PCV valves are identified in Section 5.3.

### 3.0 Test Procedures

This section of the report describes in detail the test procedures used in Phase I and Phase II of the road test program.

#### 3.1 Phase I

##### 3.1.1 Vehicle Preparation

Each of the vehicles was given a "major tune-up" consisting of the following items:

1. New flowed PCV valve meeting manufacturers' specifications was installed.
2. New points and spark plugs were installed, and the distributor spark advance mechanism was checked against manufacturers' specifications.
3. Oil was changed and new oil filter installed.
4. New fuel and air filters were installed.
5. Ignition timing was set to manufacturers' specifications.
6. Dynamic cylinder compression was checked.
7. The 1966 Chevrolets were equipped with new carburetors. On the other vehicles, the carburetor was cleaned by disassembling and installing a new kit (excluding jet change). The float level was set to manufacturers' specifications. Finally, the air-fuel ratio at idle and idle speed adjusted to manufacturers' specifications and the screws were locked with epoxy cement to prevent any changes in idle rpm or mixture ratio due to readjustment of the carburetor during either phase of the program.

### 3.1.2 Emission Tests

Emission tests were performed after the vehicles were adjusted to manufacturers' specifications according to the procedure described in Section 3.1.1. Exhaust emissions measured were unburned hydrocarbons by a nondispersive infrared analyzer and flame ionization detector. Carbon monoxide was measured by a nondispersive infrared analyzer. Tests were conducted using the Federal 7-Mode Cycle and steady state conditions of idle, 25, and 50 mph. Each test was performed in triplicate. Prior to conducting the emission tests, each vehicle was preconditioned on the dynamometer by cruising 15 minutes at 40 mph at road load. The 7-Mode Cycle tests were conducted in accordance with the Federal Exhaust Procedure. The test fuel used during the emission tests was Indolene 30 as required by the Federal Test Procedure. The emission tests were performed at approximately 3000-mile intervals during Phase I for the first 10 cars tested. The emissions for the last 4 cars were measured at the beginning and end of Phase I. At the end of Phase I, the involvement of the degree of PCV valve plugging on the emissions of the vehicle was determined in some cases by replacing the plugged PCV valve with a new clean (reference) PCV valve and rerunning the emission test.

### 3.1.3 Fuel Consumption Tests

Fuel consumption measurements were made on the chassis dynamometer in conjunction with the emission measurements described above. The fuel consumed during each 7-Mode Cycle test was measured by weighing the amount of fuel used during each test. Steady state fuel consumption was measured over a fixed time period to establish the flow rate. Triplicate measurements in all tests were obtained.



#### 3.1.4 PCV Valve Flow Tests

At the end of Phase I, the PCV valves were removed from each vehicle and flow tested. The results of these tests were compared with the clean flow data obtained during vehicle preparation. The PCV valve replacement procedure varied between tests. In the test result section, vehicles receiving new PCV valves at the end of Phase I are identified.

### 3.2 Phase II

At the beginning of Phase II, the fuel was drained from the vehicle tanks and the tanks refilled with the Chevron F-310 gasoline. Vehicles in which the oil was also changed at this point are discussed in Section 5.0.

#### 3.2.1 Vehicle Emission Tests

The emissions were measured during Phase II for the first six vehicles at 2000, 4000, and 6000 miles. Emission measurements were made for the remaining vehicles at various intervals as discussed in Section 5.1 of this report. Exhaust gas emissions of unburned hydrocarbons and CO were measured during the 7-Mode Cycle tests and at the steady state conditions as described previously in Section 3.1.2 above. In some cases, a new clean (reference) PCV valve was installed to determine the effect of the condition of this valve on the exhaust emissions.

#### 3.2.2 Fuel Consumption Tests

Fuel consumption tests were measured in conjunction with the emission measurements in Phase II and in accordance with the procedures outlined in Section 3.1.3 above.

4.0 Test Vehicles

The test vehicle fleet comprised six Chevrolets, one Ford, and one Dodge. The vehicle statistics are shown in the following table:

Car No.	Make/Model	Year	License No.	Eng. Displ. (Cu In.)	Start Odometer
1	Chevrolet Bel Air	1966	SHS 830	283	28,497
2	Chevrolet Impala	1966	RJU 953	283	29,579
3	Chevrolet Biscayne	1966	TIM 740	283	26,298
4	Chevrolet Impala	1966	SCD 871	283	25,887
5	Chevrolet Impala	1966	SSY 960	283	29,892
6	Chevrolet Impala	1966	SGV 576	283	28,529
7	Ford Fairlane	1969	XXB 569	302	6,020
8	Dodge Charger	1968	WVK 426	383	13,332

The initial criteria for vehicle selection was to choose vehicles which were representative of a popular make and model of high sales volume. Mileage accumulation of between 25,000 and 30,000 miles was desired to ensure adequate blowby rate for deposit buildup. The same make and engine displacement was desired to allow direct comparison. Therefore, the original fleet consisted of six 1966 Chevrolets with 283 cu in. displacement engines and odometer mileages ranging from 25,887 to 29,892. Later in the program, a 1969 Ford Fairlane 302 cu in. displacement and a 1968 Dodge Charger 383 cu in. displacement were added to the test fleet. These two different models were added to evaluate the performance of the additive in other vehicles.

## 5.0 Results and Discussion

This section presents and discusses the results of the test program. Measurements of both exhaust emissions and fuel consumption were made in triplicate. The data presented on PCV valve plugging is in duplicate. A complete tabulation of test results is given in Appendix 6.0.

### 5.1 Emission Results

#### 5.1.1 Phase I

Table 5.1 presents the emission test results for Phase I of the program. The Phase I vehicle test was designed to accumulate both carburetor and PCV valve deposits. The test mileage covered a range of from 5,414 miles in test No. 12 to 20,538 miles in test No. 9 for an average of 9,526 miles. The test mileages shown in the tables presented in this section and in Appendix 6.0 represent both the mileage accumulated over the test route and the mileages accumulated on the dynamometer during the emission test procedures. The emission tests averaged approximately 70 miles per test. The values for unburned hydrocarbons and carbon monoxide shown in Table 5.1 are for two cycles of the Federal 7-Mode Cycle test and generally referred to as the "hot cycles." The data is presented for both the start and the end of Phase I. The values for the start condition were measured after the engine was tuned to manufacturers' specifications and the vehicle prepared as described in Section 3.1.1. The values for the end condition in most cases represent two triplicate measurements, which consist of the measurements made at the end of Phase I and the beginning of Phase II.

TABLE 5.1  
PHASE I  
EMISSION TEST RESULTS

Test No.	Car No.	Phase I Miles	Hydrocarbons, ppm Start/End/Change	Carbon Monoxide, % Vol Start/End/Change
1	1	7,991	237/292/55	0.76/2.1/1.34
2	3	14,471	318/500/182	0.58/1.6/1.02
3	5	12,157	238/468/230	0.64/2.0/1.36
4	2	8,309	264/409/145	0.55/2.3/1.75
5	4	6,049	308/539/231	0.53/2.7/2.17
6	6	7,811	262/454/192	0.72/1.8/1.08
7	2	6,051	268/925/657	1.2/3.1/1.90
8	4	8,585	286/920/634	2.05/3.4/1.35
9	7	20,538	323/637/314	0.36/1.9/1.54
10	7	8,265	234/605/371	0.33/1.6/1.27
11	8	10,016	205/575/370	1.18/3.7/2.52
12	1	5,414	200/400/200	1.66/3.2/1.54
13	6	8,184	211/557/346	2.08/3.1/1.02
	Average	9,526	258/560/302	0.97/2.5/1.53

Note: Emission Tests 1 through 4 and Test 6 were run with new PCV valves.

Table 5.1 shows that the increase in unburned hydrocarbons ranged from 55 ppm in test No. 1 to 657 ppm in test No. 7 with an average increase of 302 ppm. The increase in carbon monoxide ranged from 1.02% by volume in tests No. 2 and No. 13 to 2.52% by volume in test No. 11 with an average increase of 1.53% by volume.

#### 5.1.2 Phase II

Table 5.2 presents the emission test results for Phase II. The results are tabulated in the same fashion as previously described for Table 5.1. In the first six tests, the cars were run for approximately 6000 miles on the "cleanup" phase. However, the results shown in Table 5.2 are for the first measurement which was made at approximately 2000 test miles. The mileages required for cleanup in the remaining tests ranged from 858 miles for test No. 7 to 1,796 miles for test No. 13.

In five of the first six tests, a new PCV valve was installed at the beginning of Phase II. As previously discussed, this was done to isolate the effect of PCV valve deposits from carburetor deposits. Therefore, in tests No. 1 through No. 4 and test No. 6, the values for unburned hydrocarbons at the start of Phase II reflect lower emissions obtained with a clean PCV valve. The balance of the hydrocarbon measurements recorded reflect the influence of both carburetor and PCV valve deposits.

The hydrocarbon reduction of all 13 tests ranged from 48 ppm in test No. 1 to 675 ppm in test No. 7 with an average reduction

TABLE 5.2  
 PHASE II  
EMISSION TEST RESULTS<sup>1</sup>

Test No.	Car No.	Cleanup Miles	Hydrocarbons, ppm Start/End/Change	Carbon Monoxide, % Vol Start/End/Change
1	1	1984 <sup>2</sup>	292/244/48	2.1/1.5/0.6
2	3	2069 <sup>2</sup>	500/220/280	1.6/1.4/0.2
3	5	2052 <sup>2</sup>	468/210/258	2.0/1.5/0.5
4	2	1765 <sup>2</sup>	409/224/185	2.3/2.0/0.3
5	4	2015 <sup>2</sup>	539/211/328	2.7/1.5/1.2
6	6	2042 <sup>2</sup>	454/214/240	1.8/1.2/0.6
7	2	858	925/250/675	3.1/1.6/1.5
8	4	1222	920/260/660	3.4/2.5/0.9
9	7	1109	637/314/323	1.9/0.9/1.0
10	7	1000	605/298/307	1.6/1.1/0.5
11	8	1600	575/431/144	3.7/2.7/1.0
12	1	1737	400/198/202	3.2/1.2/2.0
13	6	1796	557/226/331	3.1/2.1/1.0
	Average	1634	560/254/306	2.5/1.6/0.9

<sup>1</sup>Tests 1 through 4 and Test 6 started Phase II with new PCV valves.

<sup>2</sup>Mileage at first measurement.

of 306 ppm. The carbon monoxide in Phase II for the 13 tests ranged from 0.02% by volume in test No. 2 to 2.0% by volume in test No. 12.

A graphical presentation of the results shown in Tables 5.1 and 5.2 is presented in Figures 5.1 and 5.2. The first figure shows the unburned hydrocarbon concentration vs. test number. It may be noted that the hydrocarbon emissions are reduced in all cases after operating the test vehicle on a fuel containing the F-310 additive package for an average of 1,600 miles. Similar reductions in carbon monoxide emissions were obtained in all cases.

#### 5.1.3 "Stay-Clean" Test Result

Figure 5.3 shows the Federal 7-Mode test results of unburned hydrocarbons and carbon monoxide vs. mileage for a vehicle operated on the Phase I fuel containing F-310. For comparison purposes, a vehicle operated on the same fuel without F-310 is shown. Both vehicles were prepared as described in Section 3.1.1. The purpose of this test was to determine the ability of F-310 to maintain the carburetor and PCV system in clean condition. It is shown that the unburned hydrocarbon emissions of the car operating on the fuel without F-310 increased from 262 ppm to 598 ppm. The carbon monoxide emissions of this car increased from 0.72% by volume to 2.31% by volume. The hydrocarbon emission for the car operating on the fuel with F-310 was 260 ppm at the start and was 216 ppm after 7,600 test miles. The carbon monoxide emission from the car operating on the fuel with

FIGURE 5.1  
SUMMARY OF TEST RESULTS - FEDERAL  
7-Mode Cycle UBHC





FIGURE 5.2  
SUMMARY OF TEST RESULTS - FEDERAL  
7-Mode Cycle CO

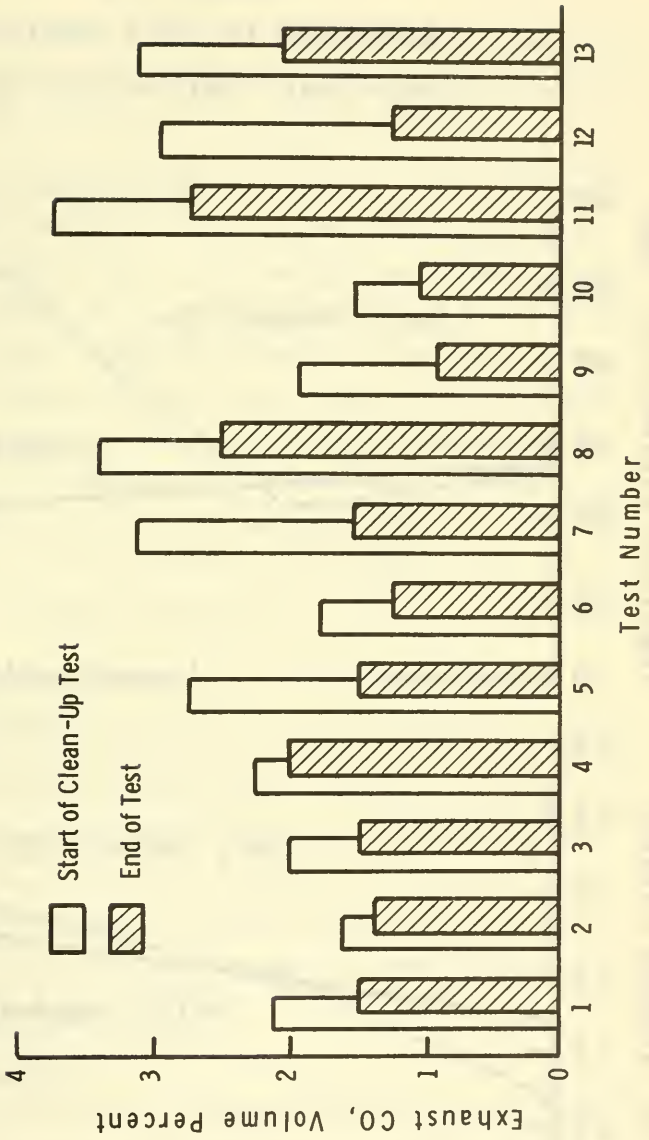
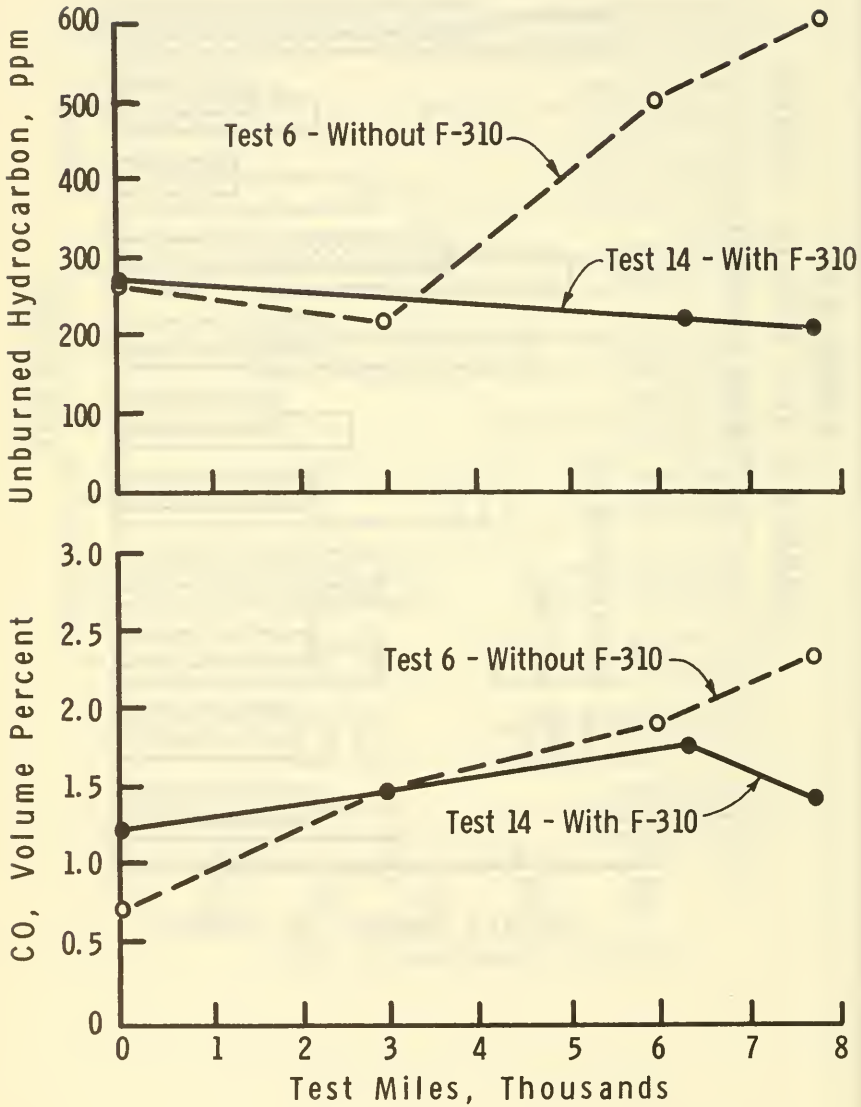


FIGURE 5.3  
SUMMARY OF TEST RESULTS  
"Stay-Clean" Test on Car No. 6



F-310 started at 1.2% by volume and ended at 1.4% by volume. The detailed emission figures for tests No. 6 and No. 14 are given in the appendix.

## 5.2 PCV Valve Plugging Results

Table 5.3 shows the PCV valve flow in cubic feet per minute at 14 inches of mercury vacuum. This condition was chosen because it is representative of the manifold vacuum at the idle condition at the end of Phase I in which the PCV valve involvement is most significant. It may be seen from this table that the percent plugging of the PCV valve at the end of Phase I ranged from 0% to 76% with an average plugging of 33%. After an average of 2,491 test miles on the fuel containing the Chevron F-310 additive package, the PCV flow was restored to the original flow rate on all but one of the eight cars tested.

## 5.3 Fuel Consumption Results

### 5.3.1 Phase I

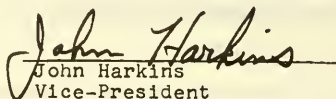
Table 5.4 presents the fuel consumption data for the idle, 25 mph, and Federal 7-Mode Cycle measurements. It may be seen from this table that after an average of 9,526 miles of operation on the Phase I fuel, there was a 26.2% increase in the idle fuel consumption, a 14.4% increase in the fuel consumption at 25 mph, and a 5.6% increase in the fuel consumption measured for the Federal 7-Mode Cycle.

### 5.3.2 Phase II

Table 5.5 presents the fuel consumption data for Phase II after an average of 4,082 miles of operation on a fuel containing the

5-10

F-310 additive package. It may be seen from this data that there was an 18.2% decrease in fuel consumption at the idle condition, a 12.6% decrease in fuel consumption at the 25 mph condition, and a 7.7% decrease in fuel consumption on the Federal 7-Mode Cycle.

  
John Harkins  
Vice-President  
Scott Research Laboratories

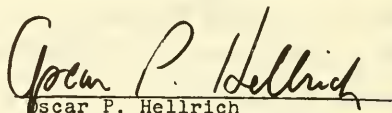
  
Oscar P. Hellrich  
Supervisor, Emissions Testing  
Scott Research Laboratories

TABLE 5.3  
PCV VALVE PLUGGING AT  
14 INCHES HG VACUUM

Test No.	Car No.	Flow at Start of Phase I (CFM)	Flow at End of Phase I (CFM)	Plugging, %	Phase II Test Miles	Flow at End of Phase II Test Miles	Plugging, %
1	1	1.83	1.50	18	-	-	-
2	3	1.89	1.53	19	-	-	-
3	5	1.84	0.58	68	-	-	-
4	2	1.83	1.15	37	-	-	-
5	4	1.79	0.43	76	6115	1.81	0
6	6	1.89	1.90	0	-	-	-
7	2	1.84	1.15	37	1932	1.83	0
8	4	1.74	1.49	14	2162	1.85	0
9	7	1.85	1.33	28	2069	1.85	0
10	7	2.06	1.95	5	2235	2.11	0
11	8	1.82	1.99	0	1600	2.00	0
12	1	1.89	0.57	70	2023	1.55	18
13	6	1.89	0.63	67	1796	1.87	0
Average		<u>1.86</u>	<u>1.25</u>	<u>33</u>	<u>2491</u>		

TABLE 5.4  
PHASE I  
FUEL CONSUMPTION DATA

Test No.	Car No.	Idle, Fuel Consumption Pounds/Minute Start/End/Change	25 mph, Fuel Consumption Pounds/Minute Start/End/Change	Federal 7-Mode Cycle Pounds/Minute Start/End/Change	Miles In Phase I
1	1	0.061/0.066/+0.005	0.130/0.122/-0.008	0.162/0.157/-0.005	7,991
2	3	0.048/0.059/+0.011	0.116/0.125/+0.009	0.151/0.158/+0.007	14,471
3	5	0.068/0.073/+0.005	0.132/0.133/+0.001	0.163/0.162/-0.001	12,157
4	2	0.065/0.076/+0.011	0.120/0.137/+0.017	0.161/0.169/+0.008	8,309
5	4	0.065/0.070/+0.005	0.124/0.119/-0.005	0.158/0.158/0	6,049
6	6	0.079/0.068/-0.011	0.127/0.128/+0.011	0.165/0.162/-0.003	7,811
7	2	0.062/0.084/+0.022	0.120/0.149/+0.029	0.171/0.195/+0.24	6,051
8	4	0.061/0.088/+0.027	0.100/0.151/+0.051	0.156/0.189/+0.033	8,585
9	7	0.045/0.055/+0.010	0.101/0.103/+0.002	0.132/0.129/-0.003	20,538
10	7	0.047/0.067/+0.020	0.098/0.104/+0.006	0.165/0.149/-0.016	8,265
11	8	0.067/0.103/+0.036	0.142/0.195/+0.053	0.177/0.214/+0.037	10,016
12	1	0.069/0.093/+0.024	0.112/0.146/+0.034	0.167/0.191/+0.024	5,414
13	6	0.062/0.099/+0.037	0.107/0.148/+0.041	0.173/0.185/+0.012	8,184
Average		0.061/0.077/+0.016	0.118/0.135/+0.017	0.162/0.171/+0.009	9,526
		Average Percent Increase <u>26.2</u>	Average Percent Increase <u>14.4</u>	Average Percent Increase <u>5.6</u>	

Note: Fuel consumption test for Tests 1 through 4 and Test 6 were run with new PCV valves.

TABLE 5.5  
PHASE II  
FUEL CONSUMPTION DATA

Test No.	Car No.	Idle, Fuel Consumption Pounds/Minute Start/End/Change	25 mph, Fuel Consumption Pounds/Minute Start/End/Change	Federal 7-Mode Cycle Pounds/Minute Start/End/Change	Miles In Phase II
1	1	0.066/0.050/-0.016	0.122/0.093/-0.029	0.156/0.129/-0.027	6051
2	3	0.059/0.042/-0.017	0.125/0.108/-0.017	0.158/0.151/-0.007	6127
3	5	0.073/0.062/-0.011	0.133/0.124/-0.009	0.162/0.160/-0.002	6151
4	2	0.076/0.067/-0.009	0.137/0.121/-0.016	0.169/0.170/+0.001	6224
5	4	0.070/0.056/-0.014	0.119/0.111/-0.008	0.158/0.155/-0.003	6165
6	6	0.068/0.058/-0.010	0.128/0.108/-0.020	0.162/0.137/-0.025	6151
7	2	0.084/0.066/-0.018	0.149/0.123/-0.026	0.195/0.158/-0.037	3099
8	4	0.088/0.071/-0.017	0.151/0.123/-0.028	0.189/0.162/-0.027	4625
9	7	0.055/0.050/-0.005	0.103/0.099/-0.004	0.129/0.120/-0.009	1109
10	7	0.067/0.058/-0.009	0.104/0.117/+0.013	0.149/0.158/+0.009	2235
11	8	0.103/0.067/-0.036	0.195/0.149/-0.046	0.214/0.177/-0.037	1600
12	1	0.093/0.094/+0.001	0.146/0.130/-0.016	0.191/0.178/-0.013	1737
13	6	0.099/0.084/-0.015	0.148/0.126/-0.022	0.185/0.181/-0.004	1796
Average		0.077/0.063/-0.014	0.135/0.118/-0.017	0.170/0.157/-0.013	4082
		Average Percent Decrease <u>18.2</u>	Average Percent Decrease <u>12.6</u>	Average Percent Decrease <u>7.7</u>	

Note: Tests 1 through 4 and Test 6 started Phase II with new PCV valves.

6.0 Appendix

This appendix contains the tabulated results of the emissions and fuel consumption measurements for the 14 tests. Included are measurements made on the Federal 7-Mode Cycle as well as at three steady state operating conditions. Data for both Phase I and Phase II are included. The numbers represent the average of triplicate measurements.



TEST NO. 1  
 PHASE I AND II  
 CAR NO. 1 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7						Corrected Steady State Cruise Conditions												Fuel Consumption					
				50 mph			25 mph			Federal Cycles 6 and 7						50 mph		25 mph		Idle							
				CO		UHC	CO		UHC	NDIR		FID	CO		UHC	NDIR		FID	CO		UHC	Lb./Min.		Lb./Min.		RPM (D)	
				Vol. %	ppm	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	Min.	Min.	Min.	Min.	Min.	Min.
I	11-1-68	Base Line	29,625	0.76	237	0.55	214	375	0.21	294	490	1.83	251	439	0.162	0.266	0.130	0.061	610								
I	11-8-68	3,102 Mi.	32,727	1.26	208	1.14	122	276	1.07	183	382	3.27	141	379	0.155	0.264	0.120	0.066	580								
I	11-16-68	6,148 Mi.	35,773	2.54	777	1.72	241	416	2.56	347	641	12.4	1326	6000	0.165	0.248	0.113	0.082	400								
I	11-27-68	7,944 Mi.	37,560	2.77	433	2.07	193	379	2.57	205	483	8.2	602	2452	0.158	0.255	0.122	0.069	350								
I	11-27-68	7,991 Mi. (New PCV Valve)	37,616	2.49	319	2.1	168	384	2.6	188	435	6.4	405	1766	0.156	0.252	0.123	0.066	400								
II	12-14-68	Base Line	37,687	1.77	266	1.81	145	305	2.91	185	419	4.59	211	765	0.158	0.264	0.121	0.065	415								
II	12-20-68	1,584 Mi.	39,671	1.47	244	1.69	170	264	1.63	211	388	3.30	167	412	0.158	0.265	0.119	0.065	450								
II	12-27-68	3,874 Mi.	41,561	1.43	202	1.54	142	231	1.03	201	351	3.21	165	323	0.158	0.264	0.115	0.065	500								
II	1-3-69	5,051 Mi.	43,738	1.72	214	1.53	119	226	0.88	148	267	3.28	185	395	0.129	0.205	0.093	0.050	525								
II	1-10-69	6,157 Mi. (Reference PCV Valve)	43,844	1.85	155	1.27	72	327	0.85	119	406	2.61	95	434	0.155	0.264	0.117	0.065	500								
II	1-15-69	6,204 Mi. (Phase I PCV Valve)	43,891	1.91	179	1.99	116	325	1.24	153	387	3.40	134	425	0.152	0.273	0.112	0.056	500								

Note: All data are average of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications. Sreading exceeded range of instrument scale.

TEST NO. 2  
 PHASE I AND II  
 CAR NO. 3 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions										Fuel Consumption			
				50 mph					25 mph					Idle w/A <sup>1</sup>	Federal 7-Mode Cycles 6 and 7		Idle (Lb./Min.)	Idle RPM (D) <sup>2</sup>	
				CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm		NDIR ppm	FID ppm			50 mph (Lb./Min.)
				CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	(Lb./Min.)	(Lb./Min.)		
I	11-4-68	Base Line	27,314	0.58	318	0.60	186	333	0.17	318	545	1.55	348	495	0.151	0.218	0.116	0.048	550
I	11-11-68	3,226 Mi.	30,542	1.01	247	1.11	171	327	0.42	253	443	2.54	233	460	0.149	0.279	0.116	0.048	575
I	11-18-68	6,472 Mi.	33,786	1.63	372	1.73	173	324	1.52	247	484	3.15	288	545	0.140	0.250	0.101	0.049	400
I	11-25-68	9,040 Mi.	36,354	1.38	302	1.85	167	297	1.9	244	418	4.2	268	986	0.143	0.264	0.119	0.055	418
I	12-4-68	12,064 Mi.	39,378	1.50	428	1.99	180	379	1.84	275	626	5.43	375	1511	0.148	0.287	0.109	0.043	400
I	12-9-68	14,471 Mi.	41,785	2.00	648	1.35	207	379	2.51	269	567	9.24	1603	4929	0.160	0.254	0.126	0.043	325
I	12-9-68	(Old PCV Valve) 14,532 Mi. (New PCV Valve)	41,846	1.73	580	1.15	179	399	2.71	249	451	9.44	1196	5689	0.158	0.247	0.126	0.065	350
II	12-18-68	Base Line	41,897	1.54	420	1.42	223	398	1.75	303	495	8.63	627	1994	0.157	0.279	0.124	0.053	300
II	12-27-68	2,069 Mi.	43,966	1.36	220	1.86	161	269	1.09	241	427	3.02	247	482	0.174	0.288	0.119	0.074	450
II	1-7-69	4,437 Mi.	46,354	1.28	279	1.42	160	299	0.98	224	424	2.34	211	417	0.126	0.207	0.099	0.041	500
II	1-13-69	6,037 Mi.	47,934	1.18	233	1.54	123	290	0.50	211	436	1.49	172	388	0.148	0.267	0.111	0.042	600
II	1-13-69	6,083 Mi. (Reference PCV Valve)	47,980	1.96	256	1.64	145	267	0.74	216	384	1.75	192	361	0.155	0.263	0.106	0.042	580
II	1-16-69	6,127 Mi. (Phase I PCV Valve)	48,024	2.09	323	1.80	141	365	1.16	234	513	3.32	205	525	0.145	0.292	0.113	0.040	525

Note: All data are average of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

TEST NO. 3  
 PHASE I AND II  
 CAR NO. 5 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode and 7 Cycles		Corrected Steady State Cruise Conditions												Fuel Consumption							
				CO Vol. %		50 mph				25 mph				Idle W/A <sup>1</sup>				Federal 7-Mode Cycles 6 and 7		50 mph		25 mph		Idle	
				CO	UBHC	CO	NDIR	FID	CO	UBHC	CO	NDIR	FID	CO	UBHC	CO	NDIR	FID	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)	(D) <sup>2</sup>		
				Vol. %	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	Vol. %	ppm	ppm	ppm	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)	(D) <sup>2</sup>		
I	10-31-68	Base Line	30,984	0.64	238	0.96	173	439	0.23	260	553	1.98	206	476	476	0.163	0.132	0.068	600						
I	11-7-68	3,098 Mi.	34,082	1.64	254	1.91	172	340	1.20	248	478	2.97	170	358	358	0.162	0.118	0.071	600						
I	11-14-68	6,034 Mi.	37,018	2.39	235	1.57	130	283	1.64	183	420	2.82	113	365	365	0.159	0.103	0.077	550						
I	12-2-68	12,104 Mi.	43,088	1.33	265	1.80	185	344	1.75	236	408	3.00	177	473	473	0.158	0.130	0.078	350						
I	12-2-68	12,157 Mi. (Old PCV Valve)	43,141	3.08	957	2.27	188	342	2.92	227	405	9.58	1098	4943	4943	0.168	0.142	0.097	350						
I	12-2-68	12,212 Mi. (New PCV Valve)	43,196	2.00	497	1.61	150	392	2.62	189	405	9.45	959	4758	4758	0.160	0.134	0.074	375						
I	12-5-68	12,212 Mi.	-	1.78	417	1.65	176	373	2.60	219	449	9.03	730	3639	3639	-	-	-	-						
I	12-5-68	12,212 Mi. (Old PCV Valve)	-	1.72	432	1.50	190	390	2.41	239	443	8.19	610	2731	2731	-	-	-	-						
I	12-5-68	12,212 Mi. (New PCV Valve)	-	1.72	432	1.50	190	390	2.41	239	443	8.19	610	2731	2731	-	-	-	-						
II	12-14-68	Base Line	43,270	2.01	439	1.87	174	381	2.83	249	517	9.41	871	3133	3133	0.163	0.132	0.072	360						
II	12-19-68	2,052 Mi.	45,322	1.52	210	1.81	136	231	1.81	195	353	3.24	142	308	308	0.161	0.129	0.075	475						
II	12-26-68	4,126 Mi.	47,396	1.48	244	1.95	161	281	1.16	243	389	3.73	186	354	354	0.162	0.125	0.063	500						
II	12-31-68	6,040 Mi.	49,310	1.74	222	2.06	124	297	1.36	208	412	3.59	195	471	471	0.160	0.124	0.062	510						
II	1-14-69	6,098 Mi. (Reference PCV Valve)	49,368	1.92	208	2.20	84	301	1.29	179	414	3.60	145	377	377	0.166	0.124	0.062	510						
II	1-17-69	6,151 Mi. (Phase I PCV Valve)	49,421	1.86	270	2.05	131	330	1.34	213	438	3.62	183	418	418	0.164	0.120	0.062	490						

Note: All data are average of triplicate measurements.

<sup>1</sup>With air injection Reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

TEST NO. 4  
 PHASE I AND II  
 CAR NO. 2 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7				Corrected Steady State Cruise Conditions												Fuel Consumption					
				CO		UBHC		50 mph				25 mph				6 and 7 Cycles		50 mph		25 mph		Idle			
				Vol %	ppm	Vol %	ppm	CO	NDIR	FID	ppm	CO	NDIR	FID	ppm	Vol %	ppm	Vol %	ppm	Vol %	ppm	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)
I	10-31-68	Base Line	30,873	0.55	264	0.90	360	0.19	290	360	1.38	331	477	0.161	0.292	0.120	0.065	600							
I	11-8-68	3,254 MI.	34,127	1.99	217	1.60	140	240	1.70	214	369	2.17	114	230	0.164	0.276	0.114	0.055	595						
I	11-15-68	6,062 MI.	36,935	2.35	239	1.51	122	252	2.22	180	402	5.01	213	498	0.170	0.277	0.123	0.086	525						
I	11-21-68	8,245 MI.	39,118	2.90	716	1.5	147	205	2.3	186	355	10.0	1630	5228	0.170	0.281	0.140	0.080	350						
I	11-22-68	8,509 MI. (New PCV Valve)	39,182	2.20	391	1.47	136	259	2.6	186	348	7.60	605	2261	0.165	0.278	0.134	0.076	450						
II	12-13-68	Base Line	39,277	2.32	428	1.53	145	207	2.57	189	331	9.56	1023	3323	0.173	0.279	0.140	0.076	335						
II	12-16-68	1,765 MI.	41,042	2.04	224	1.61	114	174	2.14	172	299	2.77	112	319	0.173	0.292	0.135	0.079	480						
II	12-21-68	2,714 MI.	42,991	1.45	212	1.15	130	193	1.49	195	338	2.00	113	247	0.168	0.294	0.136	0.080	460						
II	12-28-68	6,123 MI.	45,400	1.81	192	1.54	117	187	1.24	162	287	3.22	141	273	0.170	0.283	0.121	0.067	525						
II	1-10-69	6,172 MI. (Reference PCV Valve)	45,449	2.03	184	1.56	223	203	1.14	131	318	3.18	117	323	0.163	0.268	0.125	0.067	500						
II	1-16-69	6,224 MI. (Phase I PCV Valve)	45,501	1.84	166	1.54	58	205	0.89	127	343	3.20	117	360	0.164	0.286	0.122	0.052	525						

Note: All data are average of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

TEST NO. 5  
 PHASE I AND II  
 CAR NO. 4 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions										Fuel Consumption					
				CO Vol. %	UBHC ppm	50 mph					25 mph					Federal 7-Mode Cycles 6 and 7 (Lb./Min.)	50 mph (Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)	Idle RPM (D)	
						CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	CO ppm	NDIR ppm	FID ppm	CO ppm	NDIR ppm	FID ppm						W/A <sup>1</sup>
I	11-1-68	Base Line	26,998	0.53	308	0.94	210	347	0.20	320	550	1.32	278	481	0.158	0.297	0.124	0.065	620		
I	11-8-68	3,066 Ml.	30,064	1.88	284	1.65	183	285	1.00	347	344	3.13	204	405	0.160	0.290	0.122	0.068	580		
I	11-18-68	6,008 Ml.	33,006	2.67	546	1.88	146	307	2.22	252	554	9.24	1542	5561	0.164	0.276	0.111	0.073	550		
I	11-18-68	6,049 Ml. (New PCV Valve)	33,047	1.89	392	1.57	172	351	1.51	226	439	4.07	260	952	0.152	0.265	0.107	0.070	450		
II	12-13-68	Base Line	33,210	2.75	532	1.81	152	265	2.28	228	419	5.96	538	1812	0.153	0.275	0.126	0.067	325		
II	12-18-68	2,015 Ml.	35,225	1.52	211	1.42	140	191	1.01	174	200	3.06	173	418	0.152	0.269	0.118	0.055	500		
II	12-23-68	4,013 Ml.	37,223	1.64	245	1.6	146	184	0.6	199	259	2.7	204	351	0.154	0.272	0.113	0.056	525		
II	12-30-68	6,115 Ml.	39,325	1.60	280	1.86	152	318	0.83	207	313	2.62	216	359	0.155	0.265	0.111	0.056	530		
II	1-14-69	6,165 Ml. (Reference PCV Valve)	39,375	1.40	245	1.70	105	233	0.58	171	323	2.09	178	412	0.150	0.268	0.111	0.051	520		

Note: All data are average of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturer's specifications.

TEST NO. 6  
 PHASE I AND II  
 CAR NO. 6 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions										Fuel Consumption								
				CO		UBHC		50 mph		25 mph		UBHC		NDIR FID		CO		NDIR FID		Federal 7-Mode Cycles 6 and 7		Idle		
				Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	Vol. %	ppm	(Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)
				CO	UBHC	CO	UBHC	CO	UBHC	CO	UBHC	CO	UBHC	CO	UBHC	CO	UBHC	CO	UBHC	CO	UBHC	(Lb./Min.)	(Lb./Min.)	(Lb./Min.)
I	10-31-68	Base Line	29,559	0.72	262	0.72	166	369	0.34	239	474	1.83	190	422	0.165	0.291	0.127	0.079	610					
I	11-7-68	2,983 Mi.	32,542	1.46	218	1.25	129	265	0.90	209	508	2.95	156	422	0.160	0.284	0.122	0.080	580					
I	11-14-68	6,068 Mi.	35,627	1.85	502	0.98	178	262	1.68	241	405	5.98	593	6000 <sup>a</sup>	0.154	0.244	0.111	0.085	450					
I	11-26-68	7,756 Mi. (Old PCV Valve)	37,315	2.31	598	1.3	168	279	2.1	216	379	8.2	1848	5370	0.167	0.271	0.123	0.080	355					
I	11-26-68	7,811 Mi. (New PCV Valve)	37,370	2.20	518	1.33	170	283	2.03	220	387	8.3	1707	5338	0.163	0.235	0.133	0.066	300					
II	12-12-68	Base Line	37,482	1.53	390	1.17	136	253	1.55	215	458	6.98	753	3358	0.160	0.276	0.124	0.071	300					
II	12-17-68	2,042 Mi.	39,524	1.23	214	1.14	140	178	1.18	206	334	2.91	141	350	0.161	0.279	0.124	0.068	420					
II	12-23-68	3,893 Mi.	41,375	1.59	218	1.40	148	225	1.01	223	367	3.17	151	348	0.163	0.277	0.120	0.062	480					
II	1-2-69	6,151 Mi.	43,633	1.35	213	1.27	106	238	0.85	148	347	2.61	144	348	0.137	0.236	0.108	0.058	450					
II	1-9-69	6,207 Mi. (Reference PCV Valve)	43,689	1.60	267	1.59	172	252	0.98	277	410	3.28	188	362	0.166	0.285	0.122	0.073	500					
II	1-15-69	6,250 Mi. (Phase I PCV Valve)	43,732	1.34	195	1.34	59	257	0.64	150	393	2.64	110	349	0.157	0.270	0.114	0.063	500					

Note: All data are average of triplicate measurements.

<sup>a</sup>With air injection reactor in operation.

<sup>b</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

<sup>c</sup>Reading exceeded range of instrument scale.

TEST NO. 7  
 PHASE I AND II  
 CAR NO. 2 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7				Corrected Steady State Cruise Conditions										Fuel Consumption					
				CO		UBHC		50 mph					25 mph					Cycles 6 and 7		50 mph		Idle	
				Vol %	ppm	Vol %	ppm	CO Vol %	NDIR FID ppm	UBHC ppm	CO Vol %	NDIR FID ppm	UBHC ppm	CO Vol %	NDIR FID ppm	UBHC ppm	(lb/Min.)	(lb/Min.)	(lb/Min.)	(lb/Min.)			
																					(D) <sup>2</sup>		
I	2-6-69	Base Line	45,558	1.20	268	1.44	106	278	0.24	274	501	2.14	179	403	0.171	0.301	0.120	0.062	500				
I	2-13-69	2,984 MI.	48,542	2.16	318	2.10	112	310	1.40	223	484	2.73	93	342	0.171	0.301	0.129	0.065	480				
I	2-22-69	6,000 MI.	51,558	3.06	857	1.7	170	295	2.2	280	570	10.2	2532	8370	0.199	0.350	0.151	0.091	400 <sup>3</sup>				
I	2-26-69	6,051 MI. (Reference PCV Value)	51,609	2.36	874	1.6	157	279	2.0	276	479	10.2	1782	8460	0.191	0.345	0.144	0.076	400				
II	2-28-69	Base Line	51,654	3.09	925	1.6	117	189	2.2	240	387	10.3	2907	7268	0.192	0.357	0.148	0.078	400 <sup>3</sup>				
II	3-1-69	513 MI.	52,071	2.93	848	1.7	118	164	1.5	217	345	10.0	2262	6343	0.186	0.342	0.137	0.069	395				
II	3-3-69	858 MI.	52,512	1.56	250	1.4	91	144	0.6	176	280	3.0	104	198	0.183	0.338	0.129	0.066	440				
II	3-7-69	1,932 MI.	53,586	1.39	202	1.5	110	162	0.6	177	241	3.0	158	209	0.151	0.302	0.122	0.059	470				
II	4-10-69	3,099 MI. (Reference PCV Valve)	54,753	1.52	224	2.0	118	299	0.6	208	450	2.8	174	380	0.158	0.294	0.123	0.065	680				

Note: All data are average of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

<sup>3</sup>held idle rpm manually to keep from stalling.

TEST NO. 8  
 PHASE I AND II  
 CAR NO. 4 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions										Fuel Consumption				
				CO Vol. %	UBHC ppm	50 mph					25 mph					Federal 7-Mode Cycles 6 and 7 (Lb./Min.)	50 mph (Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)	Idle RPM (D) 2
						CO ppm	NDIR FID ppm	UBHC ppm	CO ppm	NDIR FID ppm	UBHC ppm	CO ppm	NDIR FID ppm	UBHC ppm	CO ppm					
				CO Vol. %	UBHC ppm	CO ppm	NDIR FID ppm	UBHC ppm	CO ppm	NDIR FID ppm	UBHC ppm	CO ppm	NDIR FID ppm	UBHC ppm	CO ppm	NDIR FID ppm	Idle w/A <sup>1</sup> Vol. %			
I	5-2-69	Base Line	62,275	2.05	286	2.1	115	315	0.8	204	452	2.6	17	516	0.156	0.295	0.100	0.0608	600	
I	5-5-69	Base Line Rerun	63,427	2.00	230	1.9	96	286	0.8	187	430	2.7	181	451	0.163	0.294	0.120	0.0665	600	
I	5-12-69	4,003	66,278	2.42	271	2.2	115	280	1.4	209	424	3.3	188	498	0.164	0.303	0.126	0.0710	560	
I	5-19-69	6,042	68,317	2.52	378	2.1	116	257	1.9	209	419	4.3	336	1,510	0.168	0.305	0.130	0.0743	480	
I	5-26-69	8,585	70,860	3.37	587	2.0	84	222	2.3	114	239	9.8	1633	6,379	0.189	0.302	0.152	0.0981	400 <sup>3</sup>	
I	5-27-69	8,625 (Reference PCV Value)	70,900	3.29	1051	1.8	107	272	2.2	156	321	10.4	4767	9,813	0.182	0.304	0.152	0.0855	300 <sup>3</sup>	
II	6-10-69	Base Line	70,074	3.36	920	2.0	114	312	3.2	226	513	9.9	4556	11,913	0.190	0.304	0.149	0.0781	340	
II	6-13-69	1,222 Mi.	72,156	2.52	260	2.1	108	294	2.6	170	346	3.3	157	503	0.176	0.312	0.132	0.0758	525	
II	6-17-69	2,162 Mi.	73,096	2.36	219	2.1	81	255	2.1	171	394	3.3	117	424	0.171	0.297	0.124	0.0718	560	
II	6-20-69	2,283 Mi.	74,339	2.44	246	2.1	90	282	2.0	170	425	3.4	148	476	0.164	0.297	0.127	0.727	560	
II	7-8-69	4,625 Mi.	75,559	2.04	279	2.0	108	320	1.6	185	438	3.3	150	418	0.162	0.305	0.123	0.0706	575	

Note: All data are averages of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

<sup>3</sup>Held idle rpm manually to keep car from stalling.



TEST NO. 9  
 PHASE I AND II  
 CAR NO. 7 - 1969 FORD

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode and 7 Cycles 6		Corrected Steady State Cruise Conditions										Fuel Consumption				
				CO Vol. %	UBHC ppm	50 mph					25 mph					Federal 7-Mode Cycles 6 and 7 (Lb./Min.)	50 mph (Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)	Idle RPM (D) <sup>1</sup>
						CO Vol. %	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	CO Vol. %	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm					
				CO Vol. %	UBHC ppm	CO Vol. %	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	CO Vol. %	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	NDIR ppm	FID ppm			
I	4-23-69	Base Line	6,020	0.36	323	0.2	209	451	0.1	182	418	1.1	304	586	0.132	0.201	0.101	0.445	560	
I	4-30-69	3,181 Mi.	9,201	0.36	385	0.24	217	564	0.23	173	416	2.3	351	789	0.125	0.207	0.103	0.045	560	
I	5-7-69	5,968 Mi. <sup>2</sup>	11,988	0.62	369	0.2	203	535	0.2	175	415	3.2	288	697	0.118	0.203	0.105	0.042	510	
I	5-7-69	6,345 Mi. <sup>4</sup> (Reset Idle rpm)	12,365	0.59	330	0.2	210	552	0.2	168	402	3.0	279	635	0.119	0.204	0.102	0.049	560	
I	5-19-69	9,906 Mi.	15,926	1.12	355	0.2	189	540	0.2	158	409	5.5	330	793	0.117	0.198	0.101	0.051	530	
I	5-29-69	14,394 Mi.	20,414	1.20	380	0.3	198	474	0.8	192	426	7.2	419	1386	0.125	0.191	0.098	0.047	460	
I	6-6-69	16,955 Mi.	22,375	1.64	487	0.2	214	569	0.9	208	516	8.1	521	1313	0.125	0.204	0.104	0.051	435	
I	6-13-69	18,806 Mi.	24,826	1.51	429	0.2	185	479	0.9	179	423	7.5	489	1369	0.126	0.190	0.096	0.054	450	
I	6-18-69	18,925 Mi.	24,946	1.59	384	0.2	168	480	0.9	168	424	7.5	411	1358	0.128	0.198	0.107	0.051	460	
I	6-23-69	20,538 Mi.	26,558	1.93	637	0.3	193	586	1.7	201	523	8.5	648	2345	0.129	0.195	0.103	0.055	400 <sup>2</sup>	
II	7-8-69	1,109 Mi. <sup>3</sup>	27,667	0.90	314	0.2	163	462	0.2	138	348	5.2	313	781	0.115	0.196	0.0991	0.0498	510	
II	7-15-69	2,069 Mi. <sup>3</sup>	28,627	0.79	257	0.2	138	438	0.2	123	356	3.4	231	643	0.120	0.179	0.0992	0.0586	540	

Note: All data are averages of triplicate measurements.

<sup>1</sup> Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

<sup>2</sup> Held idle rpm manually to keep car from dying during idle.

<sup>3</sup> Phase II base line mileage is 26,593.

<sup>4</sup> Tachometer error correction.

TEST NO. 10  
 PHASE I AND II  
 CAR NO. 7 - 1969 FORD

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7	Corrected Steady State Cruise Conditions										Fuel Consumption				
					50 mph					25 mph					Federal 7-Mode Cycles 6 and 7 (Lb./Min.)	50 mph (Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)	
					CO Vol %	UBHC ppm	NDIR FID ppm	CO Vol %	UBHC ppm	NDIR FID ppm	CO Vol %	UBHC ppm	NDIR FID ppm	CO Vol %					UBHC ppm
I	7-25-69	Base Line	28,740	0.33	234	0.2	191	517	0.2	187	408	1.0	210	528	0.165	0.255	0.098	0.047	560
I	8-13-69	8,265 Mi.	37,005	1.56	605	0.3	227	530	0.6	272	531	8.2	674	581	0.149	0.264	0.104	0.067	350 <sup>2</sup>
II	10-24-69	1,000 Mi. <sup>3</sup>	38,280	1.10	298							3.6	280						550
II	10-28-69	2,235 Mi. <sup>3</sup>	39,515	0.69	239	0.23	183	351	0.23	203	385	2.14	212	421	0.158	0.262	0.117	0.058	560

Note: All data are averages of triplicate measurements.

<sup>1</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

<sup>2</sup>Throttle held manually because engine was stalling.

<sup>3</sup>Base line mileage at the beginning of Phase II was 37,280.

TEST NO. 11  
 PHASE I AND II  
 CAR NO. 8 - 1968 DODGE

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7			Corrected Steady State Cruise Conditions										Fuel Consumption				
				CO Vol %	UBHC ppm	FID ppm	25 mph					Idle					Federal 7-Mode Cycles 6 and 7 (Lb./Min.)	50 mph (Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)	Idle RPM (D) <sup>1</sup>
							CO Vol %	UBHC ppm	NDIR ppm	FID ppm	CO Vol %	CO Vol %	CO Vol %	CO Vol %	CO Vol %	CO Vol %					
I	8-4-69	Base Line	13,014	1.18	205	124	424	2.0	206	527	0.7	117	334	0.177	0.330	0.133	0.071	600			
I	8-8-69	Base Line (Rerun)	13,332	1.61	325	226	371	3.1	296	572	0.7	168	292	0.177	0.323	0.151	0.064	600N			
I	8-12-69	2,637 Mi.	15,651	1.91	275	136	418	2.1	267	654	1.4	158	420	-	-	-	-	540			
I	9-5-69	10,016 Mi.	23,030	3.73	575	196	495	7.6	386	1060	8.1	789	388	0.214	0.343	0.195	0.103	400 <sup>2</sup>			
II	10-24-69	969 Mi. <sup>3</sup>	26,886	2.78	578						7.3	920			0.306	0.149	0.067	440			
II	10-27-69	1,600 Mi. <sup>3</sup>	27,517	2.76	431	167	288	7.11	269	577	6.74	398	984	0.177							

Note: All data are averages of triplicate measurements.

<sup>1</sup>Idle rpm was measured with transmission in drive (D) position per manufacturers' specifications.

<sup>2</sup>Throttle held manually because engine was stalling.

<sup>3</sup>Base line mileage at the beginning of Phase II was 25,917.

TEST NO. 12  
 PHASE I AND II  
 CAR NO. 1 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions												Fuel Consumption				
				CO Vol. %	UBHC ppm	50 mph						25 mph						Federal 7-Mode Cycles 6 and 7 (Lb./Min.)	50 mph (Lb./Min.)	25 mph (Lb./Min.)	Idle (Lb./Min.)	Idle RPM (D) <sup>2</sup>
						CO ppm		UBHC ppm		CO ppm		UBHC ppm		CO ppm		UBHC ppm						
						NDIR	FID	NDIR	FID	NDIR	FID	NDIR	FID	NDIR	FID	NDIR	FID					
I	8-7-69	Base Line	60,396	1.66	200	2.0	123	303	1.1	202	391	2.5	145	327	0.167	0.304	0.112	0.069	600			
I	9-3-69	5,414 Mi.	65,810	3.22	400	2.7	207	439	2.6	224	441	9.8	1330	6100	0.191	0.319	0.146	0.093	380			
II	10-21-69	1,265 Mi. <sup>s</sup>	67,075	2.42	340	1.95	152	320	2.70	200	310	9.8	3317	3367								
II	10-23-69	1,737 Mi. <sup>s</sup>	67,547	1.23	198	1.5	163	300	2.45	188	300	3.6	147	457	0.178	0.301	0.130	0.094	525			

Note: All data are averages of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

<sup>3</sup>Phase II base line mileage is 65,810.

TEST NO. 13  
 PHASES I AND II  
 CAR NO. 6 - 1966 CHEVROLET

Phase	Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions										Fuel Consumption						
				CO Vol %	UBHC ppm	50 mph					25 mph					Federal 7-Mode Cycles 6 and 7 (Lb/Min.)	50 mph (Lb/Min.)	25 mph (Lb/Min.)	Idle (Lb/Min.)	Idle RPM (D) <sup>2</sup>		
						UBHC		CO		NDIR FID		UBHC		CO							NDIR FID	
						Vol %	ppm	Vol %	ppm	Vol %	ppm	Vol %	ppm	Vol %	ppm						Vol %	ppm
I	8-11-69	Base Line	51,776	2.08	211	2.2	110	263	0.8	203	398	2.3	179	388	0.173	0.294	0.107	0.062	600			
I	9-15-69	8,184 MI.	59,960	3.11	557	2.1	167	306	3.1	290	486	9.70	1476	6735	0.185	0.350	0.148	0.099	380			
II	10-18-69	Base Line	62,296								10.5	4230							300 <sup>3</sup>			
II	10-25-69	1,796 MI.	64,092	2.11	226	1.7	127	186	1.97	188	335	3.0	100	266	0.181	0.338	0.126	0.084	525			

Note: All data are averages of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications. Shield idle rpm manually to keep engine from stalling.

TEST NO. 14  
 "STAY CLEAN" EVALUATION  
 CAR NO. 6 - 1966 CHEVROLET

Date	Test Description	Odometer Miles	Weighted Federal 7-Mode Cycles 6 and 7		Corrected Steady State Cruise Conditions										Fuel Consumption				
			CO Vol. %	UBHC ppm	50 mph					25 mph					Federal 7-Mode Cycles 6 and 7 (Lb/Min.)	50 mph (Lb/Min.)	25 mph (Lb/Min.)	Idle Min.	Idle RPM (n) <sup>2</sup>
					UBHC		CO		UBHC		CO		Idle W/A <sup>1</sup>						
					NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	NDIR ppm	FID ppm	CO Vol. %	UBHC ppm	NDIR ppm	FID ppm					
3-24-69	Base Line	43,800	1.18	260	1.3	137	248	1.4	230	380	2.8	210	389	0.163	0.279	0.116	0.0560	590	
4-10-69	6,283	50,083	1.75	231	2.14	127	336	-	210	491	3.0	138	357	0.163	0.288	0.118	0.0686	580	
4-14-69	7,604	51,404	1.71	207	2.3	175	474	1.4	211	506	3.4	130	397	0.161	0.298	0.115	0.0591	570	
4-22-69	7,639 New Camshaft	51,439	1.41	216	1.7	138	238	1.1	225	391	3.5	197	355	0.160	0.278	0.114	0.0580	570	

Note: All data are averages of triplicate measurements.

<sup>1</sup>With air injection reactor in operation.

<sup>2</sup>Idle rpm measured with transmission in drive (D) position per manufacturers' specifications.

Senator EAGLETON. Thank you, Dr. Kane.

I have a series of specific questions which I will propound to you at this time.

We are pleased to have with us now Senator Jennings Randolph, the chairman of the full Public Works Committee.

I will yield to Senator Randolph at this time.

Senator RANDOLPH. Mr. Chairman, I was not here for the formal statement. I regret that I could not readjust my schedule to be present. But I have had the opportunity to go over the material.

Senator EAGLETON. I will have to testify at another hearing. Senator Randolph has been kind enough to take over the Chair.

Senator RANDOLPH (presiding). Thank you, Senator Eagleton.

Mr. Kane, I did have the opportunity to read your statement in part, so that I could understand the premise and the results of the research you have been doing and documenting.

I am unclear as to when F-310 was first used as a fuel additive by the Standard Oil Co. of California.

Would you go into that, sir, and make such explanation as you desire?

Mr. KANE. Yes, sir. We introduced it first into the Los Angeles area and Hawaii on January 9 of this year. It was announced at that time.

We have been introducing it into the balance of our marketing areas just as rapidly as supplies permit. We have two plants in operation, one at Oak Point, La., and one at Richmond, Calif., for manufacturing this material.

It will be moved into all of our marketing areas in a matter of a few months.

Again, the supplies are limited at this time.

Senator RANDOLPH. Dr. Kane, in your prepared statement, you have indicated that within several weeks after F-310 was initially introduced into the Los Angeles area, you provided samples to the Federal, State and local government groups.

I think the subcommittee would have a special interest in knowing whether you discussed these plans for F-310 with the National Air Pollution Control Administration or the California Air Resources Board before you were making these tests and doing this research pilot program.

Mr. KANE. Yes, sir, we did. On December 16, 1969, we invited representatives from the National Air Pollution Control Administration, from the Bureau of Mines, from the California State Air Resources Board, from local air pollution control officials in various cities in the State of California, and a number of university professors to attend a special preview showing at which time we presented our data, information on the material, and disclosed to them our plans to introduce it roughly 3 weeks later in the Los Angeles area.

Senator RANDOLPH. Then, Dr. Kane, you are saying that insofar as you think was necessary, you made the proper contacts with the appropriate agencies and with the persons who would be intensely interested and would have reason to be hopeful that there would be success attached to your development, is that right?

Mr. KANE. That is correct, sir. I might add that along that line we subsequently, and that means about the end of January, as I recall—were in a position to supply experimental quantities of the material to these people, and we did so.

Senator RANDOLPH. You speak of experimental materials. What were those materials?

Mr. KANE. This is an additive package. The active component in it is a polybutene amine, which means that it contains the elements hydrogen, carbon and nitrogen. So it is a nonmetallic, completely ashless active material.

The other components in the package are all hydrocarbons. This is a patented, proprietary formulation which is the result of a good many years of research effort on our part to find an optimum package which would perform as I have described in this testimony. F-310 will perform.

Senator RANDOLPH. I note, Dr. Kane, that you have presented certain public services advertisements, as perhaps you would classify them. But whatever their designation, they were in reference to the work in the area on which you are speaking. You go to law enforcement officers to confirm the value of this program, too, I understand.

What area did these advertisements cover? How much exposure did you give in this way to seek to engender an understanding by the public?

Mr. KANE. I am not certain as to what area the ads covered. I am sure that they were presented in the Los Angeles area, and we saw them on at least one or two occasions, to my knowledge, in the San Francisco area newspapers.

I would have to check to find out whether they got more extensive coverage than that.

Senator RANDOLPH. I have noted that they were published in March, I believe, of this year.

Mr. KANE. That is correct, yes, sir.

Senator RANDOLPH. The reason I mentioned it was to indicate that you were attempting to bring this advertisement to the attention of the public.

At the same time, what were you attempting to do through other means? Let us say information sources or the general media, as it were. When you work on something like this, often it is in a research category and it doesn't blossom, or let us say it doesn't surface, the people generally don't understand what is being done.

That is why I wanted to have you tell us just what you could about it.

Mr. KANE. Thank you.

We did assist at press conferences coincident with the introduction of this product in Los Angeles, in Richmond, where our laboratories are located, and subsequently when we were able to introduce it into the Northwest, in Seattle, Portland, and Phoenix.

In general, in whatever area we were able to move the product and make it available commercially we have been attempting, through press conferences, through informal meetings with air pollution officials and others interested in the problem, in advance of the formal advertising, to tell them the story on F-310, the background on it and



the technical facts about it. Of course, this has been supplemented with the normal type of advertising program released at the time that the material is commercially available.

We also have scheduled next month, as a matter of fact, at a meeting of the Society of Automotive Engineers, a technical paper which will present to the technical community, you might say, in public for the first time, a description of a good deal of our test data and background on F-310.

Senator RANDOLPH. That perhaps should be submitted to our subcommittee at the time. Could that be arranged? I think that would be helpful to the staff, Dr. Kane.

Mr. KANE. We will be very happy to do that.

(The paper referred to was later presented and appears in this volume following Dr. Kane's testimony. See p. 1441.)

Senator RANDOLPH. I would want to encourage you, Dr. Kane, and your associates, as developments progress, that you keep a continuing contact with the subcommittee.

I am sure our staff members will work with you and will wish to have that done. Sometimes, frankly, there is a lag in information brought to us and we cannot, therefore, act perhaps as intelligently as we might otherwise be able to do.

Mr. KANE. We will consider that an opportunity and be very happy to do that, Senator.

Senator RANDOLPH. There are other companies, of course, that make gasoline. I request that you place in the record, if you feel you can, the list of those who use the F-310.

Mr. KANE. There are no other companies outside of the Standard Oil Co. of California group of companies, which is the western operations on the west coast, and in the southeast the Standard Oil Co. of Kentucky.

Senator RANDOLPH. They are Standard Oil subsidiaries, part of the umbrella under which you all work?

Mr. KANE. And in general, they have the trademark on the product of Chevron. So wherever Chevron products are sold, F-310 will be, in due course, in the gasolines.

Senator RANDOLPH. I asked you this question because I wanted to find if F-310 is available only to Standard or whether you will make it available—I am just talking as a layman—to other companies.

What about the public that buys from other companies? Is this a competitive item that sets you apart? Give us the status, if you would, please.

Mr. KANE. I will try, Senator. First of all, when we made our first public announcement on this material, in fact, at the preview sessions where we had the Government and State officials present, we announced that as a matter of policy the company had decided that the material would be made available to any refiner that wanted to use it.

In consonance with that, we have provided samples since roughly the end of January to just about every one of our respected competitors that you could name.

I know that they are evaluating it. I know that they are running their own tests. In this highly competitive business of ours, they are

going to do their best to see if they can come up with equivalent performance and perhaps do it by some other way.

We have informally had some indication that at least one other oil company is about ready to talk terms on obtaining F-310 from us as soon as they can.

I can only speculate as to what the next few months may bring. We would make it available via the route, initially at least, of selling it to them. I mention that we have two plants in operation now. We have a third one building in Richmond. So we will be able to supply a substantial percentage of the country's gasolines if other refiners elect to use the material.

Senator RANDOLPH. I commend such a policy. I think it is in the public interest. I think it is for the general good.

What they do in the way of response, of course, will be based on their technical evaluation. That is true, isn't it?

Mr. KANE. That is correct.

Senator RANDOLPH. I also ask you this: In other cases, not F-310, but whatever they might be, can you tell us if Standard Oil has done this before in some other area, or is some other company doing it in some other area?

What I am talking about is providing something which you are making available to others. Do you know of other instances or is this a new procedure?

Mr. KANE. No, sir. I mentioned earlier in my testimony that in 1954 the Standard Oil Company of California had pioneered the introduction of what we call the conventional carburetor detergent in our gasolines.

In the subsequent years, that same formulation was licensed through another company and made available to the industry.

At one point it was in about 25 percent of the industry's gasolines. So there is precedent for making a product of this type available to the industry.

Senator RANDOLPH. I suppose I could say that it seems that lead-free gasoline is on its way to widespread use. Is that right?

Mr. KANE. Yes, sir, that is the way we read the situation in view of the recent statements of the automobile companies that in order to beat this air pollution problem from automobiles they are ultimately going to have to have lead-free fuels available. Some of them are indicating that they would like to have them available sooner rather than later.

We have said we would make them available just as soon as they need them.

Senator RANDOLPH. You have a useful product, we will say. How does that actually fit in with what we call unleaded gasolines?

Mr. KANE. I think the best way to answer that question, Senator, is to point out that experimental prototype unleaded fuels that we are working with right now and which, in fact, we have supplied to segments of the automobile industry, contain F-310.

So in our view, because of the way F-310 operates, it will be at least as important in unleaded gasolines as it is in leaded gasolines.

This is speculation on my part at the moment, but there is a possibility that it could be even more important in the more tightly con-

trolled, lower emission cars of the future which use unleaded gasolines than it is at the present time. Depending on the exact design of those systems they may be even more subject to the kind of deterioration that we have noted on control systems already in the hands of the public.

Senator RANDOLPH. Dr. Kane, you speak of the apparent benefits of F-310. Let us say it causes beneficial effects on the two pollutants that we think of in reference to the operation of the automobile, the unburned hydrocarbons and carbon monoxide, would that be true?

Mr. KANE. Yes, sir. It has a beneficial effect on those two pollutants which, as you know, at the present moment, are the only ones that are under control; next year, nitrogen oxides will join that list.

Senator RANDOLPH. What do you do in reference to a possible effect on air pollution? Is there nothing but good? Is there some indirect or direct bad effect? You would want us to know all about it, no doubt.

Mr. KANE. That is correct. Of course, on a development like this, when we were back in the stages where we were still developing it, and trying to put it through the hurdles on its way toward commercialization, one of the things that we would be concerned about was whether it had any toxicity problems, or whether it would introduce into the exhaust any new pollutant which might be harmful.

So checking these possibilities out was very definitely a part of the extensive experimental program that we put this material through before we commercialized it. We would not expect, just on the basis of the chemistry of the material, that there would be any harmful effects.

But I can assure you that we checked that out very thoroughly to our own satisfaction, and I think we can state without concern on the point at the present time that F-310 does its job and does not have any harmful side effects.

Senator RANDOLPH. Would the commercial gasolines contain as much of F-310 as your product?

Mr. KANE. Yes, Senator.

The data that I showed, the Scott data, for example, where we showed the ability of the material to clean up these dirty cars, those tests were carried out using the same concentration of F-310 that we are using in our commercial gasolines.

This is an important reason for the effectiveness of the material in the commercial version of the gasolines, the fact that we are using it in this same high concentration.

Senator RANDOLPH. As always, and understandably so, one party says it is better than the other. A man in public office indicates that he has more to offer than another person, especially in campaigns.

There are other companies that are going to make claims, are there not, for their gasoline additives? What basis do you have to say to the subcommittee that although those claims are made, there may be some peculiar reason why yours is unique and perhaps really answers our problem to a great degree?

I think you ought to discuss this possibility.

Mr. KANE. All right, sir.

There have been, as you say, indications from some of our respected competitors that they think they have, let us say, roughly equivalent materials in their gasolines.

Our view on that is that we have subjected F-310 to the toughest kind of tests that we know, from which the kind of data I indicated were obtained by the Scott Laboratories, and on the basis of that we are able to make very definite statements about F-310's ability to do its job of cleaning up engines and, as a result, reducing hydrocarbon emissions which have increased because of this deposit buildup problem.

In effect, we have obtained our data. We have laid it on the table for public scrutiny. If any of our competitors are in a position to produce equivalent data and show that they do in fact have a development that will perform equivalently, we will congratulate them and welcome them to the ranks.

I think perhaps that is the best answer I can give.

Senator RANDOLPH. Thank you. I am sure that is the way you and the other companies would want to proceed.

We are interested, of course, in this subcommittee, as you would understand, Dr. Kane, with the lowering of those exhaust pollutants. We want the emission standards to be very stringent.

We feel that, as we think in terms of legislation, that is almost a mandate that we have. There are control devices, of course, to be considered in connection with the emission standards being raised.

If you add F-310, what have you done in connection with these control devices? Can they handle it? Would it meet more nearly the emission standards that may have to be brought into being and are now actually in being in some States?

Mr. KANE. Yes. In general, what F-310 does is make it possible for the engine as designed to realize the emission levels that are built into the engine.

To the best of our knowledge, any mechanical device that is used in order to meet more stringent emission standards should be helped, not hindered, by F-310.

Similarly, any catalytic device that is likely to be used we would expect would be unaffected by F-310. We know this for certain types of catalysts. It depends somewhat on what type might eventually be put into an automobile. But I can say confidently that we would certainly not expect any problem with even catalytic systems due to the use of F-310 in the gasoline.

Senator RANDOLPH. Dr. Kane, you realize that as we think legislatively of these matters we are attempting to say how Government properly and aggressively can attempt to cope with such a situation as exists.

So, as we think of the emissions that come from the automobiles, knowing that they continue, sometimes increasing, we are thinking in terms of what you apparently are thinking of, too—some type of additive, like F-310, that would be used in gasoline.

I ask you a very important question: Are we at the place or at the point where the Government should mandate that there be additives, either F-310 or other additives, that meet certain requirements that must be present in all gasolines, whether Standard of California or what?

Here is a place for you to help us from your standpoint as an industry spokesman.

Mr. KANE. I agree that that is an important question. I have already testified earlier that I do not think that fuel composition should be specified to, for example, contain F-310 or equal, but I would suggest that the effectiveness of F-310 in keeping these emission systems working should suggest that appropriate performance tests might be set up, and gasolines subjected to those performance tests to show that they could keep these engines working from the standpoint of their emission systems effectively over a reasonable life of the car, by the use of F-310 or by any other material that someone was able to come up with that would successfully pass this test.

I would suggest that it is the performance check that should be the basis rather than an attempt to specify F-310 or any other material as a part of the composition of the gasoline.

Senator RANDOLPH. Thank you, Dr. Kane. I wish you might bring some of your expertise to the campus at Berkeley, Calif., in other matters. You graduated from that institution and served on its faculty.

If I were to ask you now how you would cope with the problem, be it pollution or otherwise, that is on the campus there, I believe you would be clear cut in your answer.

In our work we recognize, and we are not reluctant to recognize, the value of the research that is done independently by industry, and often the breakthroughs that come because of the knowledge and efforts of men like you, Dr. Kane, who have backgrounds of engineering and research abilities.

I am grateful for your testimony and I am sure the subcommittee will determine that what you have said will help us in the further decisions that we must make.

We have had the presence, Dr. Kane, of Senator Eagleton, of Missouri. I am very glad that a member of the subcommittee who sits on the Republican side, but has a bipartisan approach in this committee, Senator Baker of Tennessee, is with us now.

Senator Baker, do you wish to inquire of the witness?

Senator BAKER. Thank you, Mr. Chairman.

Dr. Kane, I apologize to you and the committee for having arrived a little after your testimony began. Bear with me if a question or two that I may put has already been covered either by you or by Senator Randolph.

Do I understand that the essential function of F-310 is a detergent function?

Mr. KANE. That is correct. I would characterize it as a super cleaner.

Senator BAKER. And that the principal contribution to the quality of the environment, so called, is that F-310 keeps the engine cleaner and, therefore, more efficient, and, therefore, contributing fewer pollutants to the atmosphere.

Mr. KANE. That is essentially correct, Senator, if I could amend that just slightly.

It helps the engine to keep its emission levels at those that were designed into it. It can't do better than that, but it can do that.

Senator BAKER. That leads me into the next question, which is meant in no way to demean or detract from the desirability of your product for this function.

Under those circumstances, is it fair to say that its value would be in engines that have already suffered buildup and it would have very little value with respect to new engines?

Mr. KANE. It would have very little direct value in reducing emissions in the new engines, but I think it is pretty clear that it would keep new engines from experiencing the kind of progressive deterioration.

Senator BAKER. Preventing new engines from becoming old engines?

Mr. KANE. That is correct.

Senator BAKER. But it would do nothing to improve the efficiency of a new engine, per se?

Mr. KANE. That is correct.

Senator BAKER. Does this product contain any lead compounds?

Mr. KANE. No, sir; it has no metals in it at all. It consists of what we call the polybutene amine as the active material, and that is just a way of saying that it has hydrogen, carbon, and nitrogen in it.

Senator BAKER. Would it work particularly well in gasoline fuel composition that did or did not contain lead?

Mr. KANE. It certainly works in leaded fuels, which is where most of our experience is up to this point. We have experimental formulations going of lead-free fuels which also contain the material.

We have every expectation that experience will prove it works at least as well there.

Senator BAKER. You have no reason to expect that it would not work well or as well with unleaded fuel as it does with leaded fuel?

Mr. KANE. No, sir. As a matter of fact, we have a little bit of reason to expect that it may have some advantages that are even more significant for unleaded fuels, but that is speculation at the moment.

Senator BAKER. Looking into the future and assuming for the moment that the ultimate control of contaminants will depend in some measure on catalytic mufflers or similar devices is there anything in F-310 that would impede or enhance the performance of catalytic mufflers?

Mr. KANE. We believe it should be essentially passive as far as the catalyst is concerned. In other words, the catalyst should not know whether it is there or not. This answer, too, is a bit speculative, because it depends on the exact composition of the catalyst that is finally introduced.

But I would not expect, since it contains only hydrogen, carbon, and nitrogen, which will be present in any fuel that is burned, in any exhaust gas, I would not expect that it would have any particular effect one way or another on a catalytic device.

It certainly doesn't have the poison effect of lead or another metal.

Senator BAKER. Any metal compound is potentially harmful to a catalytic muffler, is it not?

Mr. KANE. As a general statement, that is correct.

Senator BAKER. Whether it is lead, phosphorus, or any other lead. This compound has no lead compound?

Mr. KANE. No metallic compound of any kind.

Senator BAKER. I think that is all, thank you very much.

Mr. KANE. Thank you, Senator.

(Subsequent to his appearance Dr. Kane supplied the following paper which was referred to in his testimony. See p. 1435.)



SOCIETY OF AUTOMOTIVE ENGINEERS, INC.  
Two Pennsylvania Plaza, New York, N. Y. 10001

## Ability of Gasoline Additives To Clean Engines And Reduce Exhaust Emissions

K. L. Kipp, J. C. Ingamells,  
W. L. Richardson, and C. E. Davis  
Chevron Research Company

SOCIETY OF AUTOMOTIVE ENGINEERS

Mid-Year Meeting  
Detroit, Mich.  
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700456

# Ability of Gasoline Additives To Clean Engines And Reduce Exhaust Emissions

K. L. Kipp, J. C. Ingamells,  
W. L. Richardson, and C. E. Davis

Chevron Research Company

## Introduction

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Intake system and engine deposits have plagued the engine designer, fuel and lubricant refiner, and the motorist from the start of the automotive industry. At one time, it was necessary to disassemble the engine every few thousand miles to remove "carbon" deposits. In fact, intake valve deposits prompted one author, Mr. E. H. Belden, to predict in

1919 that automotive engines of the future would have sleeve intake valves because of the trouble with deposits that accumulated on the poppet-type valves.<sup>1</sup> Of course, this did not come about, as improvements in fuels, lubes, and engines decreased the problems associated with intake system deposits. However, in some services, intake system deposits have continued to be a problem.

## Abstract

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Carburetor detergents introduced in the early 1950's were capable of keeping carburetors clean and thus prevented engine malfunction caused by this source. However, these detergents generally would not keep PCV valves clean, nor prevent ring belt deposits, and usually did a poor job of cleaning up dirty carburetors on vehicles used in severe services (taxis). Chevron Research has developed new gasoline additives

that keep carburetors clean and remove existing deposits from carburetors. These additives also clean up intake manifolds, intake ports, intake valves, and PCV valves. In addition, they assist in keeping oil rings free and clean. Information obtained from numerous field and laboratory engine tests of these new additives in preventing engine deposits and reducing exhaust emissions is discussed in this paper.



## Engine Deposits and Problems

Engine deposits can cause increased exhaust emissions, rough running, stalling, power loss, and in some cases can lead to piston breakage. Deposits that form in the ring belt area can cause piston ring sticking, oil ring plugging, and ring breakage, all of which lead to high oil consumption and short engine life. High oil consumption is undesirable from the standpoint of oil cost, poor engine performance (misfiring and power loss), and its contribution to air pollution. Exhaust smoke, even aside from its absolute effect on pollution, certainly creates a poor image of the internal combustion engine in the public's mind. Deposits on oil pump relief valves, valve lifters, and other areas of the "lower" part of the engine can cause premature engine failures.

The effect of cold stuck oil rings, shown in Figure 1, in a taxi fleet illustrates how deposits that stick oil rings can decrease useful engine life, even when there is very little oil ring plugging and no hot stuck piston rings. The high oil consumption is thought to be due to a combination of stuck oil rings during engine warmup and of deposits preventing the oil rings from fully expanding to seal the bore during warm operation. The rings are expanding enough to scrape deposits from the ring face. This could account for the ring faces remaining deposit-free (where hot stuck ring faces are heavily deposited) yet having lost oil control.

PCV valve plugging has been shown to be a function of oil quality and oil drain interval by many authors. The long oil change periods now specified by most car manufacturers have imposed an extra burden on the crankcase oil in preventing PCV valve deposits. Plugging of these valves can "upset" carburetor operation (A/F ratio) and, in many cases, results in exhaust emission increases. A combination of carburetor deposits and PCV valve plugging nearly always results in higher exhaust emissions and accounts, we believe, for a major portion of the emission increases with car age or mileage

FIGURE 1  
OIL MILEAGE RECORD TAXICAB 905  
30,000-MILE TEST  
COMMERCIAL FUEL AND OIL  
SIX-CYLINDER ENGINE

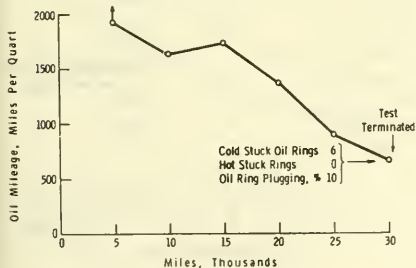
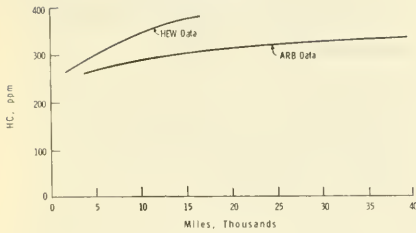


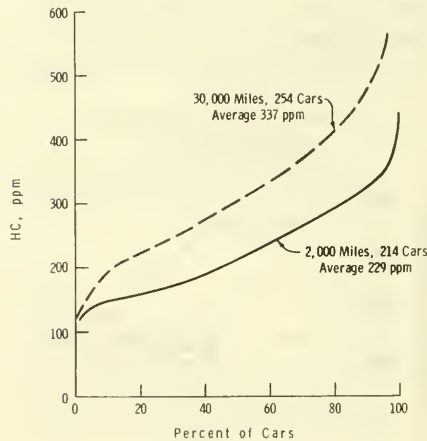
FIGURE 2  
SURVEILLANCE PROGRAMS  
1966 MODEL CARS



as noted in the United States Department of Health, Education, and Welfare (HEW)<sup>4</sup> and California Air Resources Board (ARB)<sup>5</sup> surveillance programs, Figure 2. The HEW data are arithmetic averages of tests of 120, 1966 model cars at various mileages. The lower curve is a best fit curve of ARB data on 1461, 1966 model cars based on a log hydrocarbons versus log mileage analysis for each car tested. This method of analysis tends to decrease the influence of the higher emissions level cars on the overall car population averages. However, both HEW and ARB data show that, in general, there is a significant increase in unburned hydrocarbon (UBHC) emissions with increasing car mileage. We believe a significant portion of this increase is due to engine deposits because most motorists would probably have any serious engine or ignition system malfunctions corrected.

It is interesting to note the range in exhaust hydrocarbons that can be encountered in a group of cars. Figure 3 shows the distribution of hydrocarbon emissions for one group of 1966 model cars with about 2,000 miles and another group with about 30,000 miles of service. These are data measured in the ARB program.<sup>5</sup> The lower mileage group ranged from about 110-440 ppm (average, 229 ppm) and the higher mileage group ranged from about 120 ppm to well over 600 ppm with an average of 337 ppm. It is quite possible that a few of the very high exhaust emitters also had engine malfunctions along with an accumulation of deposits to cause their high emission levels.

FIGURE 3  
DISTRIBUTION OF EXHAUST HYDROCARBON EMISSIONS  
ARB SURVEILLANCE DATA OF 1966 MODEL CARS



### EFFECT OF GASOLINES on Engine Deposits

We have noted in a number of field and laboratory tests, as have other companies, that gasoline quality has a very significant bearing on deposit formation both in the

intake system and in the lower part of the engine regardless of the lube oil quality or drain interval. An example of this is shown in Figure 4 by total sludge deposits from a taxi fleet test using three gasolines with different deposit-forming tendencies. These gasolines are representative of gasolines currently on the market. Other engine part deposit ratings from this test series show a somewhat similar trend with the quality of the gasoline as that in Figure 4. These results are shown in Table I. It may be noted that changing from the poorest gasoline to one of the better gasolines resulted in slightly better sludge deposit control than changing from a 6000- to a 4000-mile oil drain interval with the same oil. Another

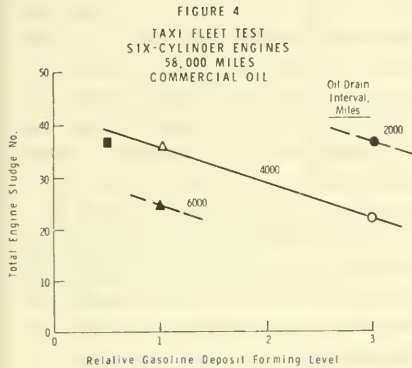


TABLE I

#### EFFECT OF GASOLINE DEPOSIT FORMING LEVEL ON ENGINE DEPOSITS TAXI FLEET TEST, 58,000 MILES, SIX-CYLINDER ENGINES

Gasoline	Oil Drain Interval, Miles	No. of Cabs	No. of PCV Valves Replaced <sup>1</sup>	Carburetor Throttle Body <sup>2</sup>	Intake Valve <sup>2</sup>	No. of Stuck Oil Rings	Overall Varnish <sup>3</sup>	Overall Sludge <sup>3</sup>	Oil Ring Plugging, %
A <sup>4</sup>	4000	3	0	9.7	4.4	1.7	20.5	37.0	68
B <sup>4</sup>	4000	3	1	9.2	4.3	1.3	23.5	36.5	74
B <sup>4</sup>	6000	3	5	8.7	4.1	1.3	16.5	24.5	90
C <sup>4</sup>	4000	2	8	9.0	3.9	4.0	20.5	22.5	86
C <sup>4</sup>	2000	3	3	8.8	4.7	2.3	22.5	37.0	79

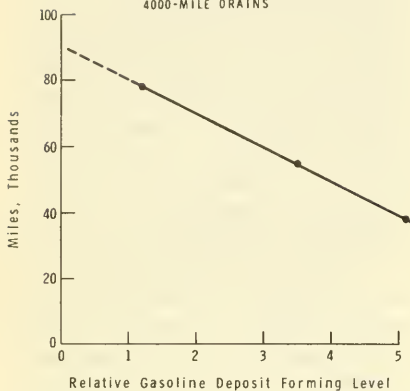
<sup>1</sup> Replaced when 35% or more plugged.

<sup>2</sup> 10 = Clean

<sup>3</sup> 50 = Clean

<sup>4</sup> Fuel contained a carburetor detergent.

FIGURE 5  
EFFECT OF GASOLINE QUALITY ON  
MILES TO OIL RING STICKING  
V-8 PASSENGER CARS  
COMMERCIAL OIL  
4000-MILE DRAINS



example of the effect of gasoline quality, Figure 5, is shown by the mileage to excessive oil consumption (less than 500 miles per quart) due to piston ring sticking. These data were obtained in V-8 cars operated in passenger car-type service and are similar to the taxi data of Figure 1, except that longer mileages are required to stick the oil rings in the milder service when using typical gasolines. However, use of a high deposit-forming gasoline (Figure 5) can decrease the miles to ring sticking to about the same level as shown by taxi tests that used a better quality gasoline.

#### Detergent Action (DA) Additives

During the 1950's, a

number of compounds were developed to control or prevent deposit formation in the carburetor throttle body.<sup>6</sup> We have had an additive in our gasolines since 1954 for this purpose. Most premium-grade and many regular-grade gasolines now on the market contain such materials. While these additives do a good job preventing carburetor and, in some cases, intake manifold and port deposits, they are not very effective in removing preformed deposits in these areas. In addition, these materials usually have either no effect or a detrimental effect on intake valve deposits. Also, most of these compounds have no effect on deposits in the "lower" part of the engine at their normal use concentrations. We have observed increased piston ring, varnish, and sludge deposits when some of these additives are used at high concentrations in an attempt to prevent intake valve deposits.

Laboratory engine tests showing the effectiveness of commercial carburetor detergent-action (DA) additives in removing preformed carburetor throttle body deposits are given in Table II. These results cover the least to the most effective of 17 commercial additives. Details of the test procedure are given in Appendix I. Although some of these additives showed excellent carburetor deposit

TABLE II  
CLEANUP OF CARBURETOR THROTTLE BODY DEPOSITS

Additive <sup>1</sup>	Relative Percent Cleanup <sup>2</sup>
N and V	0
X	3
M	7
K	25
P	27
Q	28
L	29
H	31
G	40
S	55
I	74
E	78
T	79
F	84
R	86
U	93

<sup>1</sup>Tested at recommended use concentrations in a regular-grade base gasoline.

<sup>2</sup>Complete deposit removal = 100%, no deposit removal = 0%.

cleanup, they did not prevent or remove intake valve deposits in other engine tests, even when used at up to 10 times the normal concentrations. At these higher concentrations, these DA additives often caused increased intake valve and/or piston deposits. This is illustrated by the results of tests of Additive F at high concentrations shown in Table III. In these tests, the additive reduced deposit levels in the carburetor, intake manifold, and intake ports. However, it definitely caused trouble in the piston ring belt area along with no effect or an increase in intake valve deposits.

In recent years, we have seen evidence that the carburetor deposit problem has become more severe. In services where good DA additives had been doing an excellent job in keeping carburetors clean, we are now finding excessive deposits. We believe that the use of PCV systems has been a major contributing factor to this increased deposit problem. From all of the various tests conducted on commercial DA additives, we conclude that the best of these additives are effective in preventing carburetor deposits in most, but not all, services. We see no effectiveness of these DA additives beyond the carburetor.

TABLE III  
FIELD AND LABORATORY TESTS OF  
ADDITIVE F AT HIGH CONCENTRATIONS

Test	Intake Manifold and Port Deposits	Intake Valve Deposits	Piston and Ring Deposits
Laboratory Six-Cylinder	-	218% Increase	-
Local Delivery Fleet	50 to 100% Cleanup	No Change	35 to 50% Increase
Taxi Fleet	11% Cleaner	10% Increase	Stopped Test Because of ORP <sup>1</sup> and Stuck Rings

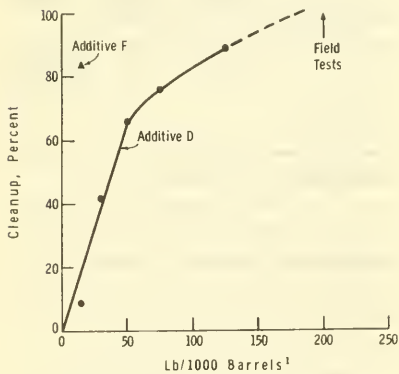
<sup>1</sup>Oil ring plugging.

### Deposit Control (DC) Additives

As a result of the poor "lower" engine deposit control performance of carburetor detergents, efforts were directed toward finding new classes of materials that would give the desired benefits. We chose to call these chemicals deposit control (DC) additives.

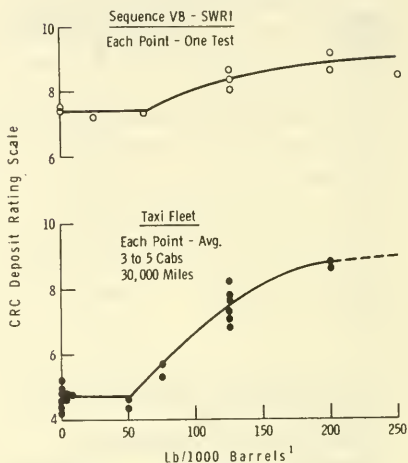
Past experience led us to believe that it would be necessary to use relatively high concentrations in order to achieve the goals established for an effective additive. Thus, although costly, this opened the field to materials that were not outstanding carburetor detergents at low concentrations but were very effective at the additive levels needed to control "lower" engine and intake valve deposits. Results of numerous field and laboratory tests led to a class of compounds that provided the desired characteristics for a DC additive. These are the polybutene amines.

FIGURE 6  
CARBURETOR DEPOSIT CLEANUP  
LABORATORY GLASS THROTTLE BODY (GTB) TEST



<sup>1</sup> Functional amount including solvent.

FIGURE 7  
CONTROL OF INTAKE VALVE DEPOSITS  
WITH DC ADDITIVES



<sup>1</sup> Functional amount including solvent.

The ability of DC additives to remove preformed carburetor deposits at various concentration levels is shown in Figure 6. Note that the DC additive is not as effective as a good carburetor detergent at 15 lb/1000 bbl. However, at the recommended use concentration of 200 lb/1000 bbl, the DC additive essentially removes all throttle body deposits. Field tests in employee cars and taxi fleets have confirmed the laboratory Glass Throttle Body (GTB) test results. Use of these high concentrations of a DC additive will dramatically reduce intake

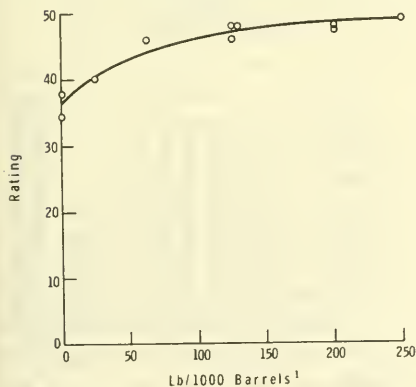
valve deposits as shown in Figure 7. The taxi data show both deposit removal and deposit prevention. The deposits tended to attain the same low level whether starting clean or starting with preformed deposits.

Intake manifold and port deposits are usually completely removed in 15,000 miles of operation on a gasoline containing a DC additive. Starting clean, no deposits are formed in these areas.

The ability of the DC additives to prevent "lower" engine deposits is shown in Figure 8 by Sequence VB test

FIGURE 8

EFFECT OF DEPOSIT CONTROL ADDITIVES ON TOTAL ENGINE SLUDGE  
MIL-L-2104B OIL - SWRI  
SEQUENCE VB



<sup>1</sup>Functional amount including solvent.

results of total engine sludge. Sludge and varnish ratings all tend to show the same trend as total sludge. These data are shown in Table IV for Sequence VB

TABLE IV  
SWRI SEQUENCE VB TESTS - MIL-2104B OIL SAE 10W

Additive	Base Fuel	Base +	Base +	Base +	Base +	Base +	Base +
	MS-08	Additive C	Additive C	Additive C	Additive D	Additive D	Additive D
Concentration, Lb/1000 Bbl <sup>1</sup>	0	25	52	125	125	200	250
<b>Varnish</b>							
Rocker Cover <sup>1</sup>	8.2	8.6	9.2	9.0	8.7	8.7	8.6
Piston <sup>1</sup>	8.2	7.0	7.7	9.0	8.1	8.1	8.8
Overall <sup>2</sup>	32.6	35.9	38.8	44.9	40.0	41.6	44.5
<b>Sludge</b>							
Rocker Cover <sup>1</sup>	6.4	8.1	9.4	9.8	9.2	9.5	9.8
Overall <sup>1</sup>	36.5	40.5	46.2	48.2	46.1	47.8	49.1
<b>Miscellaneous</b>							
Oil Screen Plugging, %	12	20	2	0	5	1	0
PCV Valve Plugging, %	86	40	13	4	53	15	5
Oil Ring Sticking, No	2	0	0	0	0	0	-
Rust <sup>1</sup>	9.4	9.5	9.7	9.8	9.4	9.6	9.8
<b>Intake System<sup>1</sup></b>							
Carburetor Throttle Body	9.4	10	10	10	10	10	-
Manifold	6.0	9.4	10	10	9.5	9.2	-
Ports	8.0	7.9	9.5	9.8	9.2	9.5	-
Valves	7.4	7.2	7.3	8.2	8.6	8.8	8.4

<sup>1</sup>10 - Clean

<sup>2</sup>50 - Clean

<sup>3</sup>Functional amount including solvent

TABLE V

SWRI SEQUENCE VB TESTS - MULTIGRADE OIL

Additive	Base Fuel, <sup>3</sup>	Base + <sup>4</sup>
	MS-08	Additive D
Concentration, Lb/1000 Bbl	0	200
<b>Varnish</b>		
Rocker Arm Cover <sup>1</sup>	8.3	9.1
Piston Skirt <sup>1</sup>	7.9	8.9
Overall Varnish <sup>2</sup>	38.0	42.6
<b>Sludge</b>		
Rocker Arm Cover <sup>1</sup>	9.0	9.9
Overall Sludge <sup>2</sup>	45.4	48.9
<b>Miscellaneous</b>		
Oil Screen Plugging, %	0	0
PCV Valve Plugging, %	19.2	8.0
Oil Ring Sticking, No.	0	0
Rust Rating <sup>1</sup>	9.8	9.9
<b>Intake System<sup>1</sup></b>		
Carburetor Throttle Body	9.7 <sup>4</sup>	10
Manifold	8.8 <sup>4</sup>	10
Ports	8.2 <sup>4</sup>	9.6
Valves	7.2	8.4

<sup>1</sup>10 - Clean    <sup>2</sup>50 - Clean    <sup>3</sup>Average of Four Tests    <sup>4</sup>One Test Only

TABLE VI  
EFFECT OF DC ADDITIVES ON SLUDGE AND  
VARNISH DEPOSITS

Test	Additive <sup>1</sup>	Piston Varnish <sup>2</sup>	Total Sludge <sup>3</sup>	Number of Stuck Oil Rings Per Engine
Laboratory <sup>4</sup> 200 Hours	None	7.5	34.0	-
	0	9.4	42.0	-
Taxi Fleet 0 <sup>4</sup> 30,000 Miles	None	6.4	35.7	2
	B	6.3	36.3	2
	C	7.0	43.3	0
Taxi Fleet S <sup>4</sup> 30,000 Miles	None	7.1	42.5	6
	B	7.2	43.5	4
Taxi Fleet S <sup>4</sup> 30,000 Miles	None	6.8	45.5	4
	C	7.8	48.0	0

<sup>1</sup>Additive at 125 lb/1000 barrel (including solvent.)

<sup>2</sup>10 - Clean

<sup>3</sup>50 - Clean

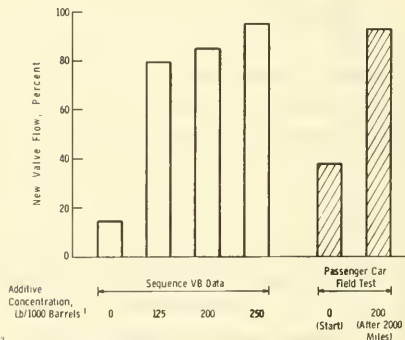
<sup>4</sup>Six-Cylinder Engines

tests using a single-grade MIL-L-2104B oil. Results were obtained from Sequence VB tests using a multigrade oil, Table V. These results again show an improvement in sludge and varnish deposits even when using a high quality crankcase oil. Deposit ratings from a laboratory test and from two different taxi fleet tests, summarized in Table VI, also showed the improvement in "lower" engine deposit levels with use of the DC additives. In addition, use of the higher concentrations of DC additive in field tests reduces the piston ring sticking that occurred in those vehicles operating on a non-DC additive base gasoline.

DC additives are quite effective in preventing the buildup

of PCV valve deposits and in functionally removing preformed PCV valve deposits as shown in Figure 9. The bars on the left show average flow rates from Sequence VB tests where new valves were used at the start of the 192-hour test. Practically no reduction in flow rate due to deposits occurred with the higher concentrations of DC additive. Bars on the right side of Figure 9 are six-car averages of valves from a passenger car field test that were partially plugged by operation on a nonadditive gasoline for 5,000 to 20,000 miles. Subsequent operation on a DC additive fuel for an additional 2000 miles showed a significant reduction in deposit levels. Flow rates increased from 38% to 93% of

FIGURE 9  
AVERAGE EFFECT OF DC ADDITIVES ON  
PCV VALVE DEPOSITS



<sup>1</sup>Functional amount including solvent.



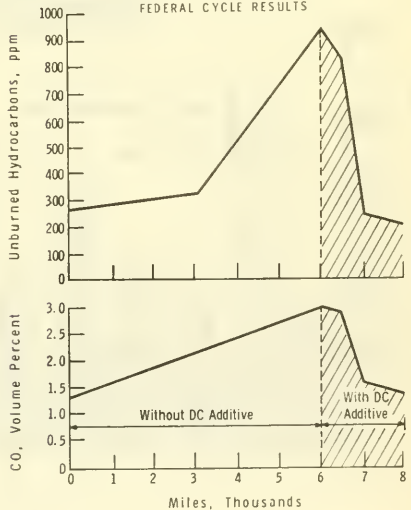
new valve flow. Thus, the DC additives will both prevent and clean up PCV valve deposits.

### Exhaust Emissions

Studies by numerous authors (3, 7, and 8) have shown that either carburetor deposits or deposits that plug PCV valves can cause changes in the fuel/air ratios fed to the engine. An increase in the amount of fuel flowing into a cylinder (richer mixture) will usually cause an increase in exhaust unburned hydrocarbons and carbon monoxide. Data previously shown illustrate that exhaust emissions tend to increase as cars accumulate mileage (Figure 2), and that the DC additives can prevent or clean up dirty carburetors (Figure 6) and PCV valves (Figure 9). The combined effects of deposits in carburetors and PCV valves on exhaust emissions are illustrated by the results of a passenger car field test conducted for Chevron Research by Scott Research Laboratories. This was a test in which the cars were operated in stop-and-go service for 5,000 to 20,000 miles on a nonadditive gasoline typical of some of the poorer quality gasolines (deposit-forming tendency) marketed in Los Angeles. The fuel bromine no. of 22 met Los Angeles County standards. The low quality fuel in combination with an intermediate quality oil

(MIL-L-2104B) was used in order to decrease the test miles to engine malfunction due to carburetor and PCV valve deposits and to provide a severe test for DC additives. At the end of the deposit accumulation period, the cars were switched to a gasoline containing a DC additive and operation continued for a period of time necessary to show carburetor cleanup. Details of the test procedure are given in Appendix II. These cars were all 1966 to 1969 models with V-8 engines and automatic transmissions and were equipped with the standard exhaust emissions control package. Mileage

FIGURE 10  
SCOTT ROAD TEST PROGRAM  
CAR NO. 2  
FEDERAL CYCLE RESULTS



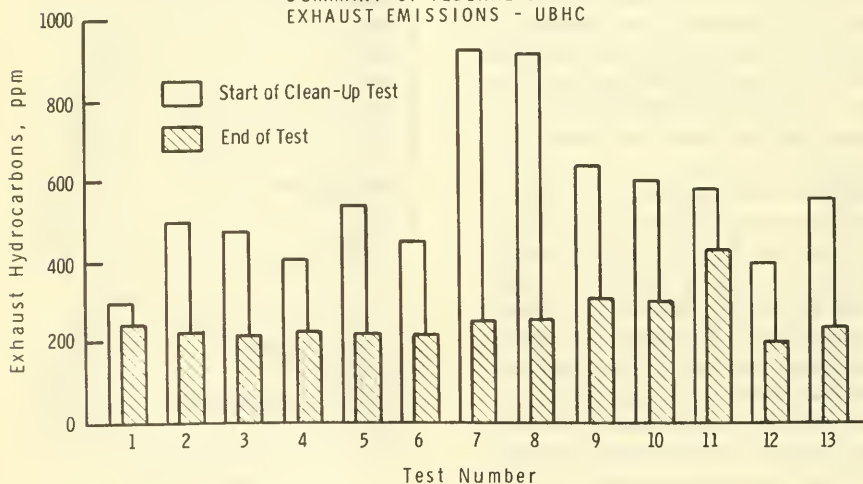
to the end of the deposit accumulation phase was established by the point at which the car was operating poorly over the test course because of stalling at idle. Exhaust emission measurements were made at the start and about every 2000 to 3000 miles during the deposit accumulation period and every 1000 to 2000 miles during the deposit cleanup test phase.

The manner in which exhaust emissions increased during deposit accumulation and then decreased after operation on the gasoline with DC additive is shown in Figure 10. A summary of the

results of the Scott tests listing the emission levels at the end of the deposit accumulation (start of cleanup) and end of the cleanup phase is shown in Figure 11 for unburned hydrocarbons and Figure 12 for carbon monoxide. These are "hot" Federal cycle data. After approximately 2000 miles' operation on the DC additive fuel, the hydrocarbon emissions were reduced to the initial clean carburetor and PCV valve level and CO emissions were significantly reduced. The range in hydrocarbon decreases (Figure 11) was from 48 ppm to 675 ppm. The 13-test average HC reduction was

FIGURE 11

SCOTT ROAD TEST PROGRAM  
SUMMARY OF FEDERAL CYCLE  
EXHAUST EMISSIONS - UBHC



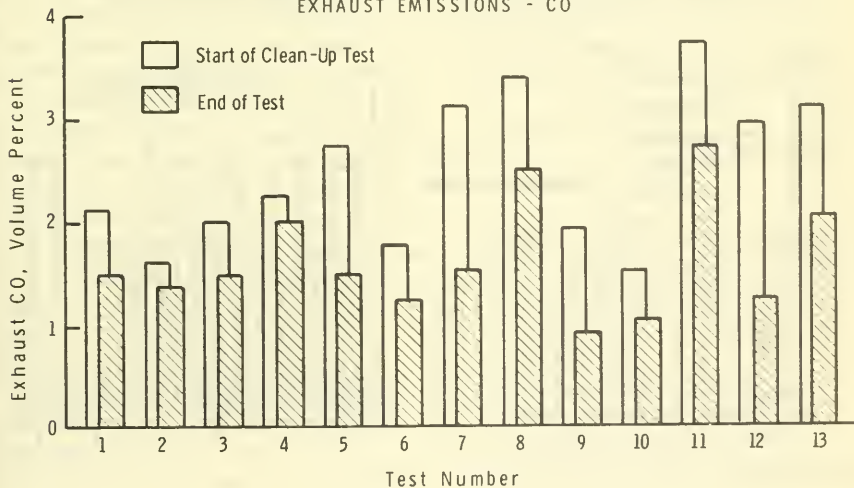
from 560 ppm to 254 ppm (about 55%). CO decreases (Figure 12) varied from 0.2% to 2%. The 13-test average CO reduction was from 2.5% to 1.6% (36%). Average changes in exhaust emission levels for the 13 tests are shown in Table VII.

The benefits of a DC additive were dramatically demonstrated by reductions in exhaust emissions noted in a six-car test conducted for the County of Los Angeles, Mechanical Department.<sup>9</sup> These were three 1968 and three 1969 model sheriff's cars which had accumulated from 30,000 to 60,000 miles on their

usual commercial gasoline. These tests, in cars with uncontrolled driving, showed an average reduction in hydrocarbons of 24% and in CO of 42% after operating on a commercial gasoline containing a DC additive for about 1500 miles. The data for each car are summarized in Figure 13. Decreases in hydrocarbons ranged from 11% to 35% and in CO from 35% to 63%.

The field tests discussed above are not intended to represent the average improvement in exhaust emissions that would

FIGURE 12  
SCOTT ROAD TEST PROGRAM  
SUMMARY OF FEDERAL CYCLE  
EXHAUST EMISSIONS - CO



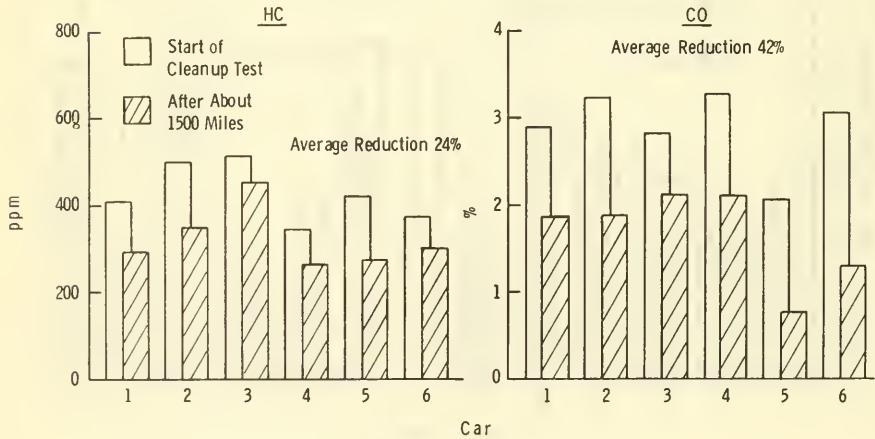
occur in the car population if all cars were switched to a DC additive-containing gasoline. The statistics of emission measurements

and the large differences encountered in emission from cars on the road, Figure 3, combine to make it essential to test a very large number of cars in order to represent the car population. Low emission level cars probably have very little carburetor and PCV valve deposits and would not be expected to show any significant decrease in emissions after using a DC additive gasoline. Cars at the higher end of the hydrocarbon distribution curve in all probability would respond most to the use of a DC additive gasoline.

TABLE VII  
SCOTT ROAD TEST PROGRAM  
FEDERAL CYCLE EXHAUST EMISSIONS  
13 TEST AVERAGE

	Initial	End of Deposit Accumulation	After 2000 Miles on DC Additive Fuel
HC-NDIR, ppm	258	560	254
HC Change, ppm	-	302	306
HC, % Decrease	-	-	55
CO, %	0.97	2.50	1.60
CO Change, %	-	1.53	0.90
CO, % Decrease	-	-	36

FIGURE 13  
REDUCTION IN EMISSIONS IN UNCONTROLLED DRIVING TESTS OF  
ADDITIVE D AT 200 LB/1000 BBL  
1968 AND 1969 383 CU IN. V-8'S  
LOS ANGELES COUNTY SHERIFF'S CARS - AFTER ABOUT 1500 MILES  
FEDERAL CYCLE DATA - HOT



## Fuel Economy

As would be expected, any malfunction or deposits that cause an engine to operate at a richer fuel/air mixture than designed into the car will result in an increase in fuel consumption. Measurement of fuel consumption rates during tests where carburetor and PCV valve deposits were accumulating shows that fuel consumption rates do increase. Subsequent operation on a DC additive fuel which removed these deposits resulted in improved fuel economy. Data from the Scott test, Table VIII, show this change in fuel economy as deposits are accumulated on a non-additive gasoline and the improvement after 2000 miles' operation on a DC additive-containing gasoline. In these tests, the improvement was greatest at idle conditions (18%) as the deposits causing the increased fuel consumption affected the fuel/air mixture at idle more than at the higher air flow conditions. The average improvement in fuel economy over the Federal cycle of 7.7% is probably more

TABLE VIII  
SCOTT ROAD TEST PROGRAM  
FUEL CONSUMPTION

Test Condition	Percent Increase Over New Carburetor, Nonadditive Fuel	Percent Decrease from Dirty Carburetor, DC Additive Fuel
Federal Exhaust Emission Cycle	5.6	7.7
25 mph - Steady State	14.4	12.6
Idle	26.2	18.2

typical of what a motorist might find in his car if it was as badly upset as those in the Scott fleet.

## Benefits to the Motorist

The two significant advantages resulting from using a DC additive in the gasoline from the refiner's viewpoint are the reduction in air pollution and the increased customer acceptance of his gasolines. The customer gains a number of benefits by using a gasoline containing a DC additive. Most of these are due to reduction or elimination of intake system, PCV valve, and general engine deposit levels. He gets improved fuel economy, power, and driveability; reduced engine maintenance; increased engine life; and prevention of premature engine failures due to deposits. These items are enumerated in Figure 14.

FIGURE 14  
CUSTOMER BENEFITS

1. Helps Reduce Air Pollution. (Carburetor and PCV valve deposits.)
2. Reduces Fuel Consumption. (Carburetor and PCV valve deposits.)
3. Improves Engine Performance.
  - A. Power (Reduced intake system deposits)
  - B. Driveability (No stalling at idle because of carburetor and PCV valve deposits.)
4. Reduces Engine Maintenance.
  - A. Carburetor Adjustments (Deposits in throttle body)
  - B. PCV Valve Life (No plugging)
5. Increases Engine Life. (Keeps rings free and not plugged.)
6. Guards Against Premature Engine Failure. (Plugged oil screens and oil passages, stuck valve lifters, stuck oil pump relief valves, etc.)

## Summary

Fifteen years of field and laboratory testing has resulted in the discovery of a class of compounds that can be incorporated into gasoline blends that will provide outstanding control of engine deposits. These additives will keep clean engines clean and will clean up dirty carburetors, intake manifolds, intake valves, and PCV valves. This results in decreased exhaust emissions in addition to reducing the need for periodic carburetor tuning and PCV valve replacement. Intake manifold, port, and valve deposits are significantly reduced, thereby preventing power loss and chances of valve deposits causing broken pistons. Piston ring sticking and oil plugging are essentially eliminated and, thus, prevent loss of oil control due to deposits. Valve lifters, oil screen plugging, oil ring plugging, ring sticking, sludge, and varnish deposits are minimized to the point where these deposits are not likely to cause premature engine failures. This results in increasing engine life to the mileage limited by only engine wear.

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A P P E N D I X I  
GTB CARBURETOR DETERGENCY  
TEST METHOD

### Test Equipment

The carburetor detergency test is a laboratory engine test which measures the ability of a detergent to clean a previously deposited throttle plate area. This test utilizes a 6-cylinder Plymouth L-head engine, a modified carburetor with a glass throttle body, and an automatic throttle cyler. No power-absorbing dynamometer is used.

The carburetor is modified by clamping a glass tube section between the throttle body and the main carburetor body. Teflon gaskets are used at the joints for sealing purposes. The throttle plate and shaft are mounted in the glass section, and the original shaft holes are plugged. The idle passage and the power-jet vacuum passage from the carburetor are connected to the original throttle body with Tygon tubing.

The throttle is operated by an electric positioning motor which is controlled by a potentiometer geared to the motor. A timing motor initiates a series of five successive accelerations every 7.5 minutes by energizing a second timing motor. The second motor drives a cam which alternately closes an "accelerate" switch and then an

"idle" switch five times. Each of these two positions can be adjusted manually with a potentiometer.

### Test Procedure

The deposits which accumulate at the throttle plate section of a carburetor result from crankcase fumes (blowby) entering the carburetor. During the first phase of the procedure, a nondetergent gasoline is used; and all crankcase fumes are vented directly to the carburetor inlet. A substantial amount of deposits will accumulate in 1 hour. During the second phase, the test detergent is added to the gasoline; and the crankcase fumes are vented away from the engine. A good detergent will remove a portion of the deposits in 4 hours.

The test cycle in more detail is as follows:

1. Run 1 hour with blowby connected to intake air using a nondetergent base fuel. Automatic cyler is used with 7.5-minute idle periods, followed with five accelerations to 2000 rpm. Remove throttle body and photograph both sides.
2. Reinstall dirty throttle body on engine and run for 4 hours on test fuel. Do not pipe blowby to carburetor. Automatic cyler is used throughout the 4-hour run. At completion of run, photograph the throttle body.

A P P E N D I X I I  
ROAD TEST PROGRAM PROCEDURE  
SCOTT LABORATORIES

The idle mixture and idle speed have a large effect on the dirty up phase. It is necessary to run mixtures slightly richer than normal at 500 rpm to obtain satisfactory results. Idle mixture has a minor effect on the cleanup phase, so the mixture is set for maximum vacuum to conserve fuel. There is no apparent effect of engine oil type or age in this test. For consistency, the oil is changed at the completion of each 4-hour run.

The effectiveness of the detergent is evaluated by comparing the second-phase photographs with the first-phase photographs and estimating the relative amount of deposits that was removed. This is called "percent cleanup." Periodic check runs are made with a nondetergent base fuel to check the 0% cleanup point, and a good detergent fuel is used to check an intermediate cleanup point.

Because of the difficulty of controlling idling and accelerating conditions, the accuracy of each test is poor. Thus, a minimum of six tests is required to establish the effectiveness of a detergent. With this amount of data, differences of 20% cleanup and above are significant.

### General

It is proposed to conduct the program in two phases. Phase I will consist of the "dirty up" period in which the test vehicles will accumulate from 6,000 miles to 24,000 miles on a fuel without a carburetor detergent additive to determine the degree of throttle body deposit formation and its effect on exhaust emissions.

Phase II will consist of a "cleanup" period in which the vehicles will be run on a fuel containing deposit control additive(s) for an as yet unspecified mileage to determine how effective the additive(s) is in removing the throttle body and PCV valve deposits and reducing exhaust emissions. The time schedule and mileages of Phase II are highly dependent on the results of Phase I.

Six or more test vehicles will be used in this program to accumulate up to 24,000 miles each over a specified test route. To assure proper dispensing of the fuel, the vehicle gas caps will be locked and the key chained to the appropriate gas pump. In addition, the vehicle gas caps will be color coded to the gas pump containing the proper fuel.

The vehicles will be tuned up according to the manufacturer's



recommended procedures and specifications. Exhaust emissions of each vehicle will be sampled in triplicate at the start and finish of the program; and duplicate tests will be run every 2000 to 3000 miles. After sampling the exhaust, the crankcase pressure will be measured. Fuel consumption measurements will also be made at the same conditions as the emission tests.

To provide visual information, color photographs will be taken of the oil pan, oil screen, rocker cover, and throttle body below the throttle plate at the start and completion of the test.

A two-dimensional (car, mileage) analysis of variance will be conducted at the various emission test intervals.

#### Test Vehicles

Scott will purchase six 1966 model cars equipped with V-8 engines and automatic transmissions and two or more other popular makes of 1968 and 1969 models to conduct the proposed study. These vehicles will have less than 20,000 miles and will be obtained from local dealers.

Each vehicle to be used in the program will be thoroughly checked and carefully selected by Scott personnel. First, the history of each vehicle will be obtained from former owners if possible. Vehicles meeting the mileage and service criteria

(less than 20,000 odometer miles) will then be checked with the Autoscan engine analyzer or equivalent for traces of malfunction, and the malfunctions will be corrected. An emission test will be conducted by running two hot cycles, and the emissions will be compared to the Federal standards. The vehicles selected for test must meet Federal standards.

#### Vehicle Preparation

The selected test vehicles will be driven over the test route for 1000 miles using the test fuel. Triplicate emission tests will then be conducted on each vehicle and compared to the initial tests.

The vehicles will then be inspected and color photographs will be taken of the new carburetor throttle body, rocker arm covers, oil screen, and the inside of the oil pan.

Experienced Scott technicians and mechanics using the auto engine diagnostic equipment, and complete garage facilities will prepare all the test vehicles. Each vehicle will have compression checked and be equipped with a new carburetor. Oil will be changed and a new oil filter installed. Also, new spark plugs, distributor points, condenser, new air filter, and a new PCV valve will be installed. The vehicles will be tuned up according to the

manufacturer's recommended procedures and specifications, including checking the distributor advance curve. Idle adjustments will be made and locked in place.

### Fuel Control

The fuel to be used during the mileage accumulation portion of the program will be supplied by Chevron Research Company. To avoid using the wrong fuel, the test fuel will be available from a single locked pump source requiring a key that matches the locked gas caps on the test vehicles. In addition, both the gas caps and the fuel pump nozzle will be color coded.

### Mileage Accumulation

Full control over the vehicle mileage accumulation will be achieved by hiring responsible drivers to drive over a specified test route. The test route, shown in Figure 1, has been approved by the CMVPCB and has been used by many vehicles in prior tests.

The vehicles will begin each circuit on the test loop from the Scott parking lot. Record idle speed and vacuum at start of each circuit. The route consists of 3.2 miles of freeway driving, 2.2 miles of business driving (with traffic signals set for 15 mph), 5.0 miles of residential, and 6.5 miles of business arterial with

speed posted 25 mph to 45 mph. The total route is 16.9 miles in length and can be completed in 35 minutes at an average speed of 29 mph. The vehicles will return to the Scott parking lot after two circuits for a 15-minute hot soak. At this rate, the vehicles will accumulate 600 miles/day. At an average of six days of driving per week (one day per week on average required for exhaust tests and servicing) and three shifts per day, Phase I of the program can be completed in less than nine weeks.

At the end of each shift period, each driver will turn in to the fleet supervisor a written record of mileage, gasoline added, and service to his vehicle. Crankcase oil to be changed every 6,000 miles and oil filter every 12,000 miles.

### Emission Testing Schedule

Exhaust emissions of each vehicle will be sampled in triplicate at the start of the program, and duplicate tests will be run every 2000 miles to 3000 miles (except when engine malfunctions require special maintenance as described below). Prior to emissions sampling, the electrical system of the vehicle will be checked with the Autoscan engine analyzer. Faulty points, plugs, condensers, wiring, air filters, etc., will be changed or

adjusted to manufacturer's specifications. Timing will be checked (by moving throttle by hand if necessary to correct speed). Timing band is  $\pm 2$  degrees. Idle speed or mixture will not be changed.

Exception to the above is when a vehicle exhibits continued stalling; i.e., the engine will not idle. The stalling in such a vehicle will be diagnosed at the time of the complaint by a Scott mechanic. The vehicle will be returned to the fleet if maintenance of the electrical system eliminates the stalling.

If idle quality is not restored and no other explanation for the stalling can be found (except attributable to the PCV system or carburetor), the following procedure will be followed. The exhaust emissions will be measured, and a new PCV valve will be installed. If stalling is eliminated, the emissions will be remeasured and the vehicle will be returned to the fleet. This would give a new base line.

At the end of the mileage accumulation period (up to 24,000 miles), the exhaust of each vehicle will be sampled in the specified manner. Following this, the carburetor throttle body, oil pan, oil screen, and rocker covers will be photographed.

#### Exhaust Sampling Procedure

Vehicles will be preconditioned by cruising 25 minutes at

50 mph at road load followed by driving seven 7-mode cycles. Exhaust emissions from the last two 7-mode cycles will be sampled, measured, and the data reduced according to the Federal procedure. In effect, both concentration by volume and grams of emission per mile from the two cycles will be reported.

At the end of the sampling, emissions will be measured during steady state modes of idle, 25, and 50 mph. The vehicles will be stabilized at 25 mph (top gear) for three minutes. Average exhaust emissions (parts per million hydrocarbon by NDIR and FID, volume percent CO, CO<sub>2</sub>, and O<sub>2</sub>) will be reported from a 15-second period commencing at the end of the stabilization period. This procedure will be repeated at 50 mph and at idle (stabilizing period at idle will be 1 minute). This provides steady state emission data during the operation of the idle system, off-idle system, and main metering system of the carburetor.

After sampling the exhaust, the crankcase pressure will be measured at idle, 25 mph, and 50 mph at road load. Idle speed during exhaust sampling procedures will be reported. Indolene 30 will be used during all exhaust emission testing.

Fuel consumption will be measured at each of the above emission tests by weighing the amount of fuel consumed.

### Reporting

Monthly reports will be provided summarizing the 3000-mile interval emission tests including computer summaries and analysis of all data accumulated to date. Also included will be a plot of fleet mileage accumulation.

The final report will include a complete description of the program methodology and a summary of the parameters and relationships derived from the computer data processing. All relevant raw data collected from the vehicle measurements and that processed by the computer will be provided.

Senator BAKER. Our next witness is Mr. George H. R. Taylor, economist with the Department of Research, and secretary of the Staff Committee on Atomic Energy and Natural Resources, AFL-CIO.

**STATEMENT OF GEORGE H. R. TAYLOR, ECONOMIST WITH THE DEPARTMENT OF RESEARCH, AND SECRETARY OF THE STAFF COMMITTEE ON ATOMIC ENERGY AND NATURAL RESOURCES, AFL-CIO**

Senator BAKER. Would you proceed with your statement?

Mr. TAYLOR. If I could make a request, we have two policy statements which were adopted by the 1969 convention of the AFL-CIO dealing with air pollution, and if I could have those included as part of the testimony, I would appreciate it.

Senator BAKER. Without objection, they will be included at the conclusion of your statement.

Mr. TAYLOR. Mr. Chairman, my name is George H. R. Taylor. I am an economist in the Department of Research, American Federation of Labor and Congress of Industrial Organizations.

I am also secretary of the AFL-CIO Staff Committee on Atomic Energy and Natural Resources.

I will attempt to refrain from adding to the already more than adequate quantity of rhetoric describing the dangers of air pollution in particular, and environmental insults in general. The proof that a problem exists is the air we breathe.

I wish to convey to this subcommittee the position of organized labor on legislation which would extend and amend the Clean Air Act of 1967.

The job of this subcommittee is to insure that the most effective clean air legislation possible is written into law—it is an obligation that applies to future generations of Americans as well as the present.

I am here today to present the basics of the legislation we deem necessary to meet this problem.

The assumptions on which we rest our position in addressing ourselves to the pending legislation are these.

1. That air pollution is not only a massive cause of economic, ecological, and other damage, but a growing menace to public health.

2. That if not controlled, air pollution threatens the continuation of human life and the lives of most living creatures on this planet.

3. That the Clean Air Act of 1967 and all other present efforts, public and private, to control air pollution are incapable of meeting the problem. Since its inception the operation of programs under the Clean Air Act have been seriously curtailed by the lack of adequate funding in both the budgeted authority and the appropriations granted by Congress.

4. That there is need to extend the program for 5 years with a stated air pollution reduction goal of 50 percent.

Under the 1967 act, the National Air Pollution Control Administration, in the Department of Health, Education, and Welfare, has been directed by the Congress to perform these functions:

1. Administer the provisions for regional control of air pollution—designate air quality criteria; report on means of control; review air quality standards and plans for implementation adopted by the governments of the States included in the air quality control regions.
2. Give financial and technical assistance to State, local, and regional abatement programs.
3. Train manpower.
4. Nationwide regulation of pollution from new motor vehicles.
5. Air quality surveillance.
6. Conduct research and development programs on nature and effects of air pollution and preventive and control techniques.

These functions need to be strengthened. They have never been able to achieve their full potential. The legislation under consideration by the committee is an admission of such.

Before going into our recommendations on the three bills before this subcommittee—S. 3229, S. 3466, and S. 3546—I would like to outline briefly how these bills propose to extend and amend the life of the 1967 act.

Since S. 3229 and S. 3546, introduced by Senator Muskie and others, are really complementary, we wish for purposes of simplification to deal with them as though they were a single bill.

S. 3466 is the administration bill which would implement the proposed program to control air pollution in this country as set forth by President Nixon in his recent message on the environment.

#### S. 3229 AND S. 3546

These bills would:

1. Extend the life of the Clean Air Act through fiscal year 1972.
2. Authorize these appropriations in millions of dollars:

Fiscal year ended	Sec. 104(a)	Sec. 106(b)	Total
June 30, 1970.....	<sup>1</sup> \$45	<sup>2</sup> \$134.3	<sup>3</sup> \$179.3
June 30, 1971.....	125	150.0	275.0
June 30, 1972.....	150	175.0	325.0
June 30, 1973.....	175	200.0	375.0
Total.....	495	659.3	1,154.0

<sup>1</sup> Sec. 104(c).

<sup>2</sup> Sec. 106(c).

<sup>3</sup> Total secs. 104(c) and 106(c).

- (a) Research and development on fuels and motor vehicle emission effects and control.
- (b) All other purposes of the act other than section 103(d) and 104.
- (c) Same amount as authorized by 1967 Act.

3. Broaden the scope of Federal authority to set and enforce emission standards on moving sources by extending coverage to vessels, aircraft, commercial vehicles, and aircraft and vehicle engines.

4. Establish an Office of Noise Pollution in the Department of HEW. Provide for a 1-year study of the effects of noise, and authorize a \$30 million appropriation for this purpose.

5. Direct the Secretary of HEW to designate immediately the 26 remaining undesignated air-quality-control regions, bringing the total to 57.

6. Set a timetable for the various States to designate one or more air-quality-control regions in order to cover their entire geographical areas, and give the Secretary authority to do so himself if the State or States fail to act within the allotted time.

7. Set a timetable submitting plans for their implementation, for turning the Secretary's criteria into standards and for the States involved in HEW-designated air-quality-control regions.

8. Set a timetable for the States to adopt standards for HEW criteria and to submit plans for implementation.

9. Require the review of all emission standards and, if necessary, improve them at least every 5 years.

10. Provide for Federal enforcement of air quality standards by means of orders or injunctions, and include fines and/or jail sentences, right-of-entry and reporting requirements. Prohibit sanctions against workers who may file a proceeding or testify at a proceeding.

11. Allow citizen's suits for enforcement of standards.

12. Require new capital investment beginning in 1972 to employ the latest control techniques at the time of construction as a condition of proceeding with construction.

13. Prohibit Federal agencies beginning in 1972 from making loans, grants, or contractual arrangements for construction, installation, or operation of commercial or industrial facilities unless there is compliance with the air-quality standards promulgated under the act.

14. Establish an effective date for most of these provisions as July 1, 1971.

S. 3466

This bill would :

1. Extend the life of the Clean Air Act through June 30, 1973.

2. Provide no specific monetary authorization to carry out the purposes of the act, but "such sums as are necessary" for the fiscal year ended June 30, 1971, and the next 2 fiscal years.

3. Direct the Secretary to test new motor vehicles and engines by representative sample, with the right to conduct assembly line testing, right of entry to inspect and test vehicles, papers, processes, and so forth, and to revoke the certificate of compliance until compliance has been achieved.

4. Require the registration of fuel additives, with prohibitions against their sale without complying with registration requirements and the Secretary's standards. Increase the civil penalty for violation from the present \$1,000 to \$10,000.

5. Authorize the Secretary to promulgate national air quality standards, together with control techniques, and alternative methods of control.

6. Do away with air-quality-control regions and air quality criteria.

7. Set a timetable for States to comply with the Secretary's national standards and to develop implementation and enforcement plans approved by the Secretary, with authority given to the Secretary to do the job if the State fails.

8. Provide for Federal enforcement.

9. Authorize the Secretary to establish national stationary source and emission standards for facilities releasing pollutants "extremely hazardous to health."

10. Prohibit any new air pollution source to be constructed except under conditions set by the Secretary, or subject to his exemption.

11. Set a timetable for State compliance with standards, with authority for the Secretary to step in on failure by a State and enforce through the Federal courts, with violators liable to civil penalties up to \$10,000 per day of violation.

Addressing myself to the legislation, I should first of all like to set forth the areas where we find ourselves in agreement with the specific provisions of the legislation, and then those sections we propose be strengthened. We do not propose to discuss every facet of the three bills, only those which we regard as most significant.

1. *Extending the Clean Air Act.*—We endorse such extension, but not for the 3-year period in S. 3229, nor the 4-year period in S. 3446, but for at least 5 years in order to meet the policy goal we have proposed of reducing air pollution in the United States by at least 50 percent. We believe that control technologies are now available to reduce all major sources of man-made pollution from 50 to nearly 100 percent.

2. *Authorization for appropriations.*—We favor the specific authorization of appropriations for programs under sections 104 and 106 of the act. We oppose the open-ended appropriations approach of S. 3446, the administration bill. For this is but another means by which this program would be made an even more helpless victim of the balanced administrative budget. Adopting such a provision leaves the President free to lay the blame on the Congress for increases in his budget. Or it allows the appropriation to remain close to the parsimonious funding allowance in the President's fiscal 1971 budget, while Congress incurs the wrath of those who want to clean up the environment. Moreover, it would provide the Secretary of HEW with unchecked authority to shift priorities without adequate guidelines and accountability.

We believe that for the first time, this subcommittee has before it authorization amounts in S. 3229 which are beginning to approach the true needs of the Federal program.

We propose, however, that under amended section 104, you take a closer look at the requirements of a research and development program to produce unconventional low-emission propulsion systems in motor vehicles. We urge a program that will yield a vehicle commercially acceptable and ready for the road in 5 years.

We believe this will require an aggregate expenditure of around \$300 million. This figure should be worked into the authorization amounts of the bill reported out of this subcommittee, together with a provision in an amended section 104 for authorization by year specifically for this purpose.



Senator BAKER. What do you visualize we will buy with this \$300 million?

Mr. TAYLOR. We factored this figure on the basis of the proposed program of HEW, which provided, I think, for unconventional research around \$45 million or \$46 million over a 6-year period, including the present fiscal year.

In discussing this with the people at the Federal Air Pollution Control Administration, we asked the specific question: If you really wanted to get a car out on the road, a truck, a bus, whatever the model is, using as a first priority what they determine is a design that would be most feasible, how much would it cost if you had a crash program like that and you really wanted to get it out and have it ready to be used, first by the Federal Government in its fleet acquisitions and then spread out into the public purchasing economy in general?

They said you would have to increase this amount by at least a factor of five in order to achieve those ends. So using that as the basis, we have suggested, as a target for purposes of discussion before this committee, the amount of \$300 million. It is not a precise figure.

Senator BAKER. I am not trying to hold you to a precise amount. I just wanted to try to identify whether or not you were predicating this on development of a conventional power source or research in the broad field, or improvements in terms of existing models.

Mr. TAYLOR. I think the end result as far as the Government is concerned, would be a vehicle ready for the road, and any agency of the Federal Government could buy cars for the Federal Government with this design.

I understand that the United States buys about \$125 million or \$130 million worth of cars every year. This, in effect, would be a yardstick to provide the incentives for the motor industry to work these designs into their cars that they sell to the Federal Government, the State governments, and eventually to the motoring public.

Senator BAKER. Thank you very much.

Mr. TAYLOR. We also believe that HEW, as the lead agency but in collaboration with the Department of Transportation, should institute in-house research and development of unconventional, low-emission vehicles, as a yardstick for private industry.

Contracts could then be awarded for demonstration purposes, but with title to the patents, for any devices made possible by Federal money, being held by the United States.

*3. Coverage of vessel, aircraft, commercial vehicles by Federal standards and regulation.*—We believe this coverage is highly justified. The present act forces the Secretary of HEW to obtain voluntary agreements, for example, from the airlines, to do something about controlling emissions from commercial airplanes. To do the job properly, he should have the necessary authority to establish standards and enforce them.

Burning a ton of petroleum hydrocarbons produces about  $1\frac{1}{3}$  tons of water and  $2\frac{1}{2}$  tons of carbon dioxide ( $\text{CO}_2$ ). This process is accomplished in about 10 minutes by a large, modern jetliner.

Such planes are estimated to emit annually some 36 million tons of water and CO<sub>2</sub> into the atmosphere, just for flights terminating in New York City.

At high altitudes, such emittants require a long time for dispersal. CO<sub>2</sub> released from airplanes is also a factor in upsetting the carbon dioxide-oxygen relationship essential to photosynthesis, and hence, disturbs the life-support system of this planet.

4. *Section 107, dealing with air quality control regions, and criteria.*—We support extension of section 107, and we oppose the provisions of the administration bill (S. 3466) which would terminate them.

We propose that the requirement in S. 3546 for the Secretary to designate the remaining 26 undesignated air-quality-control regions, should also direct him to accomplish this within 30 days following enactment.

Section 107 should also be amended to require the Secretary to publish criteria for carbon monoxide, fluorides, photochemical oxidants, nitrogen oxides and hydrocarbons not later than January 1, 1971, together with the required information on recommended control techniques.

In this connection, we urge that every air-quality-control region, not merely those directed to be designated under the proposed amendment to section 107 in S. 3546, should consist of the Secretary or his designees, as chairman, and adequate representation of State, interstate, or local government and a public representative as well.

Senator BAKER. You have the recommendation that section 107 should be amended to require the Secretary to publish criteria for carbon monoxide, fluorides, photochemical oxidants, and so forth.

It is my information, and I wonder if you agree, that the criteria for carbon monoxide, photochemical oxidants, and nitrogen oxides have already been published?

Mr. TAYLOR. Yes, it has been put into the Federal Register.

5. *National air quality and national stationary source emission standards.*—We strongly urge amendments to the 1967 Act which will direct the Secretary of HEW to promulgate regulations establishing both national air quality and national stationary source emission standards, applying to all areas in the country.

This subcommittee should reject the provision in the administration bill to establish “nationally applicable standards of ambient air quality,” without requirements for prior publication of air quality criteria and formal requirements for public hearings on the proposed standards.

We oppose the provision in S. 3466 which would both confine the standards-setting authority of the Secretary only to stationary emission levels which would substantially contribute to endangering the public health and welfare.

We also oppose the provisions in S. 3546 which allows the Secretary to establish only ambient air quality levels nationally.

We should like to see this subcommittee report out a bill which also provides for Federal enforcement of such standards until or unless the State or the air-quality-control region establishes equivalent, or

more stringent standards within these areas, together with implementation and enforcement plans that meet the Secretary's criteria as set forth in S. 3546.

Additional language would therefore be necessary to specify effective dates on which the standards become effective, with consideration given to the technical and economic problems that may arise in connection with compliance.

Provision should be made in addition to the desirable 5-year review period of the standards as provided by S. 3546, requiring the Secretary to review the changes in the State of the appropriate control technology, consequences arising out of the imposition of the standards, and the results achieved against the goals of the act.

Finally, we believe, just as we stated to this subcommittee during the hearings on the 1967 act, that control programs should not stop with standards and abatement programs governing ambient air quality and emissions from stationary sources.

They should include overviews and recommendations on industrial siting and zoning, design and location of highways and freeways, establishment of traffic patterns, incineration and other means of disposing of solid wastes, land use ordinances and other programs.

All these require a high degree of interdisciplinary interactions and cooperation of all affected elements of Federal, State, and local government, private industry and concerned citizen's groups.

All areas of a State should be covered by adequate air pollution control programs as set forth by sound legislation. Accordingly, we support the requirement in S. 3546 requiring the Governors of the various States to designate air quality control regions in those areas not contained in the regions determined by the Secretary.

Senator BAKER. May I ask if your remark in paragraph 3 on page 8 is to be interpreted as calling for emission standards for stationary pollution sources, as seems to be the case?

Mr. TAYLOR. Yes. We do support that.

Senator BAKER. Would that be in addition to air quality criteria so that they work in tandem or instead of ambient air quality criteria?

Mr. TAYLOR. What we would like to see in the bill with respect to stationary emitters is both ambient air quality standards for an area and emission standards for the particular source.

Senator BAKER. Would you have in mind that the standards might vary according to the requirements of the ambient air quality of the region?

Mr. TAYLOR. I don't think the standard would vary so much as in the application.

For example, in a large metropolitan area, where you have varying degrees of heavy doses of pollution by virtue of inversions or traffic patterns, it is quite possible that an air quality control region might have to impose somewhat tougher ambient standards than the emission standard itself. It would determine how long a factory would be allowed to emit at particular times of the day, or change traffic patterns, or perhaps if there was a tremendous inversion, like there might be in Chicago or Los Angeles, you might limit the use of cars in certain sections of the city, where freeway traffic was very heavy and the effects might be deleterious to health.

In other words, what we are proposing is that you would have a basic standard which would be a strong one on emissions, but to meet particular problems around the country, particularly in large metropolitan areas, you would want to leave some flexibility with the Air Quality Control Region Administration to use these standards to meet particular situations which are more severe than the standards you might perhaps envisage when you combine all the sources.

Senator BAKER. In other words, you might have an interaction of the requirements of the ambient air quality criteria and the stationary source emission standards, and while emission standards might be set nationwide at a certain acceptable level they might be varied downward according to the requirements of a particular situation.

Mr. TAYLOR. Yes; you want to have a strong basic national standard, and one of the reasons we support that is because of the fact that in many areas of the country where there is either a small town with one big industry or an industrial complex like Pittsburgh or Gary, we get pressures from management when there is a question of standards being imposed. Management says to our people, "Look, if we get this kind of a standard, we may have to dismiss a bunch of people or we may have to move to another State where they treat us better."

Senator BAKER. That is an interesting point, and I know one of particular significance to you.

It is of vital concern in the formulation of legislation. That is whether or not, from a philosophical standpoint, we are going to permit a clean, virgin envelope in one part of the country to be polluted up to a certain level, or whether you are going to require everyone to abide by the least minimum emission standards. Many people are recognizing that distinction.

It will have a profound economic impact in this country. There are certain areas, for instance, especially in steel-producing areas or chemical producing and processing areas that would be critically affected if the emission standards were invoked that were either economically or technically difficult to accommodate.

Just for the sake of theoretical clarification, isn't it possible that the same general objective, which, after all, is the quality of the ambient air, might be accomplished by ambient air quality criteria as well as by emission standards, although you seem to doubt that it will be accomplished in that way?

Mr. TAYLOR. I think, of course, you have to base all standards on the development of criteria which the act presently and undoubtedly will continue to do, and that is to direct the Secretary of HEW to prescribe the criteria covering some general classification of emission, such as hydrocarbons or oxides of sulfur, what it does to the human's health, what it does to visibility, vegetation, and so forth.

Once you get those accomplished, the next problem is to establish a standard using the criteria the Secretary has developed as a basis for the standard. You can do it two ways: You can do it the way it is now provided for in the act, which is to allow a State, or more than one State, through the air quality control region to use those criteria to establish their own standards, which are then subject to public hearing and they are finally established by the Governor or the Governors, and they to submit to HEW an implementation plan on how the standards will be enforced.

The Nixon bill uses one classification for a stationary emitter which might have a particularly severe effect on public health.

It uses that particular category to establish emission standards, and ambient air quality standards for those which don't come under that heading.

As far as we are concerned, we believe you should go beyond that, beyond what both the act now provides, what Senator Muskie in other legislation provides, and what the Nixon bill provides.

Senator BAKER. Would it be fair to say that the present Air Quality Act is the point of departure, that the new proposal for ambient air quality standards in some cases is the next step, and what you are describing, that is, the interrelationship of emission standards and tougher criteria is the third and next step?

Mr. TAYLOR. If you are going to have a preventive program and not a dilution problem, which ambient air standards alone would provide, you will have to start at the source, with what kind of emitter it is, what it emits, how much it emits, and prevent it from emitting anything beyond what an act of God, an accident, or deficiency in the state of the art would allow.

From the testimony before this committee and other committees of Congress by scientists and ecologists who have said we are approaching an emergency with respect to the quality of the air in this country and in the world, I think ordinary, leisurely methods of dealing with this problem just have to be abandoned and we have to be tough about it. It involves everybody who breathes air.

Senator BAKER. I think your description of the program of prevention and not dilution is particularly appropriate, and I think it goes in the area of broader emission standards.

But it is a most delicate operation we are undertaking, this business of trying to clean up the air envelope and water of this country without destroying the vitality of the economy at the same time.

Let me ask you another theoretical question, if I may: Is it likely in your view that we must finally realize that certain areas of the country will have cleaner air than other parts of the country because of meteorological conditions in some cases, geographical conditions in some, and because of a long history of observation which indicates that air in Wyoming is probably always going to be cleaner than the air in the Los Angeles basin?

Mr. TAYLOR. Yes.

Senator BAKER. We musn't deceive ourselves into thinking that you will have pristine purity of air in every location of the country, but, rather, that we have to return it to the best acceptable level we can find.

Mr. TAYLOR. That is why we thought it might be a good idea to set a specific goal, a 5-year goal, of reducing air pollution in the country by 50 percent at the end of 5 years.

I am not arguing, and I don't think anybody could argue, that you could return the air to the quality it had before the Pilgrim Fathers and the Spanish came over here.

Senator BAKER. It has been interesting to me that the Indians refer to the area of the Los Angeles basin as the land of the smoky bush. That area has always had some deleterious effect on the air before we got around to discussing polluting methods.

Mr. TAYLOR. I guess pollution started when the caveman first got a fire started.

Senator BAKER. We all agree that a lot can be done. Let me take advantage of your testimony to express my own philosophy. There are one or two things we must keep in mind.

No. 1, you will never have pristine pure air in all parts of the country.

No. 2, we have moved in the right direction but there is much yet to be done.

No. 3, some form of emission standards as distinguished from quality criteria will probably have to be the next step.

No. 4, that there probably should be a flexibility of intermix of criteria and standards in order to accomplish the next step.

Next, the final result will probably be the development of a new economic and industrial distribution around the country as a part of the total ecological balance.

I don't dignify all of that by the term "questions," but do you have any observations on what I have just said?

Mr. TAYLOR. I think the concentration of industry that this country now has grew up during the industrial evolution of this country by locating plants close to the sources of raw materials with access to transportation, and trying to keep the process as closely intertwined with that as possible.

This is before the transportation ability to relocate, and all the other flexibility factors which you now have in the present-day industrial siting took place.

So you have enormous investments in plant facilities, railroads, highways, freeways, and everything else in a few relatively large industrial conglomerations.

We don't have to describe where they are; we all know where they are.

As a result of this, unanticipated at the time this evolution took place, the technology, itself, not only produces goods and services for the American people, but also extracts a high social price as well, which was unanticipated—air pollution, water pollution, traffic chaos, deteriorating interior cores of cities, all the other ills that presently the Congress and the American people are addressing themselves and which they are plagued by.

The question of industrial relocation is a problem of money, but it can be done, the dispersing of industry, but I am not sure how it is going to be done unless you agree that more industrial planning should be a function of the Federal Government. I am not sure we have reached that emergency state yet.

Senator BAKER. I wonder if we haven't been there for a long time. I am not being antagonistic, but I am enjoying a colloquy with a distinguished person. We have really been in industrial planning ever since we created a system of tax incentives and economic development authority on the part of the Federal Government.

It has had some impact on industrial planning. It is really a question of how much we elaborate it, rather than if we begin it.

Mr. TAYLOR. It has grown up like Topsy. It is broken up into a large number of not particularly integrated statutes and programs that have developed out of those statutes.

As a result you have, sometimes, contradictions in the way a program is intended and the actual effect of it.

Senator BAKER. Yesterday in the Commerce Committee I heard testimony with respect to cities having grown up as a result of factors and circumstances of the last century, of which they are not only not relevant to this century but were the very worst possible reasons for development of metropolitan areas.

I am not sure what the answer is. I think it is a fairly stated problem. But just to tie this up and move on to another subject, and to let Senator Gravel have his turn at bat, would you agree that this whole business of air and water pollution control is interrelated with the requirement for more useful and orderly utilization of our land space in this country, which only, incidentally, happens to include the problem of our cities as well?

Mr. TAYLOR. I don't think there is any so-called environmental problem that is separate and distinct from another one.

I think one of the reasons why the Government right now seems to be at cross-purposes is that you don't always see these problems, either the public, the Congress, or the scientific community, all in one interrelated, seamless web until perhaps a large number of programs which take a little nibble at some parts of it have been enacted, money appropriated, clientele developed, and you get a sort of fixture.

It is like the New Testament, where people say, "If it was good enough for grandpa, it is good enough for me," because it has been going.

There is this inertia that has developed as a result of it. The matters that we are discussing this morning are so subtle and complex and have so many implications on the economy, on social institutions, on the structure of things in the city and elsewhere, and hitting so hard and so fast, that a committee like this, and even the American people, will start at a fixed point, like this legislation, and by the time you get through deliberating on it there may be other factors that will come up which you will have overlooked, not because of any fault of yours but because somebody has developed new ones.

Senator BAKER. I think it is important that we all keep that firmly in mind.

I commend you for your recognition of the multidisciplinary nature of these undertakings. We have some problem with that in the Senate because of the jurisdiction of the standing committees, but less than one might think.

We have created a constituency that demands improvement of the quality of the environment probably before we have created the competence to do anything about it.

Your contribution is a good one and I commend you for stating it.

Mr. TAYLOR. If I could make one more interpolation just for the record, which, unfortunately, did not appear in the statement but which we regard as being a matter of considerable importance, in 10(a) of Senator Muskie's bill, S. 3546, there is a provision protecting employee representatives or other workers in case they are called upon to testify in an enforcement hearing or a pollution situation from having sanctions leveled on them by management for so doing, and a procedure whereby, in case they are, there is an attempt to get justice—

Senator BAKER. Where is that?

Mr. TAYLOR. This is on pages 14 and 15 of S. 3546.

I would like to especially endorse this. We feel in this field, and in a closely allied field, occupational health and safety, the obligation of our people is to help police either the workplace or the general environment wherever we can.

The Federal Government can't do it alone. The States can't do it alone. We are trying to develop a higher degree of sophistication and identification of these problems among our workers.

We are hoping that they may be of considerable assistance to the Federal Government or the State, or the local government, in pushing to clean up the air by their efforts, participatory democracy, if you want to call it that.

In the occupational health and safety bill, which has just been reported out of the House committee, there is a similar provision.

This committee, however, should give serious consideration to shortening the schedules for adoption of Federal standards and submittal of implementation plans.

There has already been too much time lost by the cumbersome processes in the present act, and the effective date of July 1, 1971, in S. 3546 is just another delaying factor. These sections of the legislation should be effective immediately upon enactment.

*6. Enforcement and penalties.*—The subcommittee should report a bill with strong enforcement and strict penalties, as well as adequate preventive measures. Lack of these has been a major weakness of the 1967 act.

The Government has as much of a duty to protect the air, the land, the water, and the natural environment against technological damage as it has to protect our Nation against enemies from without, and the individual against criminals.

It should be provided with all of the tools necessary to fulfill this duty.

Enforcement of the Clean Air Act of 1967, as amended and extended, should provide for Federal enforcement of all air quality and stationary emission standards from emitters in interstate commerce preliminary to approval action by the State or by the air quality control region designated by the Secretary, or in default thereof.

The Secretary should be given the right of entry and to assess civil penalties of not more than \$25,000 per day on stationary source violators. This should, of course, be subject to a hearing and with review by the Federal courts and based on the record of the administrative hearing.

The Secretary should be empowered to institute civil or criminal suits against violators or willful violators in order to obtain compliance with national stationary source emission standards.

The penalties should not exceed \$25,000 per day of violation or 1 year's imprisonment for the first offense, nor \$50,000 per day of violation or 5 years' imprisonment for violations committed after the first conviction.

In this area, we oppose the authority given to the Secretary in S. 3466 to exempt any industry or establishment from compliance with Federal, State, or local standards over stationary source emissions.



7. *Control of emissions from motor vehicles.*—The AFL-CIO strongly supports the provision in S. 3466 giving right of entry without prior notification to representatives of the Secretary of HEW to inspect automobile manufacturing plants and determine if emissions standards are being complied with.

After the Secretary issues a certificate of conformity on the basis of testing prototype models, we support giving him the authority to test models from the assembly line as to conformity with emission standards, and to withdraw the certificate of conformity if the sample shows violation.

We also urge that the manufacturers of motor vehicles be required to include adequate performance of emission control devices in their warranty for 12 months, and that the Federal Government be authorized to make grants to States to assist them in the development of uniform motor vehicle emission device inspection and testing programs.

It would be only proper to require that all States enact legislation providing for inclusion of mandatory emission controls inspections as part of their motor inspection laws for new and late model vehicles found to have this equipment.

The bill reported out by this subcommittee should amend the present section 210 to provide for registry of fuels or fuel additives, such registry should contain full information concerning their physical or chemical properties.

The Secretary should be directed to require from the manufacturer full data on emissions and the effects of their use, and also their effect on the emission control devices in use.

If he finds after hearings that the emissions are harmful or reduce adequate performance of vehicle pollution control systems, the Secretary should have the power to remove it from the registration list.

It should be declared unlawful to sell in interstate commerce any unregistered fuel or fuel additive. Violators should be subject to the same range of penalties—fines and/or imprisonment—as those violating stationary emission standards.

Mr. Chairman, there are three other provisions which organized labor believes will add effectiveness to the extended Clean Air Act.

1. Allowing citizens' suits for enforcement of standards.

2. Requiring new capital investment, beginning in 1972 to employ the latest approved control techniques as a condition of construction.

3. Prohibiting Federal agencies, beginning in 1972, from making loans, grants or contractual arrangements for construction, installation or operation of commercial or in-trial facilities unless there is compliance with standards promulgated under the act.

With respect to the provisions of S. 3229, establishing an Office of Noise Pollution in the Department of HEW; we are in general agreement regarding its intent, but we still have reservations about its relevancy to this legislation. Noise, and especially industrial noise, is worthy of most serious consideration, and we should like to set forth our position at a later date.

Mr. Chairman, let me state quite bluntly that the Clean Air Act of 1967 was in many of its major aspects, the victim of political compromise under the massive pressures of big industry and of the various States.

Once enacted, the programs under the act were further weakened by being subjected to the budgetary ax under both administrations.

The AFL-CIO has felt that these shortcomings have seriously delayed the achievement of significant reduction of air pollution in our country. The three bills under consideration are admissions that both the Congress and the Executive recognize many of these weaknesses and are attempting to correct them.

In our judgment, we are approaching an emergency in the deterioration of the quality of our air, not to mention water, land and other interrelated elements of the environment.

The ordinary considerations of making the States happy, tempering the winds of enforcement to industry, and open-ended research and development until all questions have been answered are luxuries that we can no longer afford.

In short, we would like to see a bill reported out of this subcommittee, adopted by the Congress and enacted, that will establish an immediate 5-year goal of reducing pollution in the air by at least one-half, and that will operate its programs on the premise that there should be no emission of pollutants from any stationary or moving source except by accident, act of God, or deficiency in the state of the art of controlling them.

As we have said before, we believe that control technologies are now available to reduce nearly all major sources of manmade pollution from 50 to nearly 100 percent.

While we continue to support all necessary research and development wherever needed, we find the main roadblocks of an effective abatement program are political.

The temperament of the American people, in our belief, is that these roadblocks must be torn aside—not in 1971, or 1972, but now. Though the price may be high, and the opposition formidable, they recognize that the alternatives are unthinkable.

(The attachments referred to follow:)

#### AUTO AIR POLLUTION

The internal combustion powered motor vehicle is the nation's greatest threat to its precious and irreplaceable air resource.

One hundred and ten million cars, trucks and buses emit about 50 percent of the total volume of pollutants released into the atmosphere each year. This pollution is linked to such diseases as cancer and emphysema and causes \$13 billion worth of property damage each year.

While every American city is faced, to some degree, with air pollution, in Southern California automotive vehicles contribute 85 percent of the total pollution belched into the air. In a single year, doctors advised 10,000 people to leave Los Angeles because of the harmful effects of air pollution.

The direct causal relationship between high levels of pollutants emitted by motor vehicles and illnesses and even deaths, has been definitely established.

For many years, efforts by state governments and the federal government to control air pollution have met with a wall of opposition thrown up by the major automobile manufacturers.

For 16 years, the giants of the auto industry and their trade association have conspired to delay and obstruct the development and installation of pollution control devices on motor vehicles.

In 1966, Federal Grand Jury in Los Angeles uncovered the criminally conspiratorial nature of this opposition. The Johnson Administration filed an anti-trust suit against the auto industry's "big four"—General Motors, Ford, Chrysler and American Motor Company—charging them with specific acts of conspiracy as far back as 1953 and in 1961, 1962-63 and 1964.

But this year, the Nixon Administration, after secret negotiations, agreed to a consent decree—an out-of-court settlement in which the manufacturers would escape punishment for all past and present actions, but would promise not to conspire in the future.

It is an anomaly that this Administration urges stern measures against individual law breakers and allows corporate crime to go unpunished.

The public statements by Attorney General Mitchell, and other administration spokesmen, amount to nothing more than a coverup of favored treatment being given to the auto industry.

The Administration is not trust busting; it is window dressing with the consent decree.

However, the decree must be accepted by the Federal District Court in Los Angeles before it becomes final. Judge Jesse E. Curtis has invited the views of all interested persons and public bodies before he approves or disapproves of the consent decree.

Other groups already are making their views known in this case, which may become a legal watershed toward a mutual goal of promoting effective consumer protection for all Americans. Many members of Congress, the County of Los Angeles, the County of San Bernadino, the California Attorney General, and the City of New York are all seeking an open trial in the cause of the public interest and justice.

If the decree is accepted, the Federal grand jury's records would be sealed forever, because of a section of the Clayton Antitrust Act which provides that consent decrees deprive parties injured by illegal conduct from statutory remedy.

The consent decree, therefore, would make it impossible for individuals or municipalities to bring damage suits against the auto makers.

The Administration's handling of this case of the auto industry's conspiracy against air pollution control stands in marked contrast to the electrical equipment manufacturers price-fixing case a few years ago. Then the giants were brought to the bar of justice and found in violation of the anti-trust laws. Corporate officials were fined and given jail sentences. Those who had been cheated and victimized were able to file damage suits and hundreds of millions of dollars were collected from the companies.

Surely enough is known about the effects of automotive air pollution to have given the Administration pause in allowing the United States to enter into a consent decree. This is particularly true in this case, where the proposed decree would prevent the public and even the Congress from access to the evidence, which should be aired in a court of law and provide the basis for remedial action, including legislation.

The stakes in the air pollution conspiracy and the Administration consent decree involve tax expenditures for air pollution control programs, property damage, the health and, in some cases, the very lives of thousands of Americans.

Resolved: (1) The AFL-CIO reaffirms its long standing belief that a precious ingredient of our Constitution is that it extends justice to the great and small alike.

(2) The AFL-CIO condemns the Attorney General and the Administration for their failure to deal effectively with a demonstrated conspiracy by the major car makers to suppress competition in the field of automotive anti-pollution devices, which raises a serious question as to the sincerity of their many statements supporting "law and order."

(3) The AFL-CIO urges the Attorney General to withdraw from the proposed consent decree and seek a criminal indictment against the major automobile manufacturers and their trade association, so that sealed evidence will not become a barrier to remedial action, legislation and justice.

(4) Since the Federal District Court has set a deadline of October 3 for submitting views on the issue, the Eighth AFL-CIO Constitutional Convention in adopting this resolution, directs that it be transmitted forthwith to the Clerk of the Court, Central District of California, U.S. District Court, Los Angeles, California so that the official policy of the American Federation of Labor and Congress of Industrial Organizations may be considered by the Court.

Mr. Chairman, the committee recommends adoption of this resolution, and I so move.

President Meany: You have heard the reading of the resolution and the motion is to adopt. I regret that we do not have this resolution in print. If we could have waited a day or two it would have been printed and would be before you. However, the situation has been explained. The Judge must make a decision as

to whether to accept this consent decree which would cover up the entire machinations of these corporations, and leave them scot free from any damage suits from the people injured. This requires that we take action today.

Delegate William Miller: Typographical Union: I move we adopt this resolution, Mr. Chairman.

. . . The motion was seconded.

President Meany: We have a motion to adopt. Is there discussion? The question on the motion is called for. Those who favor the motion signify by saying aye; those opposed. The motion is carried and it is so ordered.

I would like to ask Secretary-Treasurer Kirkland to read a telegram which I propose to send to the United States District Court for the Central District of California, Los Angeles, California, prepared by our General Counsel.

Secretary Treasurer Kirkland: The following is the text of the wire:

OCTOBER 2, 1969.

CLERK OF COURT,

*U.S. District Court, Central District of California, Los Angeles, Calif.:*

Acting upon the invitation extended to all interested persons and public bodies by District Court Judge Jesse W. Curtis, and contained in his order of September 17, 1969, to express their views with respect to a proposed consent decree in the anti-trust suit filed in the District Court for the Central District of California, the AFL-CIO, in convention assembled, has today adopted a resolution condemning the proposed consent decree, urging the Attorney General to withdraw from the same and calling upon him to institute appropriate action under Federal Statutes designed to bring to an end a demonstrated conspiracy by major car makers to suppress competition in the field of automobile anti-pollution devices. This resolution is being forwarded to you today for filing by you and for the consideration of Judge Curtis.

J. ALBERT WOLL,  
*General Counsel, AFL-CIO.*

President Meany: Thank you. Now the Resolutions Committee can continue.

#### AIR AND WATER POLLUTION

Americans are entering the 1970s with the widening recognition that our industrial and technical accomplishments carry with them a terrible price—the deterioration of our physical environment.

The silent threat of air pollution is the greatest danger. It darkens our skies, burns our eyes, blackens our lungs, corrodes metal, kills trees and crops, dirties our homes, lowers visibility. Each year 142 million tons of chemicals and particles are belched into the air by automobiles, home heating, industry and burning of solid wastes.

The streams, rivers, lakes and estuaries of our nation are all polluted, in varying degrees, from municipal and industrial wastes, pesticides, fertilizers, heat from power generation and radioactive wastes. Lake Erie is rapidly dying: the other Great Lakes are threatened with the same fate. Water supply in the great metropolitan areas of the nation is threatened. More than 2,600 communities still discharge raw sewage into our waters. Hundreds of towns and cities supply domestic water below U.S. Public Health Service sanitary standards.

Even though the Clean Water Restoration Act of 1966 and the Air Quality Act of 1967 provided the beginnings of a national attack on these twin dangers, we are continuing to lose the battle against air and water pollution and the turning point is not in sight.

One of the major problems is the huge investment costs of the physical facilities and devices required to treat water wastes and control air pollution. Without strong standards firmly enforced, however, money alone will not change matters for the better.

The limits of the American people's tolerance for foot-dragging by government localities and private industry are being reached. The future well-being of the people of this nation depends on how well this challenge to our environment is met in the 1970s. Therefore, be it

Resolved:

##### A. Creation of an Over-all Environmental Policy.

The AFL-CIO has actively and vigorously supported programs to upgrade our environment—wilderness, national parks, air and water pollution and solid wastes.

We endorse proposed legislation to create a Committee of Environmental Advisers to recommend means of achieving a sound and sane balance between resource utilization and misuse that would produce adverse environmental effects. The President's recently created cabinet-level Environmental Quality Council is no adequate substitute for a statutory program, administered by a specific government agency directed to carry out Congressional policies. We recommend consideration be given to the establishment of a Joint Congressional Committee on the Environment to focus on the entire issue.

#### B. Control of Water Pollution.

1. We urge the Congress to restore the full \$1 billion authorized for federal grants-in-aid to localities during fiscal year 1970 for sewage treatment plants. The Administration has requested only \$214 million for this purpose, in the face of pending requests from the nation's communities for such grants totaling \$5.1 billion.

We also urge Congress to amend the Clean Water Restoration Act to increase the federal commitment in grants-in-aid to communities beginning with fiscal year 1971.

2. We support amendments to the Clean Water Restoration Act of 1966 which would empower the Secretary of the Interior to impose stronger rules over the location and type of municipal sewage treatment plants, to intervene on serious pollution situations, without waiting for the state to make the first move.

3. We support the Oil Pollution Act in the form that it was reported by the Senate Public Works Committee. This legislation requires certification by anyone applying for a federal license or permit to build installations affecting water quality, and stronger provisions requiring federal agencies to comply with state or federal quality standards.

4. We urge the Secretary of the Interior to act in the case of the thirty states which have failed to adopt water quality standards that would halt further deterioration. The federal government, under the Act, should step in and set the standards.

5. We oppose levying of effluent taxes on industrial wastes. This merely constitutes a license to pollute.

#### C. Air Pollution

1. We once again urge the Congress to adopt amendments to the 1967 Clean Air Act directing the Secretary of HEW to adopt national emission standards on all forms of air pollutants without delay.

2. In 1969, a half dozen states have blocked out effective citizen participation in air quality standards by inadequate notice, last minute changes in the standards, and obscure language. We urge the Commission of HEW's National Air Pollution Control Administration to issue rules which will require each state to provide adequate public notice, in understandable terms, before conducting hearings on proposed air quality standards.

3. Federal enforcement procedures need strengthening by amending the Clean Air Act of 1967 to reduce the time limits for compliance.

4. The greatest single contributor to air pollution is the automobile—producing 86 million tons of pollutants or 60 percent of the nation's total annual air pollution. Despite pollution controls required on new vehicles, the continuing increase in their number will increase air pollution in the next decade.

We therefore urge amendment of the Clean Air Act of 1967 to direct the federal government to limit its purchase of automobiles to models with low emission of pollutants, and to direct the Department of HEW to undertake an expanded research and development program, in cooperation with other federal agencies, to produce pollution-free alternatives to internal combustion-fueled vehicles.

5. We commend the increasing action by AFL-CIO affiliates in effectively participating in local and regional efforts to establish strong air pollution control progress and urge the expansion of such participation.

Senator BAKER. Senator Gravel?

Senator GRAVEL. Thank you, Senator Baker.

I must say, I apologize for arriving late.

I appreciate your testimony, Dr. Taylor.

I have no question at this time.

Senator BAKER. Mr. Edward F. Mannino, of Philadelphia.

STATEMENT OF EDWARD F. MANNINO (DILWORTH, PAXSON, KALISH & LEVY), CHAIRMAN, COMMITTEE ON ENVIRONMENTAL QUALITY OF THE PHILADELPHIA BAR ASSOCIATION, PHILADELPHIA, PA.

Mr. MANNINO. Mr. Chairman and Senator Gravel, my name is Edward F. Mannino, and I appear here today in my capacity as Chairman of the Committee on Environmental Quality of the Philadelphia Bar Association.

Our committee was organized in January of 1970 by our progressive chancellor, Robert M. Landis, to deal with the legal aspects of the declining quality of the urban environment.

Presently one of the largest committees in the Bar Association, the Committee on Environmental Quality has to date supplied assistance to several State legislators in drafting environmental legislation, worked with area law schools in establishing environmental law courses, and cooperated in public information activities with concerned citizen groups such as the Delaware Valley Citizens Council for Clear Air, the Greater Philadelphia Regional Earth Week Committee, and the Chestnut Hill Community Association.

The focus of the committee's concern is the health and viability of the urban environment, since we recognize, with Mayor John V. Lindsay, that:

The city is the environment for a growing majority of our citizens. It would be as shortsighted to save the countryside at the expense of the city as it would be to allow ecology to grow into a middle-class whites-only movement.

Lead poisoning, rats, the filth of the slums are just as much environmental problems as saving the redwoods and healing the scars of strip mining.

It is this concern which motivates our testimony, since air pollution represents the most serious environmental problem presently facing our large urban areas.

The extent of the air pollution hazard to our cities is already manifest. Recent studies have indicated that major metropolitan areas now show air pollution readings of 1.6 to 2.7 on a scale which represents barely adequate air, with my own city of Philadelphia scoring an unenviable 2.2.

Serious air pollution crises have already occurred in recent years in New York—where 100 people died in November of 1966—Philadelphia, November 1966; and St. Louis, August 1969.

Even more lethal conditions are expected to be common in large cities by 1980, with 10,000 deaths in one crisis predicted for a major west coast city by that year.

Already, children in Los Angeles are often denied recess outdoors when the air becomes too polluted for safe breathing during periods of physical exertion.

The outlook has become so bleak that some scientists are now predicting that domed cities or breathing apparatus may be necessary for survival if nothing is done to correct the situation.

The destructive potential of increased air pollution is terrifying. Scientists have causally linked air pollution to such diseases as lung cancer, asthma and other respiratory allergies, bronchitis, emphysema, heart diseases, genetic mutations, and strokes.

Recent studies providing specific figures on the rate of death from bronchitis, emphysema, children's asthma, and eczema, have correlated air pollution with the death rate in metropolitan areas, noting that the most serious impact of air pollution occurs in the poor and black areas of our cities.

Quantifying the impact of air pollution on the death rate, the Stritch School of Medicine of Loyola University recently concluded that deaths per hundred thousand in Chicago averaged 1,949 in high areas of air pollution, in contrast to a much lower average of 1,389 in areas of less pollution.

In addition, air pollution has a high economic cost to every American, costing between \$2 billion and \$12 billion per year—\$10 to \$60 per person—in expenses for cleaning, repairing, and protecting clothing and property.

It is in the context of this enormous public impact of air pollution that the bills presently before this subcommittee must be evaluated.

It is the sense of our committee that this impact requires, at the heart of any legislation dealing with air pollution, adequate safeguards to the right of the public to participate in the formulation, implementation, and enforcement of air quality standards.

Within the framework of this prime guideline, we make the following specific recommendations:

1. We support the provisions of S. 3229 and S. 3546 which would amend section 108(c) (1) of the Clean Air Act to require public hearings prior to the adoption of any State plan for the implementation, maintenance and enforcement of air quality standards.

To require public hearings on the adoption of such standards, without also according the public the right to be heard on implementation plans as well, is unacceptable, for the public is vitally concerned with the pace, scope, and energy, as well as content, of air quality standards.

2. We note that sections 108 (c) (4) and (5) of the Clean Air Act, as they would be amended by S. 3546, do not specifically permit or require the attendance of public representatives at the conferences and hearings provided therein.

The references to "other persons" and "other interested persons affected by the proposed standards" should therefore be changed and expanded to clearly include area residents and other representatives of the public in the affected region.

3. We are also troubled by the prospect that the public hearing may become simply a meaningless litany, performed without reference to its intended function and devoid of any substantive impact.

As Senator Eagleton commented recently upon the Senate floor:

The testimony submitted at these hearings [to set air quality standards for the St. Louis metropolitan area] seemed to have little effect on the Commission's decision regarding standards for the area.

Following numerous appeals for the adoption of more stringent standards for particulate matter and oxides of sulfur, only one minor change was made in the standards originally proposed. These standard-setting hearings should not be perfunctory or routine. They were not intended to be such by the Congress.

The intention of Congress was to provide a meaningful forum for the voice of the public to be heard in the determination of the quality of air citizens will be forced to breathe in the future.

To strengthen public participation in the formulation and implementation of air quality standards, this subcommittee should require the presence at all public hearings of a public counsel to represent the interests of area residents and to develop the record by appropriate cross-examination of witnesses.

There are now before the Senate many bills to establish a Utilities' Consumer Counsel, a Consumer's Counsel, and a consumer's representative in the office of the President.

I think this is an especially meaningful contribution that this subcommittee could make in the area of air pollution.

Such a counsel should be technically qualified and might be trained by the newly formed Council on Environmental Quality established by the National Environmental Policy Act of 1969.

Without such trained experts to probe the foundations of a witness' testimony, testimony purporting to justify lower standards or slow enforcement patterns may go unchallenged and thus be accorded greater weight than it would otherwise generate if all its premises were exposed at the hearing.

Senator GRAVEL. How would you view the funding of this special counsel operation? Where would the money come from?

Mr. MANNINO. I have to confess that I don't understand what the appropriations of this particular committee are. I do support, for example, the other bills, the consumer counsel bills, and it seems to me that the funding should come from them, or whatever the general funding is there.

In the absence of passage of such a bill, it seems to me there would have to be appropriations made by this subcommittee for the particular public counsel that I am supporting here.

It seems to me that the appropriations should then be made by this subcommittee.

Senator GRAVEL. Are you at all familiar with the ombudsman approach?

Mr. MANNINO. I am.

Senator GRAVEL. Do you think that might lend itself to this area?

Mr. MANNINO. I think the problem with the ombudsman approach is the fact that the ombudsman essentially has no enforcement powers but simply functions in an advisory capacity. He is an individual to whom people come with citizen complaints. He looks into them, makes a report, submits his report to the appropriate regulatory body and then must wait and see whether or not the regulatory body takes action.

It seems to me that there are enforcement provisions already built into this bill, some of which I support and some of which I hope could be strengthened.

It seems to me that as far as this limited aspect of the public hearing is concerned, promoting an interchange of ideas and an expose, if you will, of the foundations of witnesses' testimony by having an informed and technically qualified counsel to cross-examine witnesses might make these public hearings a more meaningful exercise and not something that is simply routine or perfunctory.

Senator GRAVEL. Thank you.



Mr. MANNINO. In addition, the participation of a public counsel would more fully develop the public record for the review of the Secretary prior to his approval, or disapproval, of a State plan.

Since the Secretary will be reviewing in most cases a cold record, somewhat in the manner of an appellate court, it becomes doubly important that the credibility and reliability of all witnesses at the public hearings be carefully developed.

4. Perhaps the most important aspect of the three bills now before this subcommittee is that only one of them, S. 3546, provides for private suits to enforce air quality standards, implementation plans, and emission requirements. The private suit is an absolute necessity for effective enforcement.

In this regard, the history of enforcement of the Federal regulatory statutes in the area of trade regulation (antitrust) and securities fraud is most instructive.

In both of these vital areas, Congress and the courts have long relied upon vigorous private suits as a supplement to governmental action to enforce the law, recognizing that the Securities Exchange Commission and the Department of Justice are simply too overworked and could not possibly bring all the suits necessary to enforce these regulatory statutes.

Thus, in *J. I. Case Company v. Borak*, 377 U.S. 426, 432-33 (1964), the Supreme Court found it necessary to read a private cause of action for damages into the proxy rules because:

Private enforcement of the proxy rules provides a necessary supplement to Commission action.

As in antitrust treble damage litigation, the possibility of civil damages or injunctive relief serves as a most effective weapon in the enforcement of the proxy requirements.

Similarly, the Supreme Court characterized private suits as "A bulwark of antitrust enforcement" in *Perma Life Mufflers, Inc. v. International Parts Co.*, 392 U.S. 134 (1968), and refused to recognize a defense of in pari delicto as a bar to such a private suit since "The purposes of the antitrust laws are best served by insuring that the private action will be an ever-present threat to anyone contemplating business behavior in violation of the antitrust laws."

The same impetus to private suits is present here, for it is unrealistic to expect agencies of the U.S. Government to be so conversant with all regional conditions, or adequately enough staffed, to effectively enforce air pollution criteria across the country.

Section 108(c)(13) of S. 3546 would recognize private suits (a) without the need for diversity of citizenship or any specific amount in controversy, (b) of a class or unitary nature, (c) against any person, including a governmental agency, and (d) for declaratory or equitable relief "or any other appropriate order."

In barring sovereign immunity as a defense, and removing the difficult task of measuring the precise amount in controversy, section 108(c)(13) provides a vital assistance to, as well as recognition of, the private suit, and we therefore support it.

I recently came from a suit in Philadelphia where the Tinicum Marshes, a national landmark, are being destroyed by the construc-

tion of an interstate highway in Philadelphia. A suit was brought by the Sierra Club and several other conservation organizations to stop the dredging operations of the highway contractor.

In the course of that suit, several governmental agencies, including the Corps of Engineers, were sued.

Their first defense was that of sovereign immunity. It seems to me that in barring sovereign immunity, this bill, S. 3546, provides a very vital supplement and needed supplement to private suits.

We think, however, that it can be strengthened in several additional ways.

First, jury trials should be specifically provided for to assure that the public will be permitted to sit in judgment on alleged pollution violations.

Second, again as in antitrust and securities litigation, a successful plaintiff should be permitted to recover his costs of suit, including a reasonable attorney's fee, since such costs will typically be large in these complicated suits, and the absence of any hope of reimbursement may bar the institution of any suits.

It is true that a victorious plaintiff in a class suit has a right to counsel fees on an equitable basis, but these depend usually on the creation of a fund, and are hard to value where the benefit conferred is in the form of an injunction against continued pollution.

Third, a cause of action for damages should be specifically provided, both as a deterrent to violations, and as an incentive for prosecution of private enforcement actions.

The present wording of section 108(c)(13), insofar as it would permit "any other appropriate order," may be sufficient to permit a damage award in special situations—the "cleanup costs," for example, of a particularly blatant violation—but a more general and predictable standard of damages is needed.

5. We also support, in general outline, the National Emission Standards Act, title II of S. 3229, and the provisions for Stationary Source Emission Standards contained in S. 3466.

Both of these statutes, if administered with due regard for their importance, will contribute to the protection of the public. We would suggest three similar changes in the text of each, however.

First, a private right of action should be specifically authorized to enforce each statute, for the reasons already discussed.

Second, the coverage of both statutes should be expanded. S. 3229, for example, applies only to emissions which "cause or contribute, or are likely to cause or contribute to, air pollution which endangers the health or welfare of any persons," while S. 3466 applies only to emissions which "contribute substantially to endangerment of the public health or welfare, and (2) can be prevented or substantially reduced."

Since both statutes are establishing standards, and since both provide for exemptions, their coverage should be broadened.

We suggest use of the words of art "endanger or may endanger" as the words of coverage in both statutes, and elimination of clause 2 from section 112(a) of the Clean Air Act, as it would be amended by S. 3466.

Third, both statutes authorize the Secretary to make broad exemptions from coverage.

While an exemption provision is probably wise, both bills should be reworded to require a written statement, to be available to the public, explaining in the necessary detail the basis and reasons for granting any exemption under the statute.

That concludes my statement.

Senator BAKER. Thank you very much, Mr. Mannino.

I will at this point defer to Senator Gravel, if he has any questions.

Senator GRAVEL. I want to compliment you on your testimony. I have no questions.

Mr. MANNINO. Thank you.

Senator BAKER. The same questions I put to the previous witness I will put to you in abbreviated form.

Would you agree in the final analysis that this fight against air pollution is going to have to have some judicious mix of ambient air quality criteria and stationary source standards?

Mr. MANNINO. It seems to me that, at least in major part, they form part of a two-step mechanism.

First, the air quality standards to hold the line, if you will, and, secondly, specific source emission standards which would take the regulation from the general area down to the specific industries which are emitting substances into the air.

It seems to me that there is a very harmonious mix between the two and that both should probably be kept in tandem.

Senator BAKER. I agree with you. I think it is important to remember, if you will agree, that criteria, as such, are not necessarily less stringent than standards.

Mr. MANNINO. That is right.

Senator BAKER. It is a question of how they are interpreted and how they are enforced.

Mr. MANNINO. That is right.

Senator BAKER. Mr. Mannino, thank you very much for your appearance today.

Mr. MANNINO. Thank you, Senator Baker.

Senator BAKER. The committee has now concluded its list of witnesses on this subject, and the hearings are concluded.

(Whereupon, at 11:35 a.m. the subcommittee adjourned subject to the call of the Chair.)



## AIR POLLUTION—1970

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WEDNESDAY, MAY 27, 1970

U.S. SENATE,  
SUBCOMMITTEE ON AIR AND WATER POLLUTION  
OF THE COMMITTEE ON PUBLIC WORKS,  
*Washington, D.C.*

[This day's proceeding was held in executive session and was subsequently released for publication with the full consent of the committee on July 8, 1970.]

The subcommittee met at 2:30 p.m. in room 2400, New Senate Office Building, Hon. Edmund S. Muskie (chairman of the subcommittee) presiding.

Present: Senators Muskie, Spong, Eagleton, Boggs, Cooper, and Baker.

Also present: Richard B. Royce, chief clerk and staff director; Bailey Guard, assistant chief clerk, minority; Thomas C. Jorling, minority counsel; Leon G. Billings, Richard D. Grundy, Adrien C. Waller, and Harold H. Brayman, professional staff members.

Senator MUSKIE. The committee will be in order.

I would like to start by outlining what I think troubles all of us about the concept of national standards, both national ambient air quality standards and national emissions standards. I won't undertake to presume to outline the committee's questions in a way that reflects all of the questions of all of the members of the subcommittee, but I will do it in terms of my own.

It seems to me that when we discuss national ambient air quality standards we are talking levels of quality between the point of no known effects of any pollutant and the maximum effects, whatever they are health, welfare, and so forth.

The standard would be somewhere between those two points. And if it is a national standard nationally applied, the question is whether those areas which are above are required only to come down to that standard—regardless of local requirements—and any areas which are below that standard in effect are permitted to allow pollution up to that standard, whatever it is.

This poses problems for all of us. As far as problem areas are concerned, supported by the testimony over and over again, we depend then upon local control to set higher standards to meet the local problems.

Insofar as the clear, clean areas of the country are concerned, the national standard would be held up by industrial developers as the prudent national goal—to move in that direction which places the people at the local level of trying to insist upon a more stringent standard in an area where there is no problem, in an area which requires industrial growth and development.

Whatever approach we take to this problem, whether it is national standards or regional standards, the objective that we all have clearly in mind is to see that there be some acceptable national uniformity of approach, with variations reflecting local conditions.

Nobody who is advocating national standards has advocated absolute conformity in every area of the country. We thought that, with these questions in mind and other members of the committee have other questions, we might ask you to respond to these observations and give us some suggestions, enlighten us.

**STATEMENT OF DR. JOHN T. MIDDLETON, COMMISSIONER, NATIONAL AIR POLLUTION CONTROL ADMINISTRATION, HEW, AND IRWIN L. AUERBACH, SPECIAL ASSISTANT FOR LEGISLATIVE AFFAIRS, NATIONAL AIR POLLUTION CONTROL ADMINISTRATION, HEW**

Dr. MIDDLETON. I am sure I can respond, and I hope it is enlightening. The purpose, of course, Senator Muskie, and your colleagues, in having a national air quality standard, is to hasten the process and see that in all places that there is action to achieve air quality improvements.

Although there are some exceptions most places do need to have something done to improve their air quality. National emission standards would be designed to be sure that wherever a new industry is located, a significant source of pollution, it would have the same base point from which to work.

Senator EAGLETON. Are you talking about standards or criteria?

Dr. MIDDLETON. We are talking about emissions now, talking about national emission standards.

Senator MUSKIE. In this discussion we will be talking about both national emission standards and national ambient air quality standards and air quality criteria.

Dr. MIDDLETON. I am trying to bring these two things together now.

Senator EAGLETON. I thought criteria would be first. I thought that was the first thing established.

Dr. MIDDLETON. The air quality criteria system that was set up by the 1967 amendments to the Clean Air Act is a mechanism for bringing about the adoption of standards of air quality by the States, a system in which we find great strength, one which the present administration likewise favors.

This system really provides an assessment of the problem, what are the effects of pollutants, at certain concentrations and exposure times upon health and welfare. The criteria documents describe the situation in a way that we hope the States are able to understand. States then must arrive at some decision, which is usually not just an administrative decision but social-political decision, on what kind of air quality that particular place wants to have.

So from the criteria documents which provide the background information, the States in each air quality control region are expected to adopt air quality standards. There can't be any air quality standards insufficient to protect health, but they do have the option of being better.

I think the crux here is that the air quality standards that are being adopted reflect the desired socio-economic status of those particular regions.

The purpose of having national air quality standards is to be sure that wherever you are, not just in selected regions, but throughout the Nation, that no area can be any worse than a level of air quality that will be protective of health.

Senator BOGGS. It would be the same in Wilmington, Del. for example, as it would be in the California desert?

Dr. MIDDLETON. Right, You could not be any worse in Wilmington than in the California desert, based on that being protective of health.

Senator MUSKIE. Then let me ask you this: You are talking about that line between these two programs, these two extremes.

Dr. MIDDLETON. That is right.

Senator MUSKIE. In other words, the national standards you describe accepts the other effects that might be related to a pollutant below the level of health effects?

Senator BAKER. Is it correct to say that Dr. Middleton is describing phase I as the establishment of criteria upon which the States and regions base their own standards?

Dr. MIDDLETON. That is right.

Senator BAKER. Now we are moving into phase 2 where we are saying that States and regions can still establish the standards but HEW is going to establish a national floor so that no standards will be below a certain point.

Dr. MIDDLETON. Perhaps I mean this for discussion purposes of course, pursuant to the chairman's question.

Senator BAKER. Good.

Dr. MIDDLETON. I am trying to make quite clear, with reference to the chairman's comments about a no-effects level, perhaps, background level, as opposed to something that does have a deleterious effect on health and welfare, that a national air quality standard will be one that protects against the minimum adverse health effect.

Senator EAGLETON. That is different than known no effects.

Dr. MIDDLETON. To identify a no-known-effects level is something that would be, in my opinion, not only extremely difficult but very likely not possible.

The question raised is whether the national air quality standard could be at a no-effects level. Yes, it could be set at a no-effects level, but I could not tell you where that level would be, because the knowledge that we have shows there is not any single level where something either begins or stops. There are a series of things taking place. Two things happen: The state of our knowledge is always in flux, improvement, and secondly, it is not that simple a decision, because the causes of destruction of lung tissue, as an example, may be the end result of a series of biochemical effects that occurred earlier and that may be difficult to detect under average observation conditions.

So, Senator Baker, it is that series of events which makes it, I would say, virtually impossible to state quite forthrightly that there is a no-effects level.

Senator MUSKIE. How does that relate to your national ambient air quality standard which you say would be set at the no-health-effects point?

Is that subject to the same difficulty just described for the no-health-and-welfare effects?

Dr. MIDDLETON. The criteria documents state the level at which effects begin, some measurable things that are observed to take place. The Clean Air Act provides that the standards shall be protective of health, which means they must be lesser than the level at which this thing was observed.

In addition, we say that a margin of safety must be included. What the margin of safety is to be is always debatable. Some people say it ought to be 10 times less than the minimum observed effect level; others have different views. That is part of the problem we can't skip over in saying that there is a no-effects level.

Senator MUSKIE. But there is a no-effects area?

Dr. MIDDLETON. We know from the criteria published for sulfur oxides, that at certain levels definite adverse effects occur in the lung. We also know that at a little lower level there are more subtle effects on the action of the lung, and that below that some enzyme system begins to fail or to function improperly.

The no-effect level would have to be somewhere below that, but as science progresses, it is very likely we are going to find still other body chemical systems that are being affected, so the no-effect level always corresponds, you might say, to the limitations of scientific knowledge in this area.

It is because our knowledge is, hopefully, improving with time that review and, perhaps, revise the air quality criteria periodically, there is a need to which, in turn may require different air quality standards.

Senator BAKER. An extension of what we are saying would include an observation, would it not, that even the accumulated background contamination in the air envelope has some effect?

You can't classify even normal background as a no-effect situation.

Dr. MIDDLETON. That is true.

We know that some civilizations have lived for sometime at certain levels of pollution in the air. Whether those levels have an adverse effect is a moot point. I think the question you raise, or the statement you make, can be borne out rather well in the radiological health area, since, in certain areas of Brazil, there are rather high radon emanations. But whether this has an effect on the native population remains a question.

Senator MUSKIE. Let me put it this way, to get away from the technical language now. As regards national standards, ambient air or emissions, what troubles me is that it is not going to be tough enough in a lot of places and is it going to be too permissive in other places?

In other words, if you have a standard above the no-effects level, whatever that is, or the low-effects area, you are not going to give a national standard which is going to be the absence of pollutants. It is going to be some level to permit pollutants up to that level across the country. If that is not so, I would like that clarified.

If that is the case, if what you are talking about is a level, I assume, it is going to be a clearly defined range of numbers, which admits there is some pollution in the air in some parts of the country.

If you can establish that level, then why can't you establish it at a lower level where there is no area underneath it which is permissive of pollution?



Dr. MIDDLETON. I understand what you are saying.

Senator BAKER. What I would like to do is to say that I observed this same question in the chairman's mind in a previous meeting. In thinking about it, I wonder if we are not confusing two questions. One, the machinery by which we try to accomplish our objective, and the other the physical scientific basis for judgment.

I think that in speaking of national standards, as I tried to say a minute ago, we are talking a second step. We have left it up to the States or the regions to establish regional standards.

But we retain the right to disapprove them. Now we are changing that and we are saying we are still going to give you local flexibility and we are still going to have the right to approve or disapprove them, but now we are telling you by specific national ambient air standards that this is the least we will settle for.

This is the machinery part of it. This is how we operate it. Now on the other side the question of where it ought to be set is unanswerable. And it will continue to be unanswerable because we at the legislative department and the executive department through its appropriate administrative channel are going to have to continue to monitor the state of the art, the condition of the world, the economic impact in dislocations, the situation as it continues from year to year and decide what we are going to do about it.

I think it is important to realize there is a difference between setting up the machinery on the one hand and making it work in the other.

I really think we are taking step 2 which is, wisely, the setting of a national standard. I predict that we are going to go on to phase 3 which will be to establish stationary source emissions standards.

Senator MUSKIE. Let me read from this report, national emission standards study, that we requested in the 1967 act, which was ordered April 27.

I take it the national air quality standard is the basis of the administration's recommendations. I would like to refer to page XVII.

A. the Department of Health, Education, and Welfare is to establish national ambient air quality standards. These standards would call for containment of air quality that would protect public health and guard against adverse and environmental and economic effects.

I don't know whether the word "all" is implicit there in that sense, against all adverse environmental and economic effects, or against some.

Whatever it is, it is not indicated in that sentence.

They would be established on the basis of available scientific evidence of the adverse effects of air pollutants.

If there is sufficient evidence, then presumably the standards would be set to avoid any such effects.

Standards would be uniform across the entire Nation, nothing about minimal or maximal. It says these shall be uniform across the entire Nation.

"However, State and local and regional agencies would have the option of establishing standards."

But if you have uniform standards across the Nation, it would avoid all adverse effects of air pollutants and you would not need any more restrictive standards on the local level.

Dr. MIDDLETON. Those words are from our report; that is right. Let me clarify.

What the words in that one paragraph may not convey is also this: It does not say "all," but what it says is that in those cases where standards would protect public health, many of those standards would also guard against environmental effects, such as damage to property, et cetera.

There may be other cases, Mr. Chairman, in which the standards for protection of health may not guard against environmental and economic effects.

That statement does not say "everything." It was not meant to be such a sweeping statement.

Senator MUSKIE. What you are saying in that language is that this would be public health effects standards?

Dr. MIDDLETON. Yes. Let's take the example of the standards being adopted for sulfur oxides. The standard being adopted by the States which are acceptable to the Secretary are less than 0.04 parts per million (p.p.m.) as an annual average.

Most States are coming up with air quality standards that are 0.03 p.p.m. or smaller, the smaller number meaning more stringent. The 0.03 p.p.m. for sulfur oxides would protect against most damage to vegetation and some to materials, but there would always be a low-grade corrosion of metals.

So, in that case, standards protective of health will achieve a very significant degree of protection of the environment. But it is not going to guard against all effects.

For particulate matter, the criteria document states that adverse health effects have been observed at 80 micrograms per cubic meter.

Standards that are acceptable to the Secretary are those less than that number.

The State standard for sulfur oxides in the Denver area is 0.009 p.p.m. as an annual average, but other States are adopting standards that are higher.

The difference in standards largely reflects the differences in public sentiment, attitude, for example, recreation being particularly important in the State of Colorado. Although the particulate matter standard in New York comes out to about 75, in Dade County, Fla., I believe, they talk about 40 micrograms being the standard.

While States must have standards that are protective of health, they are free to do better. It depends on what they want in their particular area.

Senator MUSKIE. Let me ask you this based on the .009 and .03. Which of those figures would be the national health effects standard?

Would it be the .009 or the .03?

Dr. MIDDLETON. I would say that insofar as the national air quality standards concept is described if it were to be based on health, we would be likely to promulgate a standard of .03 p.p.m.

Senator MUSKIE. That would not protect health in Colorado.

Dr. MIDDLETON. It would protect the public health in Colorado. It would protect public health in every community.

Senator MUSKIE. Let me put it another way. Would the national health effects standards be the one which would be the lowest common denominator?

In other words, if meteorological conditions in Denver are such that concentration of a pollutant would also have to be lower than in the rest of the country in order to protect against unfavorable health effects; is that the standard that would be applied to protect against unfavorable health effects in the rest of the country?

Dr. MIDDLETON. The number that would be applied would have to be protective of health everywhere.

Senator MUSKIE. So it would be more stringent in many areas of the country than it needs to be in terms of those areas.

Dr. MIDDLETON. I can't answer you in regard to a specific area.

Senator MUSKIE. Assume a hypothetical, that .009 is the figure represented.

Dr. MIDDLETON. In that case, to take account of Denver's high elevation, we would have to make an appropriate calibration of instruments used to measure air quality or we could, instead, apply a correction factor to Denver's readings. The number in the criteria documents always represent readings adjusted to sea level air pressure and a constant temperature.

Senator MUSKIE. That would be the Denver number?

Dr. MIDDLETON. Let's assume there are equivalents, to be sure we get the issue straight and not the numbers. Let's say .03 is applicable to sea level, or thereabouts.

In Denver the number would still be .03 parts per million, but by virtue of the 5,000-foot elevation and less dense air, a lower amount of actual pollution might be involved.

Senator MUSKIE. So your national standard would not be a national standard in the sense of the first impression you get—there are going to be variations in a national standard.

Dr. MIDDLETON. There is a mechanism to accommodate physical and environmental differences.

Senator MUSKIE. What other factors may dictate modifying the national standard to local conditions?

I am not now talking about more restrictive local standards I am trying to make a distinction between what would be called the national standard, and the local States and communities more stringent standards.

I am talking about the national standards.

Dr. MIDDLETON. Let me be sure we are talking about the issue you brought up, the equivalency. The equivalency is just a matter of correcting the differences in pressure and temperature.

I think we may not be debating from the same premise. If 0.03 parts per million is a number that is measured at modest elevation, it would be equivalent to some smaller number at higher elevations. You would still have a national standard, with the elevation just being reflected in the method of measurement.

Mr. AUERBACH. To the best of my knowledge, the Denver number of 0.009 parts per million, which is far lower than 0.03 parts per million, is not based on any evidence that in Denver you need to limit the ambient air concentration of sulfur oxides to that lower figure in order to be protective of health.

The Denver standard, as I understand it, reflects a couple of factors at least. One, their desire for extremely clean air, and two, the fact

that they do not use very much high sulfur fuel and they can therefore set a very stringent ambient air standard for sulfur oxides.

Senator MUSKIE. The other illustration is relevant to the point we are pursuing this afternoon. But nevertheless it was useful to surface this question of equivalency.

What we are talking about, to summarize a little more, we are talking about a national standard related to unfavorable health effects.

Now you have told us that there would be applied to that standard an equivalency test which would adjust that national standard depending upon variations in temperature and pressure. How about climate?

Dr. MIDDLETON. Let's say the physical environment.

Senator MUSKIE. Would providing for flexibility in the national standard, impose different performance requirements for a different industry, depending upon where it was located simply to meet ambient air standards?

Dr. MIDDLETON. In all probability there would be some of the same equivalency difficulties. The motor vehicle is an example, Mr. Chairman.

If you take a motor vehicle tuned to run in Cincinnati, Ohio, and then you run it in Denver, Colo., you run it rich and you have higher emissions.

So when you ask me will national emission standards be variable, they may have to take into account again elevation because of other compliances. But I am quite sure that the operation of a car at the same elevation as some other chemical process, normally would have a statute to accommodate for pressure and temperature.

Mr. AUERBACH. Even if you have absolutely uniform air quality standards, you will have some differences in the extent of emissions control required of industries in different areas to meet those standards.

Senator MUSKIE. I would like to proceed from this with another question and then I will ask other members of the committee if they would like to pursue this area. I think the discussion has been very helpful to me.

How do national emission standards fit into this concept of national ambient air quality standards?

Dr. MIDDLETON. National emission standards are proposed by the administration to be sure that wherever a large, significant source of air pollution is to be built new, that is, we are talking about new installations, wherever these new installations go, they shall be as clean as they can be.

The best available control systems will have to be used. They may not be adequate in a dense, urban-industrial complex, but they will reduce the pollution from a new plant to whatever degree can be done at that time, so far as technology allows, wherever that plant is located.

So there will be as little transgression as possible upon the air resource, and it will even things out for industry, which will have to control to the fullest possible extent available at that time.

Senator MUSKIE. Would it involve a certification of industry or a plant by the agency, in effect that this industry is as clean as it can be?

Senator BOGGS. Would you have to obtain a permit?

Dr. MIDDLETON. Permits probably would be the simplest way to be sure that a new plant will employ with the best available system for control.

Senator MUSKIE. Is there some danger that this might be interpreted as a license to operate in areas where the community decided on ambient air quality standards, to be consistent with that industry performance potential?

Dr. MIDDLETON. Mr. Chairman, it could be, except for the fact that the States have the latitude of saying, in cases where the best control techniques methodology won't allow them to attain their already determined air quality standards, they may say "Our land use plan does not permit you to build in this area."

It provides flexibility of operations, so that in a highly polluted urban-industrial section, States may decide that a new plant may not be permitted to locate.

Senator MUSKIE. If we were to adopt this concept wouldn't it be well to write into the legislation the clear intent that a meeting of this requirement in the legislation by industry does not obviate the necessity for meeting other requirements?

Under the national ambient air quality standard.

Another question: Would you ever give this kind of a certification to an industry which could not meet the national ambient air quality standard?

Dr. MIDDLETON. I think my answer would be this: The national emission standards proposal before your committee is intended to assure the maximum possible control for new plants.

It is not intended to allow a new plant for which there may not be perfect controls to go into any air quality control region regardless of its impact on air quality.

That is not the purpose. The purpose is to assure that everybody must meet the same performance requirements for new plants wherever they are built, that requirement being the best possible control, so that we begin to do more than just talk about protection and enhancement of air quality. Does that answer your question?

Senator MUSKIE. No. Your agency is going to be setting two kinds of standards, national ambient air quality standards and national emission standards.

So let me put my point this way in the form of a question. Is there any industry, using all of the technology available, that still could not meet the health standard that you are talking about, the national ambient air quality standards, anywhere in the country, in other other words, if we adopt both of these standards, wouldn't we be in effect saying to some kinds of industry, and I don't have any readily in mind, that there is no place in this country where you can operate?

Mr. AUERBACH. You could have situations in which an industry, even with the best technology, moving into a particular area, would still emit enough pollution so that that area—

Senator MUSKIE. I am talking about any area in the country, because you are talking about a national ambient air quality standard that is going to be at the health level.

Doesn't that then mean that you are closing all areas of the country to some kinds of industry? This is a hypothetical at this point?

Mr. AUERBACH. Not necessarily.

Senator MUSKIE. How about asbestos?

Mr. AUERBACH. The ambient air quality standard is applied to the level of pollutant in the air generally rather than to a specific source.

Senator MUSKIE. But nevertheless, we are talking about specific pollutants. You are not talking about specific sources in your ambient air quality standards.

Dr. MIDDLETON. Let's clean this up by degrees.

Asbestos may not have been the best example. If a pollutant is extremely hazardous to health, whether the source is new or old, the Administration is asking that it be subject to natural emission standards. When it comes to other pollutants which are not extremely hazardous in the sense of asbestos, mercury, or some other things, it is unlikely that one of them in a place, with the national emissions standards requiring it to be cleaner than it otherwise would be, would prevent the area from meeting the air quality standards, but if you had more than one you might be at a point and at which air quality would not be satisfactory, even if all the plants were in compliance with the national emissions standards.

Senator BAKER. I think what he is asking is whether or not the establishment of these standards would put industries out of the business in some places of the country because that they could not operate in any place.

Senator MUSKIE. I am not antagonistic to that idea.

Dr. MIDDLETON. I am saying that in the case of hazardous materials it may be possible that they would be put out of business. I guess you would have to end up by saying that is a possibility.

Senator MUSKIE. You are applying this only to a new industry?

Dr. MIDDLETON. That is right; a new installation.

Senator MUSKIE. Shouldn't we provide, in addition to authority to certify that a plant is using all the technology available, that you should deny a permit if that industry would have an unfavorable health effect even after applying maximum technology.

Dr. MIDDLETON. Certainly no plant should be constructed where its emissions would have an adverse health effect.

Senator MUSKIE. Shouldn't you make that evaluation? Shouldn't that be part of your national emission standard policy?

Senator BAKER. Isn't that implicit in the national emission standard policy? Isn't that part of it?

Dr. MIDDLETON. National emission standards, Senator Baker, will be aimed at getting the maximum amount of control possible at that time of construction of a new source.

And the language does not mean that if there is still a health impact, an industry may go ahead and build it anyway. That is not the intent of the legislation. It may be a language difficulty.

Senator MUSKIE. I understand that.

It seems to me that we ought to make it clear that is in the legislation that we are applying two standards to a new industry, maximum technology, plus two, no health effects from its operation after complete control.

Senator BAKER. Is there any dispute of that interpretation?

Senator BOGGS. Dr. Middleton, when we refer to the national ambient air quality standards your thought, as I understand it, would be to

set a standard that is protective of health, whatever that may be. Is that it?

Dr. MIDDLETON. That is right.

Senator BOGGS. It would be written in as part of the standard.

Dr. MIDDLETON. The national ambient air quality standard would be something that was protective of health, and as we say in the report, they would, for most pollutants, also guard against environmental effects.

But you are quite correct that it would be a health minimum.

Senator BOGGS. By using the phrase "protective of health," would that give you a latitude for variance in different areas?

A standard that is protective of health in New York or Wilmington would not necessarily be the same as a standard that is protective of health in the desert, would it?

Dr. MIDDLETON. Not really, Senator Boggs.

This may be an area of a little misunderstanding, since we do not have enough information to respond well. We really do not know to what extent the very dry atmosphere of Arizona, as an example really has some aggravating effect with respect to a given pollutant, so contrasted to another State, Maryland, where the atmosphere a good part of the year is rather humid.

Whether the standard ought to be different because of environmental factors, physical factors, of the environment, I would like to give you an answer for it, but I can't.

But that is one reason why we say that a margin of safety is necessary to be sure that the air quality number takes that into account. I think there is little likelihood that the physical factors of the environment, humidity, temperature, etc. are going to be determining points of really what that air quality standard is.

Senator BOGGS. National ambient air quality standards will be set at a realistic level that can be implemented?

Dr. MIDDLETON. I am very glad you raised that question. The air quality standards, will be protective of health. Surely they can be met, but at different rates in different places, depending upon what kind of air they have now and among other things, what kind of growth they expect. So let's not think that the standard is going to be set at some level solely so that it can be attained.

The ambient air quality standard is being set to protect health. It may be very hard for certain areas to attain that standard.

But it will be attainable after the needed technology, fuels, process changes, and so on are available. I am sure these kinds of things can be attained, because that is where research and development and the ingenuity of private enterprise can see that controlled systems are improved.

I am trying to separate out the fact that a standard, when it is adopted, implies—implicitly says—nothing about whether it is attainable today.

Senator BOGGS. I want to get that clear. A lot of people in our communities may expect immediate implementation. Would that standard seek to make a business stop its operation?

Dr. MIDDLETON. No. What it means, Senator Boggs, is that business must dedicate its resources to achieving the air quality that is desired within, as it says in the present legislation, a reasonable time.

Senator BOGGS. I understand that.

Dr. MIDDLETON. A reasonable time in our outfit is not an awfully elastic time. It has got to be as soon as it can be within the present technology and resources available.

Senator MUSKIE. So there would not be a national time objective.

Senator BOGGS. There would be a state time in the implementation plan.

Dr. MIDDLETON. It is the implementation plan that would have to have a time schedule. The implementation time may be different in different places, depending upon what the starting point is, but it is not a forgiveness factor.

Senator BOGGS. Do you contemplate doing away with the regional plans that we now have in favor of state plans?

Wilmington, Delaware and part of New Castle County, Delaware, is part of an 11-county region. Would you abandon that regional approach for a state approach under the administration plan?

Dr. MIDDLETON. What the administration is asking for in its bill, Senator Boggs, is to have the States indicate where they think the regions should be and the standards they should have and the time schedule, priorities, and resources for attaining those standards in those various regions.

By this answer, I think you will understand, and particularly since the President has asked in his February 10 message for an acceleration of interstate air quality control region designations, that the regional concept is not being destroyed or abandoned.

It is an effort to be sure that the States, in all places, will be controlling air quality.

Senator BOGGS. That is the very point I am trying to make. There is a place for the national ambient air standards and for the regional approach, as Senator Muskie suggests, and a way to tie it all together to move swiftly forward toward the goal we all want, a way to more effectively cover every area of the country. Many of those areas are not covered at the present time.

Can we blend them all together into one bill and do a simplified job of a complicated situation?

Dr. MIDDLETON. I would hope that would be possible. I am sure that it is. Perhaps the language that we sent up to you did not make that eminently clear, but I think parts of it suggest that the intent was to give due regard to intergovernmental jurisdictions, to assign priorities to the various portions of the States, and it was a way of trying to make clear to the States that, yes, you have the capability and you know where your problem areas are and how the regions should be structured.

A State also may have some difficulties in putting its manpower in all places at one time. States would give to the Federal Government a plan which says where their regions will be, what their manpower dedication will be, and their priorities to attain air quality standards.

So the national air quality standard is intended to make sure that there is air quality that is protective of health in all places and that the implementation plans to achieve it are sufficiently regionalized to take care of differences, geographically, concentrations of industry, rural, recreational interests, and the manpower, money, and other resources available to the States.



This is to provide a flexibility, not elasticity to avoid the issue of providing clean air across the Nation.

Senator BOGGS. Thank you.

Senator MUSKIE. Let me ask you this question: It has been raised by Mr. Royce. This is the question of the effects, drastic effects on health, on animal and plant life. Current health effects standards as applied to ambient air quality or national emission levels leave untouched, the area of the effects doesn't it?

Dr. MIDDLETON. We will have national air quality standards for a variety of pollutants. If the health effects level is below that which also brings about adverse effects on agriculture, livestock, plants, then the standard would also be protective of those. But there may be some pollutants, and fluorides could be one, in which the level of fluorides that has a direct personal health impact would be much higher, the number would be larger, Mr. Chairman, than that which would cause damage to livestock and plants.

So, again, we must hark back to the words "guard against adverse effects on the environment." In many cases, a level protective of health would take care of the welfare situation.

Senator MUSKIE. How do we get at those problems?

Dr. MIDDLETON. This is again where the States must make a decision on what their economy, their recreation, their industrial pursuits should be, and adopt a more stringent standard than a health standard if that is in fact the particular interest of the State.

Again, for recreational reasons, environmental concerns, or what have you, it may be the desire of people in that area to have a standard much more stringent than that which protects only health.

Mr. ROYCE. Our hearings in Florida in 1964 revealed an attitude on the part of the State, "Farmers be damned", that phosphate fertilizers industry had a favored clause, so to speak, and certainly in that administration, the State would not have offered the kind of protection that Dr. Middleton has referred to.

There is no assurance that it would now, or that another administration would, where the phosphate industry had a lot more power locally and they would not even allow the local county people to control it.

Dr. MIDDLETON. May I say that I am not suggesting that I know all the information that is going to be in the fluorides criteria document I do not. It may be that there are some health effects at low levels of fluorides, levels that would protect agriculture.

But I think that for the sake of having an understanding here, this is a possibility. Protecting human health does not necessarily guard against environmental effects, such as those in the agricultural sector.

Senator EAGLETON. Doctor, let's just for a frame of reference talk about either sulfur or particulates. Let's make this sulfur.

Do I take it that we would write into the law the specific figure on sulfur, healthwise?

Dr. MIDDLETON. It would be done by an administrative act rather than as a matter of legislation.

Senator EAGLETON. It would not be frozen legislation.

Dr. MIDDLETON. I would like to make eminently clear that writing it into Federal law presents many problems.

Senator EAGLETON. So we don't freeze a figure in by statute. With sulfur, hypothetically, if you were to issue a health regulation today and we passed the administration bill, what would that figure be for sulfur?

Dr. MIDDLETON. It would probably be around 0.03 parts per million as a maximum.

Senator EAGLETON. Let me clarify that. I thought you said earlier it was 0.04.

Dr. MIDDLETON. That is where the health effect first begins, so it would have to be lesser than that to provide protection—a margin of safety.

Senator EAGLETON. If you were issued it today, it would be 0.03.

Dr. MIDDLETON. As a maximum.

Senator EAGLETON. Nationwide?

Dr. MIDDLETON. Nationwide.

Senator BAKER. Adjusted for temperature and pressure and the like?

Dr. MIDDLETON. Thank you.

Senator EAGLETON. Would there be any place in the country where it would be permissible to be above 0.03?

Dr. MIDDLETON. None.

Senator EAGLETON. It would have to be 0.03 in New York, New Jersey, in Pittsburgh, in Cleveland, in St. Louis and in Denver?

Dr. MIDDLETON. Yes.

Senator EAGLETON. What date would it have to be? Because you got into this reasonable rate question, at the day you issue it, it would have to be 0.03?

Mr. MIDDLETON. The timetable for achieving that number in areas would have to be set forth in the State implementation plan.

Senator EAGLETON. If the number is just going to have to be in regulation, that is not good. If the number is going to be there as a pontifical goal, that is baloney, too.

Don't you think we ought to freeze into the statute by saying whatever rate you pick, 0.03, it has to be that by January 1, 1972?

Dr. MIDDLETON. I would say that the implementation plan—stating how that will be achieved in any of those areas—must have dates in it.

It ought to be a short-term date.

Senator EAGLETON. What is short?

Dr. MIDDLETON. Six months. A plan must be adopted in 6 months.

Senator EAGLETON. I am talking about the data, by which it has to be at that point, 0.03.

Dr. MIDDLETON. To set by regulation, one that will be applicable across the entire country denies States the opportunity of considering what the resources are, including control technology, that may be needed but are not immediately available.

Senator EAGLETON. Don't you think there ought to be some date, though, if we are telling the public by passing this, here is a standard that if you are more lenient than this standard, you are injuring people's health?

People don't like to have their health injured. People write letters and the ladies groups come to talk about the problem. By what date ought we be able to tell them their health is safe, no ifs, ands, or buts, in New York City, in St. Louis and in Pittsburgh?

Dr. MIDDLETON. The date at which that could be achieved depends upon a number of other variables.

To have a date by which all of these places must achieve them overlooks differences in what is available for them to achieve it with. If you are in an area that is favored by having plentiful natural gases, as an example, you could say that the date can be much earlier than in an area where they use coal or oil containing more than 1 percent sulfur.

I would have to leave it to your judgment as to whether you thought it was fair, in the best utilization of economic resources, to have a prescribed time.

The thing we have to do is build a pressure system to insure that the best control strategy, is used as soon as it can be—to see that coal is cleaned, that control technology is there, and the available gas supply is being used to the best public interest for air pollution control.

Senator EAGLETON. Bearing in mind as you say, though, the economic impact?

Dr. MIDDLETON. Right.

Senator EAGLETON. Then we are not talking about health, and that is where the nasty battle is involved. If we guarantee the public when we pass a bill, it is going to be a clean something bill, it is going to have a nice label and some people are unfortunately going to believe.

The truth is we are going to be deceiving them because their health in New York City is not going to get to 0.03 in this decade. Would you say that?

Dr. MIDDLETON. I would not say that.

Senator EAGLETON. Then by 1975?

Dr. MIDDLETON. You are closing in on me on a date, I would say 1975 may be a reasonable target date.

Senator EAGLETON. Let's get a date that is a nationwide date by which time everywhere in the country would have 0.03. Otherwise, we are fooling them.

Senator BAKER. 0.03 what?

Senator EAGLETON. I am talking about sulfur.

Senator BAKER. For a national standard?

Senator EAGLETON. A national standard, in total compliance in New York City by January 1, 1972, on 0.03.

Senator BAKER. Are you talking about the quality of the air?

Senator EAGLETON. I am talking about how much sulfur is measured in the air.

Dr. MIDDLETON. I think there is a piece of information I need to give you.

State implementation plans, to be acceptable to the Secretary of Health, Education, and Welfare, must contain, Senator Eagleton, a clear action program, not just a statement, but an action program that will include a plan to prevent air pollution episodes from having a direct adverse health effect. The Clean Air Act does provide the tools to guard against incidents that will have serious adverse effects.

And the States must have time to get air pollution down all the time so that there will be no need to have any interim emergency action.

So I make the plea that you consider the things that will bring about clean air rather than setting a date when this must be achieved,

because the States capability, the fuel resources available, the state of the art of control techniques, the existence of natural or synthetic gas pipeline transmission systems, the Federal Power Commission's policy on using fuels environmental improvement, and other factors have a bearing on compliance dates.

Taking care of these things would allow clean air to be attained in a timely and realistic manner, rather than saying that, by some specific date, you have to do it.

If the state, in adopting an implementation plan, made a finding that they could do it by a specific early date, fine.

Senator EAGLETON. I am trying to force the state of the art, just as you are trying to force the state of the art. You are trying to force industries through research, through the acquisition of new machinery, through the development of new technology to improve what they are doing.

I am trying to force it even further as we did in the Coal Mine Safety Act. For instance, on inhalation of dust, by spelling out a level that is the attainable level under current technology and saying that by about a year from this date it has got to be a .025, rather than .03, and they have a figure and a date and now know what it is going to be.

I would say why not .03 for everywhere in the country by January 1, 1972, or January 1, 1973? But I want to be honest with the people. I am going to tell them it is going to be a little sloppy between now and 1973, but I don't want them to think we passed a clean air act that has variances depending upon the reasonable rate of implementation which goes on endlessly.

Senator COOPER. How can you avoid some reasonable rate?

Senator EAGLETON. By picking a target date which we think is a reasonable period of time in which industry ought to quit injuring our health. We can give Dr. Middleton 2 years, but let us not give the public the impression when we pass this thing they are going to have it done tomorrow.

They are not. I want to tell them what it is.

Senator BAKER. I think no one is attempting to tell the public, least of all the chairman or any other member of the committee, that the passage of this or the Clean Air Act of 1967 ought to automatically make for clean air.

It does not. It represents our best efforts to promote the attainment of clean air.

I don't think the public is being deceived because I don't think anybody on this committee I have ever had any dealings with on either side of the aisle has ever claimed that the legislation is anything other than that.

So if the public is deceived it is going to be on the basis of someone trying to deceive them.

Senator EAGLETON. The public is terribly confused. When we pass these things, if they have the word "clean" in them, "safety" in the, and "health," the public all of a sudden thinks we have done something.

The way I hear it, in New York City, I am not trying to pick on New York, St. Louis may be just as tough, we are not going to have the air down there to .03 in next couple of years.

Let's tell them it is not going to be.

Senator BAKER. Of course, we will, that is part of your responsibility and mine, too. It is no criticism of the title. If you want to change the title so it is the air clean up act, instead of the clean air act let's do it; I think it is a play on words.

But I think it meets the argument you are making. The real issue is do we try to legislate a quality of air or do we try to legislate against the pollution of the air? That is not just a play on words.

As it turns out, this recommendation, which I think is a pretty good recommendation, attempts to meet both of those. It attempts to have an immediate cessation of pollutants from specific sources.

It also tries to establish a time, a reasonable future time when we will have accomplished our objectives. I don't think there is any element of fraud, deceit or political demagoguery about that or in the Clean Air Act of 1967.

I think the magic wish is implicit in this conversation: we wish the problem would just go away.

Senator EAGLETON. What is wrong with an outside time limit on reasonableness?

Senator MUSKIE. Let me suggest another approach. I think there is some advantage in trying to get a deadline in, if it can be done without stretching credibility.

In the guidelines for water quality standards, and we did not write it into the law, a time frame for achieving the first step of cleanup was established under the State's water quality standards.

Are you going to have this kind of a time frame? Do you have one in mind that you will suggest? It would seem to me you have to suggest a time frame for the States and localities for the achievement of their air quality objective, the national air quality objective?

Dr. MIDDLETON. We have not planned, Mr. Chairman, to state that all plans should provide for attainment by a specific time. Rather we take the approach of having our technical people assist the States, look at their implementation plans, look at the realism of what is being planned and the resources available and make some judgments as to whether it is meaningful and realistic in its promptness.

Let me back this up by citing what is happening in the State of New Jersey, where the 24-hour average for sulfur oxides cannot exceed 0.1 part per million. That requires the State to have a plan that says at no time will that be exceeded in a 24-hour period.

That is action we can take now. We don't have to say we are going to do anything. An implementation plan will not be acceptable unless it has provisions for preventing episodes.

But it will still take time to change the nature of the business to get down to .03 p.p.m. all the time on a yearly basis. Doing that over a 3-, 4-, or 5-year period is not as difficult when there is already available a way of assuring that air pollution episodes can be avoidable.

These are the things that ought to be flexible, rather than having a prescribed date for compliance. I'm not taking exception to the idea of having it come very quickly. I would just like the maximum flexibility left in the system so that different options can be exercised in different places, as may be required.

I am the last one in the world who would say, "Take 10 years!" I would like to see it take place in a very short period of time. I would like to be sure it could be done in different ways in different places using their different resources.

Senator EAGLETON. You talk in terms of 6 months.

Suppose we write in this: That within 2 years from the date of issuance of criteria, that is, when you trigger this thing by issuing criteria, you have already removed sulfur, you have removed particulates, and others as well.

Dr. MIDDLETON. The publication of the air quality standard.

Senator EAGLETON. Within 2 years from the date of the promulgation of criteria with respect to a particular pollutant, the nationwide standard must be achieved across the board that is reflected in this report as not injurious to health.

So .03, on sulfur, would be 60 on particulates and you would have 2 years from the date of issuance. There would be no equivocation: there would be an outside limit. Everybody would know that within 2 years from the day of issuance it would be .03 wherever they are standing and breathing in the country.

Dr. MIDDLETON. My difficulty with that is considerable knowing what the state of the art of sulfur oxides control is. But we would have much less of a problem with the particulate matter, as an example. I would like to use that as a point. There may be some pollutants where there can be fast movement to do things, but there are some where you cannot. We are going to be talking about taking lead out of gasoline.

We are going to have air quality criteria for lead.

We are going to take those steps that will look forward to a real reduction in lead in the environment.

We have a motor vehicle population that will require high octane gas for some years.

So you are going to have to take lead out on some scheduled basis. The point of this recitation is that there are some industries which are marginally economically stable, some have resources that can make a change promptly. Some may be in the marketplace and others really don't want to be in it anymore. How do you accommodate all of these variety of things by a national date for control of a particular pollutant?

Senator EAGLETON. Precisely. That is why you are not going to be accommodating by a "national standard." I think that is an illusory term, and I feel very strongly that Congress has done so much deceiving in recent years, unwittingly perhaps, by promising things that later are never produced or fulfilled. If we went the route of the national standard with all due deference to what Howard Baker said, the public is going to believe that that is a standard attained in a specified period of time, not infinity.

I will go along with the theoretical limit, if you tell me that it takes three.

Dr. MIDDLETON. I wish I could say two or three. I think what we are talking about is a need to be sure that the public participates, not just in the standard setting process, but they have a real role to play when it comes to the implementation plan, because two things will happen.

One, the public will know that public hearings on implementation plans would be an occasion to participate and say what they think about the time schedule and, too, the people would understand that the hearing was meaningful, not a fraud, or whatever other word is used here, that there is a way of accomplishing timely and effective emissions reductions.

And if the public participates in such hearings, I think this mechanism is a way of attaining what you seek, Senator Eagleton, without arbitrariness of timing, but using the changing state of knowledge on what is actually obtainable.

Senator MUSKIE. May I open up another line of inquiry here? Incidentally, I think if the record is not closed, this discussion this afternoon ought to be in the record. I think it is the most useful discussion we have had on this issue, and it ought to be in the printed record.

The ambient air quality standard is going to be difficult to achieve in some areas. The time frame for implementation is going to be *x* number of years. It is conceivable that in some areas that standard might not be achieved within any period that you can foresee.

Is that right?

Dr. MIDDLETON. No. I seriously doubt that. I think the levels we have come across in relation to adverse health factors are achievable and they are achievable in short periods of time.

I am quite sure that in the State of California they are moving the sulfur oxides levels down effectively. They have access to very low-sulfur oil and lots of natural gas. If we change fuel policies along these lines, we will see air pollution control take place faster.

In New York City, the State is going to have a tough time. It may take them 5 years if they stay with it and force the fuel market to "come clean."

Senator MUSKIE. If, in that 5 year period, the air quality of New York would continue above the national standard, could new industries move in that would contribute additional emissions of these pollutants in New York City?

Mr. MIDDLETON. The answer is "yes," if, in fact, the implementation plan the State of New York submits after due public process, Mr. Chairman, considers what such new industries will then do to their air quality.

Senator MUSKIE. So the national government would permit an area which is already above the national health standard for sulfur oxide to allow additional new industries which would add to the sulfur oxide content of the air?

Dr. MIDDLETON. If it is in keeping with the desire of the public in that region and will not interfere with execution of the implementation plan. The real issue is protection and enhancement of the air resource. Section 110 of the present act speaks clearly to that as a national policy.

The implementation plans that we expect from the States, for which NAPCA has issued guidelines must have an accountability for areas that now have acceptable air and what plans are being laid to keep them that way.

Senator MUSKIE. What troubles me in setting a national standard, from a different perspective than Senator Eagleton has been making, is that when we say national standards we are saying to people that this problem is so serious that Uncle Sam thinks he ought to set standards to protect the public health.

The regional approach to standards was based upon the proposition that the people in an area, if they are fully informed and have a chance to participate, can then set their own pace in cleaning up their own air.

But when ever you set a national standard, especially one that is going to explicitly be related to people's health, it seems to me that we accept a responsibility to the extent it is possible to assure the purity of that nation's air.

I can see the implementation problem. It takes time to implement. This is the importance of having a time frame. You explained the difficulty of doing that.

But you permit additional sources of this pollutant to be added during the period of implementation, you are stretching out the implementation time without giving you any clue in the legislation that you are permitting that.

A time frame related to what already exists is one thing. But a time frame stretched out because of the additional pollutant sources that you permit is another thing.

Dr. MIDDLETON. We dealt in our earlier discussion with the national emission standards. We spoke to the point that if a standard of emission would not be low enough to provide acceptable air quality in a control region, that such a pollution source failed to fit their land use assignment system, and therefore could not come in.

This may be a partial answer to the question you raised. If New York does clean up its air, New York does clean up to protect health and gets a little cleaner than that, then is that going to mean they are going to allow some more sulphur oxides in the air? There will have to be an administrative mechanism for the accountability for the cleanliness of that air.

Perhaps there is some desirability in having a statement, in the implementation sections of the act, to emphasize the overall policy of the act, namely, protection and enhancement of the air pressure as a goal.

So, if a region becomes cleaner, it may be very appropriate to provide some direction to be sure that it continues to stay cleaner. But I have to hark back to the idea that the national air quality standard concept, the national emission standard concept, and the implementation plan are all designed to provide air quality protective of health and the flexibility for making decisions on whether a region wants the air to be just healthful or whether it wants to have a truly livable environment.

So there are the options.

Senator MUSKIE. The question is to what extent is a national standard something that the Federal Government sets and enforces and polices and uses to protect health?

If the national standard is nothing more than a goal, like criteria, without any national teeth to it, should we be calling it a national standard?

Dr. MIDDLETON. It has teeth in it because the States are required to meet that standard. If they don't, there is an enforcement plan to be sure they do. But the point is whether they should be cleaner than a national air quality standard.

Senator MUSKIE. Let's get back. We are talking about adding other sources of pollutants. You are saying as I understand it, that there is no national control over the situation. Only regional and State control. Whether or not these new sources of a pollutant that drop the quality of the air below the national standard shall be permitted, is



a question for the local, for the State, to decide, not the National Government.

Dr. MIDDLETON. Maybe I misunderstood something earlier. May I rephrase the question this way? Are you asking me if New York attains .03 parts per million, then they decide?

Senator MUSKIE. No, I am talking about the period within which they are moving toward that objective, the time for implementation, at .04, .05, or what have you. The region is moving toward it. It is going to take 5 years to get there. In that period under the national air quality standards, are they going to be permitted to allow any sources of sulphur oxide to come into the area?

When you set for the time for implementation, New York can't anticipate the new sources that they might permit in that time frame. Is it going to be part of their implementation plan that no new sources of that pollutant will be permitted in the city?

Dr. MIDDLETON. I thought I answered that earlier; let me go through it again.

Senator MUSKIE. You did answer it. But the impression I got out of it was that this standard is something to be enforced in accordance with New York's discretion and judgment, and not the National Government.

Dr. MIDDLETON. That may be where I dropped the ball. We are talking about not only national air quality standards, but also emission standards. If some new plant is going to be another sulfur polluter in the New York air quality control region, it is going to have to use the best control process available. If that does not allow New York to achieve the sulfur oxides level it has decided to achieve, they would not be granted a permit to construct such a plant.

Senator MUSKIE. Who will deny that? The National Government then?

Dr. MIDDLETON. We would be asking the State to make a finding, and the National Government would approve it or not. We would disapprove it in a situation in which the control capability was not good enough to allow them to meet their earlier decision on the air quality in the implementation plan period.

Senator MUSKIE. Will you be in the controlling position?

Will you be monitoring these decisions of New York with respect to the licensing of new industries, new powerplants and so on, would you have the veto power over that?

Dr. MIDDLETON. We would hope so, if national emission standards are involved.

Senator MUSKIE. I am not talking about your general authority over it. I am talking about whether or not when somebody comes in to apply for a new plant, and the local agency approves it, with all the safeguards that they think are adequate; does that have to get your approval?

Dr. MIDDLETON. If it is a modification of the implementation plan as provided; yes.

Senator MUSKIE. But they make a judgment that it is not a modification of the implementation plan; does this then go to you? Does their judgment decide whether or not you get a look at it? It is too easy for them so say this is not going to modify our implementation plan.

Do you have a handle on it?

Dr. MIDDLETON. Yes. All implementation plans must take into account the normal growth pattern in the area. In some cases, these plans will not allow for the introduction of major new pollution sources. These decisions will be made as part of the implementation plan approved and covered in our monitoring of progress under the plan.

Senator MUSKIE. Unless the procedure for handling these licenses includes you, you are going to be dealing with a lot of horses gone before you can lock the door.

Senator EAGLETON. Mr. Chairman, if he is included he has the responsibility to protect. Is the Federal Government to issue a Federal order for every new plant built in this country?

Dr. MIDDLETON. No. At most, only for those industries covered by national emission standards.

Senator EAGLETON. In a region that is already "over sulfured," if it adds one microcosm of new sulfur, it is further endangering that region. You would want to stop it?

Dr. MIDDLETON. Every implementation plan is subject to the Department's review and approval. Any alterations in that plan are subject to review and approval.

So, in my mind, there is not any doubt as to who gets to look at them.

Senator MUSKIE. I think that all they will say is "We have looked at this and it does not change the implementation plan, so we don't have to take this to Washington."

Dr. MIDDLETON. We will have news for them.

Senator MUSKIE. National emission standards are related to new plans and the latest available technology. Are you cranking in another one, that you have got to be satisfied in addition, that this will not alter?

In other words, do you have that positive control, that when they come to you for certification of the new source, there are not three checks you will make: One, maximum technology; two, no effects on health; and three, consistency with the implementation plan?

Are those the three?

Dr. MIDDLETON. Those would be the three general criteria.

Senator MUSKIE. The implementation plan would already be on the record. But the decision is made to build a new powerplant under the national emission standards proposal you have to give your approval on the basis of one, maximum technology, consistency with health, and consistency with the implementation plan that is already on the books?

Dr. MIDDLETON. Let me try to answer in this way: If a new powerplant, which is potentially a significant contributor to air pollution, is to be built in the New York region, and it will have the best available control technology—and here, we are talking not just about tack-on hardware, but also about the entire combustion process—and if, in our judgment, that control technology was not adequate to comply with the approved implementation plan for the region, that plant could not be constructed in that area.

Senator MUSKIE. In your concept of the legislation, do you have a clear handle on the construction of new powerplants, new industries of any kind in these control regions?

Dr. MIDDLETON. We would expect, Mr. Chairman, to have State and local jurisdictions make a judgment for our review.

Senator MUSKIE. It would still have to come to you as a matter of routine if you are to have effective control? If local agencies decide whether or not you are to review their decision, that gives you no control.

Dr. MIDDLETON. If it is that loose, that is not the way we want it, and had not intended it that way.

Senator MUSKIE. I think we ought to look into that. By the way, I am now 4 minutes late for another appointment I have got to keep. I think it might be helpful if it is consistent with your own time, if Senator Eagleton and the staff wants to pursue any of these questions, if you will do so. This will also be a part of the record because I think some areas of inquiry that have opened up here as useful.

I think I am much more assured about the concepts than I was before. I think I understand them better. But there are still some questions. Senator Eagleton and I share one of them.

If you will excuse me now so that I can leave I would like to thank you very much for your very informative, educational afternoon.

Dr. MIDDLETON. I appreciate your arranging this opportunity for me to discuss the legislative issues with the subcommittee.

Senator MUSKIE. There are some questions I would like the staff to ask about the adequacy of your staff and your personnel to do this because what we are talking about here is going to involve a lot of manpower.

I can't see much disposition in the administration to provide that manpower. Another question I would like to explore is the first one to which you responded, the area of control regions.

Sources outside the control regions conceivably affect the quality within that regional area. Sources outside a region could affect the control.

So I would like to have some response to the problem that might create. Maybe it is not one.

Dr. MIDDLETON. It is one and we will respond to it.

Senator EAGLETON (presiding). Doctor, let me ask a question and then I will throw you to the lions den of the staff, if I may.

Let's take New York City. We have to deal with one commodity, we will call it sulfur, and with one area, New York City, the metropolitan area of New York City, the New Jersey side.

The first step under any and all proposals is the criteria. They have been published for many months now on sulfur. Then a national standard would be set. I have already asked you and you have answered that if you were to set it today it would be .03. Then the next thing would be to set a regional standard that would in no event be higher than .03, but could be lower. It could be .02 or .25 or .01 on a regional basis.

Then comes the local implementation plan. In point of time, how long should that take from the point I have carried you thus far, from the issuance of the criteria to the filing and approval by you of the plan of implementation for New York?

Do we do that within a year?

Dr. MIDDLETON. Fifteen months under present law: Three months for the letter of intent, 6 months to adopt standards and 6 more to adopt implementation plans.

Senator EAGLETON. Do we shorten that up a little under the administration's proposal?

Mr. AUERBACH. It would be 9 months from the time the national air quality standard is promulgated.

Senator EAGLETON. Nine months from the promulgation of the standard.

Mr. AUERBACH. Promulgation comes after the publication of a proposed standard. First, there is publication, followed by publication of a proposed standard, which may come almost simultaneously, and then a period for comment, followed by promulgation of the standard. Then, 9 months after that, the implementation plans are due.

Senator EAGLETON. In the implementation plan among other things, they tell you in this plan which they file with you and which you must approve or send it back if you disapprove, but very importantly in this plan there will be a schedule, shall I call it of compliance, enforcement?

Dr. MIDDLETON. There should be.

Senator EAGLETON. Would there be a date in that plan which would tell you that by January 1, of year X, everything in New York will be at .03 or below?

Mr. AUERBACH. Yes. There would be a date by which the air monitoring stations that measure air quality in New York City would have to show that sulfur oxides levels at no time exceed that number or whatever number is adopted as the standard.

Senator EAGLETON. Whatever that January 1, X, is all right. If in the submission of that implementation plan New York were to say January 1, 1990, you would posthaste reject that kind of a date as being too ponderously slow.

Mr. AUERBACH. Unacceptable.

Senator EAGLETON. I am not trying to badger you, but you would get down within more reasonable dates. First I said 10 years, you said that would be unacceptable. Five years would be a little closer to the mark; but there would be a date you would find that would be either acceptable or beyond acceptable?

Mr. AUERBACH. It would be a judgment that we would have to make.

Senator EAGLETON. Suppose New York submits to you a plan and their date is 1970—197X, and you find it acceptable within your value judgment, that then becomes the plan. Suppose I am a resident of New York, I am not an industrialist, just a citizen who lives there, do I have any recourse to challenge your reasonable judgment in court?

Dr. MIDDLETON. The opportunity for such a challenge would come at the hearings preceding the development of the plan and the adoption of the regulations.

Senator EAGLETON. I could appear at these hearings and appear before the panel, setting up the implementation plan. I understand that. That record would be a part of the material.

Senator EAGLETON. After it is all down, and you approve 197X, I am satisfied—I am still not satisfied as a citizen of New York. I think you have been too lenient. Do I have any remedy by a class action suit to test the efficacy of your administrative decision wherein you approve 197X?

Dr. MIDDLETON. I can't respond as a lawyer, because I am not one. Provisions regarding class action suits are not included in the legislation, but as I understand it, the States may have laws which provide class action. What is the case in New York, I do not know.

Senator EAGLETON. Would you be opposed to putting in under Federal jurisdiction, the hypothetical right of a citizen of New York to go into the Federal district court in New York and file a class action suit testing your wisdom in approving 197X?

Dr. MIDDLETON. Consideration was given to such a provision in developing the amendments proposed by the administration, but we did not include it at that time. What the position would be now, I don't know.

Senator EAGLETON. Would you give me your best guess with all published criteria—how many do we have out now?

Dr. MIDDLETON. Five. They are for sulfur oxides, particulates, carbon monoxide, oxidants, and hydrocarbons.

Senator EAGLETON. Those are the five that are out and some more are in the middle?

Dr. MIDDLETON. Yes.

Senator EAGLETON. With respect to the five already out, each one of those five has a level that affects health. All places in the country, all places including New York City by 1975 would be in full compliance with the health effects of these five already published criteria?

Dr. MIDDLETON. I would have to give you a personal estimate. I would seriously doubt that the oxidant and carbon monoxide standards would be met in all places by 1975.

Take carbon monoxide, as an example. The motor vehicle is the principal source of carbon monoxide. There are now Federal standards for carbon monoxide emissions from new vehicles. But the nature of the city and the freeway system, the profile of the city, ventilation rate, the number of vehicles, etc., these are all factors affecting carbon monoxide levels and their control.

I don't think we can change the face of cities in a short period of time. So I think, to answer your question, it has to be, "No," it could not be done by 1975. We could make some good inroads but not enough to solve the problem in all places.

We would have more likelihood of controlling oxidants and their irritating effects and so forth in cities that did not have to do an awful lot more control, but that would not include places such as St. Louis, Chicago, Philadelphia, New York, and Washington.

It would take some what longer in those cities than, say, in Des Moines, Omaha, or some other places without large urban centers and with favorable atmospheric conditions.

Senator EAGLETON. This is where I get hung up on a national standard. If indeed it is national, for all 50 States, then it would seem to me that it ought to be attainable within a reasonably foreseeable period of time, applied nationwide, with no exceptions, or then in truth it is not a national standard, and we are right back where we are.

Dr. MIDDLETON. Senator Eagleton, I would like to phrase it this way: The present Clean Air Act is a Federal plan calling for the States to go about their business in an orderly way to achieve effective air quality. Setting a national air quality standard is a further

step in that direction, declaring, as a matter of national policy, that air quality in all places must be uniformly protective of health.

The States will have the responsibility of developing the mechanisms whereby they are going to achieve that standard. So the value of a national air quality standard is that of making a statement at the highest level of government that the quality of air in all places has to be protective of health everywhere, while the States achieve that standard and the rate at which depends upon the severity of the problem, what the fuel resources are, and the other things we talked about earlier.

So my view is that, even if you have the States adopt these as State standards, they are not going to be able to attain them any sooner than the fuels and controls needed become available.

So I think the benefit here is that you have a Federal policy statement that as a matter of national position, we must achieve this quality of air in all places.

Senator EAGLETON. That is where you and I disagree. You say there is a benefit to be gained by telling the public that we have a national standard which you say is really a national goal.

With respect to carbon monoxide, it is a totally utopian goal. This can't be achieved in New York in the foreseeable future with automobiles such as they are.

We tell the public we now have this national standard, our goal, and as a practical matter New York probably is not going to reach it perhaps even in my lifetime.

Dr. MIDDLETON. I cannot concur in that prediction.

Senator EAGLETON. You say it is then beneficial to have a national goal. I think goals are wonderful. But I think it is detrimental to mislead the public into thinking that this is going to clean up their air within a foreseeable period of time.

The public does not look now into eternity and does not look much into the 21st century. The public wants to know how bad are things now and how quickly we are going to improve them.

I just don't see that a national standard, unless you set specific target dates, is really helping to achieve anything, beyond what you are presently doing, because you have the right to reject regional standards now. I think you have rejected some.

Dr. MIDDLETON. Yes; we have.

Senator EAGLETON. I guess it is just applied here—this is a blind spot with me.

Dr. MIDDLETON. It is not blind. You make it eminently clear. [Laughter.]

Senator EAGLETON. I think that the Ladies Garden Club of Long Island if you have a national standard, is going to think that this is going to be attained in a reasonably short period of time.

And it is not going to be attained in a reasonably short period of time.

Mr. ROYCE. How many people do you have on this job in the agency now?

Dr. MIDDLETON. At the end of the 1970 fiscal year, the ceiling is 1,016. Our ceiling before that was 1,065. We presently have about 1,000 people employed.

Senator EAGLETON. I see.

Mr. ROYCE. What is your statutory authorization?

Dr. MIDDLETON. I don't think there is a statutory authorization. I think the budget includes dollars. But I don't think the budget includes positions.

Mr. ROYCE. What is the estimate of your needs in terms of manpower to fulfill the missions that have been assigned in the Air Quality Act of 1967?

Dr. MIDDLETON. When we testified before the House committee, we said at that time that our manpower need was about 1,500 to 1,600, I think it actually is nearer 1,700.

Mr. ROYCE. In what programs is there the greatest short fall in manpower?

Dr. MIDDLETON. That is difficult to answer because, to stay within the departmental ceilings, we have had to cut back in many areas. I think our most inadequate program activity is in the health effects research area. Another one that is short of personnel is research and development on control technology. Because of the specific allocation of increased funds for section 104 in fiscal 1970 without any alterations in ceiling, we've been obliged to readjust expenditures to provide for R. & D. and minimize the efforts in the other areas. Another area in which we don't have as many people as we ought to have is our motor vehicle compliance area.

Certainly, our staff for providing technical assistance to the States is minimal, at best.

Mr. ROYCE. And with the new direction that would be recommended in the pending legislation, having just said that your greatest constraints are in the area of criteria and standard setting, what effect would the new legislation have, or putting it another way, what effect would this manpower shortage have on implementation of the pending legislation?

Dr. MIDDLETON. I believe we sent in response to a question from the committee, a preliminary estimate of 200 people.

Mr. AUERBACH. I think, in response to that question, we said, with respect to the specific new activities that would be authorized under the administration bill, 200 additional people would be needed as a starter.

That is for totally new activities: Assembly-line testing, regulation of fuels, setting of emission standards. That is just for the specific new activities and does not speak to the question of personnel for ongoing activities.

Mr. ROYCE. I understand that there has been some reclassification of temporary intermittent and part time employees that normally would not be considered under the ceiling limitations.

I don't know how much of this is going on in other agencies but if this were to be so, what effect would this have on your programs?

Dr. MIDDLETON. It would have a very serious effect because the intermittents, as they are called, irregular hour employees, are people that get much of the work done.

They are largely in the lower civil service categories, performing the necessary clerical tasks, a whole variety of just hard work. We have tried to minimize the reduction in professional personnel and use intermittents as a backup to give the professional the support they need.

I think the first estimate we have of what the impact will be is that there may be something like 150 to 200 people that we simply won't be able to employ. I am not sure of that figure. Mr. Auerbach says it is 270 and we are supposed to go down to 180. That is a reduction of 90. I was high.

Mr. ROYCE. Those people are not included in your earlier figure of 971?

Mr. AUERBACH. That is right. That 971 relates to full time permanent employees.

Mr. BILLINGS. Does the figure of 200 additional people change if you reimpose the requirement?

Dr. MIDDLETON. That is just to move toward regulation fuel additives and fuel composition, setting national emission standards, and initiating the other new activities. It does not take into account things we talked about earlier.

Mr. BILLINGS. This is a question you undoubtedly can't answer now. It would be helpful if we could have it at some point.

If there were a statutory requirement to publish the criteria which you have presently planned to publish within 18 months of enactment, how many people would that take, in addition to the 200?

Dr. MIDDLETON. Your question, as I understand it, is if we were required, within 18 months, to publish all air quality criteria that are presently contemplated?

Mr. BILLINGS. That is right. As well as control technology information. This question includes sort of a slide because that means as well as issuing those you are going to have also to have the staff approve the standards for them as well.

Dr. MIDDLETON. I can't give you an answer to that question, because we would have to see what additional services are likely to be required from the National Academy of Sciences and our other advisory groups and the contractors we rely on.

Mr. BILLINGS. Would it be possible to get some kind of a guess?

Dr. MIDDLETON. We could give you an estimate of what the manpower needs would be. There are of course just physical limitations on getting advice, calling and holding meetings, evaluating the scientific data, and so on.

Mr. BILLINGS. As an associated question, this may be one that you can't answer. Do you have any idea when we will get the manpower study?

Dr. MIDDLETON. Yes.

Mr. BILLINGS. Will it be this year?

Dr. MIDDLETON. Yes.

Mr. BILLINGS. Possibly before the first of June?

Mr. AUERBACH. Not before June 1.

Dr. MIDDLETON. I think the manpower report has been completed in a way that would permit its being done before the end of the fiscal year.

That may turn out to be an optimistic estimate.

Mr. BILLINGS. Do you recall in 1967, I believe before the subcommittee, a chart was prepared which compared the amount of time it would take to develop and apply national emission standards, versus the time it would take to develop and implement the concept authorized by the Air Quality Act.



Do you remember that chart? It was a graphic; it was very pretty, as I recall.

Mr. ROYCE. I believe it did not apply to national emission standards.

Mr. BILLINGS. Whether or not it did, it would be helpful to the committee, I think if we get back into executive session to be able to present to the members some kind of a time schedule on a program which required development criteria, promulgation of national ambient air quality standards, time for the development of more restrictive regional air quality standards, development and issuance of national performance standards for both hazardous substances and new plants, and the right of local implementation plans to implement either the national standard or the regional standard and to take into account the national standards.

It might be most useful to, assuming the pollutants for which criteria are to be issued in January or February of next year. Would that be possible?

Mr. GRUNDY. I have a question related to national emission standards which ties into criteria, namely, does the administration bill propose national emission standards for hazardous materials?

Do you see both an air quality criteria and a recommended control technology document for one of these hazardous materials before you issue emission standards for them?

Or could you go ahead?

Dr. MIDDLETON. Publication of national emission standards for extremely hazardous materials will not necessarily depend on publication of air quality criteria. There is enough available information for some specific items to move with dispatch.

Mr. GRUNDY. Some of the materials you have listed are in the category of hazardous materials. So you say you do not have to wait for the issuance of that criteria according to this projected schedule.

Dr. MIDDLETON. Let me restate something. The control of extremely hazardous materials need not wait upon the publication of criteria documents for such pollutants. We have enough information to know that we can do something. We know how long it takes to produce a criterion document. Just the mechanics of getting advice, the process of getting the facts laid out and evaluating them, consumes a lot of time.

So we would think in the case of criteria for hazardous materials, then it may not be necessary to wait.

Mr. GRUNDY. And then place that requirement upon the issues of the criteria?

I would like to be able to tell you; yes, we can manipulate the time schedules of all of these people, consultants, and so on, to get criteria out faster, but life doesn't usually go that way.

Mr. BILLINGS. I have one more question on hazardous substances. As a general rule, are you talking about getting near zero on these concentrations?

Dr. MIDDLETON. There may be instances where there would be no emission permitted. Most of them would probably be non or extremely little.

Mr. GUARD. I think it has been very helpful, Dr. Middleton, especially in defining the relationship which we have been seeking between

national ambient air quality standards and regional definition of air quality standards.

It seems to me we are saying essentially that the people are the same everywhere, and therefore be protective and be uniform.

Then to go further, where a locality or a State wishes to go down the criteria scale and pick up visibility effects, and other effects which require more stringent control than the national standard, they can do so, but do so at the regional level.

Is this a fair description of an appropriate relationship between the national ambient air quality standard to be protective of them, of the health.

It seems to me it ought to be written in the act, promulgated by the Secretary of Health, and the locally defined regional standards which might be more stringent.

Dr. MIDDLETON. I think you stated the issue very well; I like the language in the national emission standards studies report which says that national air quality standards will protect the public health and guard against environmental effects. There are many pollutants in which the protection of the public health sort of automatically protects the environment, but to limit it to just health may be too restrictive.

But your point is very well taken in the sense that local decisions are necessary on what kind of an environment they wish to have.

Mr. GUARD. These reflect local differences in geography, location, and climatology.

Dr. MIDDLETON. And economic pursuit.

Mr. GUARD. So it is appropriate to have differing regional standards to meet those criteria. But to the extent that you are setting a standard that is protective of health, and that people are the same, reacting the same, this is most appropriate as a national standard.

Dr. MIDDLETON. Across the board, right. That is why we say "national" air quality standard.

Mr. JORLING. I would like to pursue a related series of points. You have mentioned land use controls as effective views in achieving air quality. Do you have or do you anticipate guidelines or requirements governing that must be included in implementation plans for approval?

Mr. AUERBACH. Our present guidelines for development of air quality standards and implementation plans suggest strongly that States consider air quality factors in their land-use planning.

Mr. JORLING. Land use is not mentioned in existing law with respect to implementation plans. Would it be helpful if, as a guideline in the development of implementation plans, land use requirements were included?

Dr. MIDDLETON. I think it would be a useful addition because it asserts again a necessity for people to make decisions regarding their total community living standards.

May I add that in speaking recently to the heads of the State industrial land development agencies, I found they were glad to know that plans envisioning utilization of space were a proper consideration in air quality improvement.

Mr. JORLING. With the omission in existing law are States inclined to be slow about using land use and would such restraint be removed as an obstacle if it were made a part of the Federal statute?

In other words, if now you required a land-use control program of some sort in your implementation plan prior to approval, there would be some States that might comply, others would that would have compliance and others would affirmatively resist because they would question your authority to require land use as a part of the implementation plan.

That could be overcome if it were made an affirmative part of the statute.

Dr. MIDDLETON. I am not sure that would be as beneficial as pointing out that it should be a consideration, because there may be areas in which land-use planning is not going to be readily developed.

But I think that getting the idea across that land-use planning is a potentially very important tool in air quality management ought to be recited.

Mr. BRAYMAN. Would it be practical to require that a nondegradation plan be incorporated into every State's implementation plan? To put it another way, each State would have to establish a policy of nondegradation in certain areas.

Dr. MIDDLETON. Since the Clean Air Act states, in section 101, that it is national policy to protect and enhance air quality, I think it would be very appropriate to have this policy reiterated in the other sections, where action is prescribed.

I am sort of against the word, "nondegradation." I think there is a more positive way to say it—protection and enhancement.

Mr. BRAYMAN. You mentioned monitoring of the ambient air. How adequate is current monitoring? Is there any relationship between this adequacy and the ability to implement national standards?

Dr. MIDDLETON. My response would be this. National air quality standards can be set without dependence upon a monitoring system. But to determine the percent improvement required to meet that standard, we must have a decent monitoring system, and certainly, to see whether the implementation plan is achieving the standard requires that we have a highly adequate monitoring system.

Our monitoring today is highly dependent, as it should be, on the State and local governments. I feel that it is inadequate now and should be considerably extended.

I think we need also to give consideration to having more stations in rural areas so that we have a fix on what air quality is in some of those sections. Since most of our air quality data comes from State and local governments who have programs in urban areas, we have very little information in rural areas as background data.

Mr. BRAYMAN. What authority do you need—do you have—to force States to build more monitoring stations?

Dr. MIDDLETON. I think we have the authority. Our problem is another one, financial and manpower.

Mr. BRAYMAN. One last point. You mentioned lead and gasoline. Is there any causal relationship between leaded gasoline and health effects?

There is clear evidence that the added lead in the environment is man is higher in urban areas than it is in rural areas.

There is clear evidence that the added lead in the environment is coming primarily from the use of leaded gasoline, and the question of what is a direct personal adverse health effect is unclear.

I mean the word "literally." There is evidence to show that a particular ALA enzyme system may be upset by increased lead in the body.

What the impact of that on one's health is still a question. I guess what I am saying is that there is no direct evidence today to show that lead in the air environment is killing people, but there is evidence that lead is increasing, and the fact that it does have adverse effects on processes that are essential to life's activities poses a real hazard to man's health, one that we should now anticipate and start working toward preventing.

I am trying to draw a clean line between the real conservative physician who has to have a dead body in hand and say death is caused by lead, as contrasted to one who is concerned, as a biochemist, about the health impact of altered biological systems in man.

We have evidence to suggest that there is a telling biological implication, and no evidence to show that people are actually dying today solely from breathing lead.

So it is truly an environmental issue. One sees lead levels going up in water, in soils, in foodstuffs, in vegetation. Man consumes these lead-burdened materials and we can show lead inching up in man.

Mr. AUERBACH. I might add that a brief statement on this subject was submitted as part of one of the responses to the questions from the committee.

Mr. BRAYMAN. In other words, there is evidence that lead in the atmosphere does, in fact, get into the human body.

Mr. AUERBACH. Yes. About 95 percent of the lead particles emitted by the motor vehicle are less than a half microgram in diameter and they are all inhalable.

Mr. BRAYMAN. And they are, in fact, inhaled?

Mr. AUERBACH. What percent is retained. I can't tell you.

Mr. MAYNARD. It is cumulative; is it not?

Dr. MIDDLETON. Lead particles of that size are inhalable, they can be retained and also can be exhaled. I can't tell you what percent is retained. It depends upon a lot of variables, the size of the lung, its status, breathing rates et cetera.

Mr. JONES. Dr. Middleton, under the existing law, a great many regions here have been established for standards and implementation plans are awaiting approval by HEW. My question is how would that situation be dovetailed into the administration bill in the event it were enacted under section 10 which says that these plans shall not be considered invalid?

Would you elaborate a little bit about how you dovetail the existing situation into this 3466?

Mr. AUERBACH. Air quality standards and implementation plans that are coming into being under the existing act would remain in effect until they were superseded by any different standard and plans. Where a region already has air quality standards that are equivalent to or more stringent than the national air quality standards and a plan for attaining them that plan would remain in effect.

Mr. JONES. Supposing it were less, then they would not go through?

Mr. WHITE. I have a question as to the practicality, the practical way that these regional plans are being drawn up. Do you see an actual regional cooperation between the states and between the counties that

are members of these regions, or do you find that the States act independently of what the other States want and need according to their own interpretation of their needs?

Dr. MIDDLETON. The States, as individuals, have shown good cooperation among their political subdivisions in getting their place of the air quality control region taken care of. As far as I can tell, there has been very little integration of the plans among or between the States.

Mr. WHITE. So do you have actually regionally planning between States? You have regional planning with the State, but not between the States?

Dr. MIDDLETON. One can see regional planning within a State, but there is little evidence of regional planning among the States. It does take place on certain rare occasions.

I could cite the case of Indiana and Illinois which worked rather closely together. There are other occasions where States did not, for whatever reasons, choose to work closely together. Let me emphasize this point by saying that no State has asked for funds for regional planning under section 106.

Mr. BILLINGS. Have you ever issued regulations to the States for seeking funds?

Mr. AUERBACH. We have issued guidelines.

Mr. BILLINGS. Do you have a copy?

Mr. AUERBACH. We will get you one.

(The document referred to follows:)

#### GUIDELINES FOR AIR POLLUTION PLANNING GRANTS

##### PREFACE

The 1967 amendments to the Clean Air Act (Public Law 90-148) provided for an intergovernmental system for the prevention and control of air pollution on a regional basis. To put this system into operation, the Department of Health, Education, and Welfare must designate air quality control regions and issue air quality criteria and reports on control techniques. State governments then are expected to establish air quality standards for the air quality control regions and to adopt plans for implementation of the standards. The air quality standards and implementation plans must be submitted to the Department for review.

The Act further authorizes planning grants to help expedite the establishment of the air quality standards and implementation plans.

This document provides information regarding planning grants and the purposes for which grant funds may be utilized.

##### THE CLEAN AIR ACT

Planning grants are authorized under Sections 105 and 106(a) of the Clean Air Act, as amended, as follows:

##### "GRANTS FOR SUPPORT OF AIR POLLUTION PLANNING AND CONTROL PROGRAMS

"Sec. 105. (a) (1) The Secretary<sup>1</sup> is authorized to make grants to air pollution control agencies in an amount up to two-thirds of the cost of planning, developing, establishing, or improving, and grants to such agencies in an amount up to one-half of the cost of maintaining, programs for the prevention and control of air pollution and programs for the implementation of air quality standards authorized by this ACT: *Provided*, that the Secretary is authorized to make grants to air pollution control agencies within the meaning of sections 302(b) (2) and 302(b) (4) in an amount up to three-fourths of the cost of planning, devel-

<sup>1</sup> See Appendix A for definitions of terms used in the following sections of the Clean Air Act.

oping, establishing, or improving and up to three-fifths of the cost of maintaining, regional air quality control programs. As used in this subsection the term 'regional air quality control program' means a program for the prevention and control of air pollution or the implementation of air quality standards programs as authorized by this Act, in an area that includes the areas of two or more municipalities whether in the same or different States.

"(2) Before approving any grant under this subsection to any air pollution control agency within the meaning of sections 302(b)(2) and 302(b)(4), the Secretary shall receive assurances that such agency provides for adequate representation of appropriate State, interstate, local, and (when appropriate) international, interests in the air quality control region.

"(3) Before approving any planning grant under this subsection to any air pollution control agency within the meaning of sections 302(b)(2) and 302(b)(4), the Secretary shall receive assurances that such agency has the capability of developing a comprehensive air quality plan for the air quality control region, which plan shall include (when appropriate) a recommended system of alerts to avert and reduce the risk of situations in which there may be imminent and serious danger to the public health or welfare from air pollutants and the various aspects relevant to the establishment of air quality standards for such air quality control region, including the concentration of industries, other commercial establishments, population and naturally occurring factors which shall affect such standards.

"(b) From the sums available for the purposes of subsection (a) of this section for any fiscal year, the Secretary shall from time to time make grants to air pollution control agencies upon such terms and conditions as the Secretary may find necessary to carry out the purpose of this section. In establishing regulations for the granting of such funds the Secretary shall, so far as practicable, give due consideration to (1) the population, (2) the extent of the actual or potential air pollution problem, and (3) the financial need of the respective agencies. No agency shall receive any grant under this section during any fiscal year when its expenditures of non-Federal funds for other than nonrecurrent expenditures for air pollution control programs will be less than its expenditures were for such programs during the preceding fiscal year; and no agency shall receive any grant under this section with respect to the maintenance of a program for the prevention and control of air pollution unless the Secretary is satisfied that such grant will be so used as to supplement and, to the extent practicable, increase the level of State, local, or other non-Federal funds that would in the absence of such grant be made available for the maintenance of such program, and will in no event supplant such State, local or other non-Federal funds. No grant shall be made under this section until the Secretary has consulted with the appropriate officials as designated by the Governor or Governors of the State or States affected.

"(c) Not more than 10 per centum of the total of funds appropriated or allocated for the purposes of subsection (a) of this section shall be granted for air pollution control programs in any one State. In the case of a grant for a program in an area crossing State boundaries, the Secretary shall determine the portion of such grant that is chargeable to the percentage limitation under this subsection for each State into which such area extends.

#### "INTERSTATE AIR QUALITY AGENCIES OR COMMISSIONS

"SEC. 106. (a) For the purpose of expediting the establishment of air quality standards in an interstate air quality control region designated pursuant to section 107(a)(2), the Secretary is authorized to pay, for two years, up to 100 per centum of the air quality planning program costs of any agency designated by the Governors of the affected States, which agency shall be capable of recommending to the Governors standards of air quality and plans for implementation thereof and shall include representation from the States and appropriate political subdivisions within the air quality control region. After the initial two-year period the Secretary is authorized to make grants to such agency in an amount up to three-fourths of the air quality planning program costs of such agency."

## KINDS OF PLANNING GRANTS

Planning grant funds may be used for the same general purposes, whether awarded through the authority of Section 105 or Section 106. The principal difference between these authorizations may be summarized as follows:

Item	Section 105	Section 106
Who are eligible for planning grants.	State, local, intermunicipal or interstate air pollution control agencies.	In federally designated interstate air quality control regions, any qualified agency designated by the Governors of the affected States.
Limit of support authorized..	Up to two-thirds of costs for State or local control programs, and up to three-fourths for intermunicipal or interstate control programs. Not more than 10 percent of total funds appropriated for purposes of sec. 105(a) may be awarded to programs in any 1 State.	Up to 100 percent of costs for 2 years. Up to three-fourths of costs subsequently.
Non-Federal expenditure requirements.	Except for nonrecurrent expenditures, annual non-Federal expenditures cannot be less than during year preceding grant.	None specified.

Guidelines for the development of air quality standards and implementation plans in Federally-designated air quality control regions have been prepared by the National Air Pollution Control Administration, and are available upon request. Basically, required by those guidelines, are the assurance throughout such regions, of (1) acceptable air quality standards, (2) appropriate limitations of pollutant emissions to attain such standards within reasonable time schedules, and (3) necessary governmental agencies suitably empowered to accomplish their implementation.

## GUIDELINES FOR APPLICATION

I. Planning grants authorized under *Section 106* of the Act are for the purpose of expediting standards and plans in Federally-designated interstate air quality control regions. The following principles will be applied for such grants:

A. Only one planning grant will be made in an air quality control region, and the grant shall be for the purpose of developing plans for the entire region.

B. Primary uses of the grant funds are as follows.

## 1. For standard setting

a. Expenses related to meetings and hearings of the planning agency for initial planning and for decision-making regarding air quality standards to be recommended.

b. For supplemental data collection or analysis essential for standard setting, providing after consultation it is determined that control agencies operating within the air quality control region do not already possess sufficient information for such purposes, and are not able to provide the necessary supplemental data within the time constraints imposed by the Act.

## 2. For implementation plan development

a. Expenses related to meetings and hearings for decision-making recommendations on such matters as:

- (1) Strategies for achieving air quality standards
- (2) Schedules for achieving air quality standards
- (3) Emission standards
- (4) Schedules for application of emission standards
- (5) Organizational structure (s) for execution of plans
- (6) Criteria for defining emergency situations

b. Expenses related to development of long-range plans for pollution control through participation in planing for such measures as:

- (1) Relocation of major sources such as power generation facilities, industrial processes, and incineration of solid wastes
- (2) Control of community form and land use
- (3) Modifications in mass transit systems and highway design and locations
- (4) Changes in fuels
- (5) Control of sources, as could result from increasing population or planned expansions, which can be expected to cause the air quality standards to be exceeded

3. For supplemental data collection or analysis essential to development of implementation plans, providing after consultation it is determined that control agencies operating within the air quality control region do not already possess sufficient information for such purposes, and are not able to provide the necessary supplemental data within the time constraints imposed by the Act.

C. The planning agency designated by the Governors shall have representation from each State and appropriate political subdivisions in the region.

D. These grants are not subject to the ten percent limitation to any one State as specified in Section 105(c). However, in making planning grant awards, consideration will be given to other types of program grant support being given to control agencies within the region. Use of such program funds for planning will be encouraged where feasible.

E. Up to 100 percent of the planning costs for interstate air quality control regions may be paid for a maximum of two years. Any subsequent planning grants to the planning agency are limited to 75 percent of the costs of such planning. If such subsequent planning is to be done by an air pollution control agency, rather than a planning agency, the guidelines for planning grants authorized under Section 105 shall apply.

II. Planning grants authorized under *Section 105* can be awarded only to air pollution control agencies, in accordance with Section 105(a). This applies in all Federally-designated air quality control regions, as well as for planning in non-designated regions whether intrastate or interstate. The following principles will be applied for such grants:

A. The matching ratios for planning grants to control agencies are the same as for any other project grant authorized under Section 105. An agency receiving maintenance support may simultaneously receive a planning grant provided project matching funds are furnished. Such matching funds may be classified as nonrecurrent in accordance with the principle employed in Section 56.4(i) (vi) of the Regulations (42CFR56).

B. Only one planning grant will be made in a Federally-designated intrastate air quality control region, and the grant shall be for the purpose of developing plans for the entire region.

C. Grants to plan regional air quality control programs in non-Federally-designated areas will be made only for projects calculated to lead to programs which will assure air pollution control throughout an area sharing a common air pollution problem. Such grants will be made only to agencies having air pollution control authority throughout such area, except that if such area extends into two or more States, not subject to regulation by an interstate air pollution control agency, and the control agencies of each of the States agree upon a cooperative project for the purpose of developing an interstate regional air quality control program, separate grants can be made to each State to help pay its share of the costs for planning. In reviewing applications for such planning grants, consideration will be given as to the likelihood that a Federally-designated region incorporating the same general area is to be established within a relatively short period. In such situations, should the Governors elect to appoint a different group to recommend air quality standards and an implementation plan, support to the original project would need to be terminated and data collected thus far yielded to the agency appointed by the Governors.

D. The State air pollution control agency will be consulted regarding any planning grant application to determine the relationship of the proposed project to the State plan for air pollution control.

E. These grants are subject to the ten percent limitation to any one State as specified in Section 105(c).

III. To assure conformance with Section 5 of the Bureau of the Budget Circular No. A-80, all planning grant applications must include the following:

A. Identification by the applicant of planning activities being carried on for related programs within the air quality control region, including those covering a larger area within which such region is located, sub-areas of the region, and areas overlapping the region. Examples of related programs include those concerned with urban renewal, solid waste disposal, mass transit systems, and highway construction.

B. Evidence of explicit arrangements that have been or are being established by the applicant to assure maximum coordination with such planning activities.

C. Evidence of cooperative arrangements that have been or are being made by the applicant respecting joint or common use of planning resources (funds,



personnel, facilities and services, etc.) among related programs within the area.

D. Evidence that planning being assisted will proceed from base data, statistics, and projections (social, economic, demographic, etc.) that are common to or consistent with those being employed for planning related activities within the area.

E. Applications for planning grants for areas which are not part of an air quality control region must include evidence similar to that prescribed under III A, B, C, and D that the planning to be conducted will be coordinated to the extent applicable and practicable with related planning activities in the area.

## APPENDIX A

### DEFINITIONS

a. The term "Secretary" means the Secretary of Health, Education, and Welfare.

b. The term "air pollution control agency" means any of the following:

1. A single State agency designed by the Governor of that State as the official State air pollution control agency for purposes of this Act:

2. An agency established by two or more States and having substantial powers or duties pertaining to the prevention and control of air pollution:

3. A city, county, or other local government health authority, or, in the case of any city, county, or other local government in which there is an agency other than the health authority charged with responsibility for enforcing ordinances or laws relating to the prevention and control of air pollution, such other agency; or

4. An agency of two or more municipalities located in the same State or in different States and having substantial powers or duties pertaining to the prevention and control of air pollution.

c. The term "interstate air pollution control agency" means—

1. an air pollution control agency established by two or more States, or

2. an air pollution control agency of two or more municipalities located in different States.

d. The term "State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, and American Samoa.

e. The term "person" includes an individual, corporation, partnership, association, State, municipality, and political subdivision of a State.

f. The term "municipality" means a city, town, borough, county, parish, district, or other public body created by or pursuant to State law.

g. All language referring to adverse effects on welfare shall include but not be limited to injury to agricultural crops and livestock, damage to and the deterioration of property, and hazards to transportation.

## APPENDIX B

### INSTRUCTIONS—APPLYING FOR PLANNING GRANTS

Applications or inquiries concerning applications for planning grants should be addressed to the National Air Pollution Control Administration's regional offices. The addresses and telephone numbers of these offices and the States they serve are listed below.

No special application forms are required. The application may be transmitted in the form of a letter.

In applying for grants authorized under Section 106 of the Clean Air Act, as amended, the applicant should include documentation of official designation as the planning agency by the Governors of the States included in the air quality control region.

The application should describe the purposes for which grant funds are requested, the proposed period and schedule for accomplishing the purposes, and the personnel and funds required. A budget should be included specifying the amounts needed for personnel, equipment, supplies, travel, consultant and other contract services, and any other types of expenses related to the purposes outlined under I.B. of the Guidelines.

Applications for grants authorized under Section 105 of the Act should, in the budget, show the distribution of Federal and non-Federal funds.

## REGIONAL AIR POLLUTION CONTROL DIRECTORS, NAPOA

*Region 1—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont:*

John F. Kennedy Federal Building  
Boston, Massachusetts 02203  
Phone: 617-223-6883 or 223-6339

*Region 2—Delaware, New Jersey, New York, Pennsylvania:*

Federal Office Building  
26 Federal Plaza (Foley Square)  
New York, New York 10007  
Phone: 212-264-2517

*Region 3—District of Columbia, Kentucky, Maryland, North Carolina, Virginia, West Virginia, Puerto Rico, Virgin Islands:*

220 Seventh Street, N.E.  
Charlottesville, Virginia 22901  
Phone: 703-296-1387

*Region 4—Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee:*

Room 404  
50 Seventh Street, N.E.  
Atlanta, Georgia 30323  
Phone: 404-526-5787 or 526-5672

*Region 5—Illinois, Indiana, Michigan, Ohio, Wisconsin:*

New Post Office Building, Room 712  
433 West Van Buren Street  
Chicago, Illinois 60607  
Phone: 312-353-5243 or 353-4589

*Region 6—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota:*

601 East 12th Street  
Kansas City, Missouri 64106  
Phone: 816-374-5333

*Region 7—Arkansas, Louisiana, New Mexico, Oklahoma, Texas:*

Room 1414, 1114 Commerce Street  
Dallas, Texas 75202  
Phone: 214-749-3989 or 749-3980

*Region 8—Colorado, Idaho, Montana, Utah, Wyoming:*

Federal Office Building  
19th and Stout Streets  
Denver, Colorado 80202  
Phone: 303-297-4682

*Region 9—Alaska, Arizona, California, Hawaii, Nevada, Oregon, Washington, Guam, American Samoa:*

Federal Office Building  
50 Fulton Street  
San Francisco, California 94102  
Phone: 415-556-4811 or 556-5079

## DRAFT OF REVISIONS FOR GUIDELINES FOR AIR POLLUTION PLANNING GRANTS ERRATA AND ADDENDA, NOVEMBER 18, 1969

Delete Section III, page 6 in its entirety and add: All applicants for Planning Grants are subject to the requirements of the

## PROJECT NOTIFICATION AND REVIEW SYSTEM

The purpose of the system is to facilitate coordination of State, regional, and local planning and development through the establishment and use of a network of State, regional, and metropolitan clearinghouses. The functions of the clearinghouses are to identify the relationship of any project to Statewide or area-wide comprehensive plans, and to identify the relationship of any project to the plans or programs of particular State agencies or local governments. The system is the means of carrying out the policies and directives of Title IV of the Intergovernmental Cooperation Act of 1968 and the requirements of Section 204 of the Demonstration Cities and Metropolitan Development Act of 1966.

The project notification and review system is also designed to enable early

contact between applicants for Federal assistance and State and local governments and agencies in order that there will be sufficient time and opportunity for effective coordination *before* the application for the Planning Grant is developed.

#### *Applicant's Responsibilities*

As soon as an applicant decides to request support from National Air Pollution Control Administration for a Planning Grant the applicant:

(1) Must notify *both* the State *and either* the regional *or* metropolitan clearinghouses of the intent to apply for Federal assistance. The notification must contain sufficient information to enable the clearinghouses to review the proposed activity and to determine those other agencies within the clearinghouse area which would have an interest in the proposed project. The information to be included in the notification and a suggested format for its presentation, are shown at the end of these instructions.

(2) Must confer with the clearinghouse(s) or other appropriate agencies when so requested to discuss any issues which the proposed project may have raised to resolve such issues, if possible, while the application is under development and can incorporate agreed upon modifications.

(3) Must send the completed application to the clearinghouse(s) for comment if issues remain unresolved and the clearinghouse notifies the applicant of its intent to make comments.

(4) Must include with the application, when submitted to National Air Pollution Control Administration a statement that the procedures outlined above have been followed, and that (a) no comments have been received from the clearinghouse(s), (b) that the comments of the clearinghouse(s) have been considered in the development of the application, or (c) that the comments of the clearinghouse(s) on unresolved issues are transmitted with the application.

#### *Addresses of Clearinghouses*

A Directory of Clearinghouses is maintained in each DHEW Regional Office listed in Appendix B. Applicants should request the names and addresses of the clearinghouses to which they must submit the Notification. The regional or metropolitan clearinghouse to which the Notification is sent is the clearinghouse which has responsibility for the geographic area in which the proposed activity will take place. If the proposed activity extends into two geographic areas or into two States, the clearinghouse in both areas must be notified.

#### *Time Schedule for System*

(1) Clearinghouses have 30 days after receipt of notification from the applicant in which to disseminate the information in the notification to other appropriate State, local, regional, or subregional agencies, and in which to make their own review of the information. Within this 30-day period the clearinghouse(s) should also arrange with the applicant conferences or consultations on any issues raised on the proposed project.

(2) If by the end of 30 days the applicant receives no request from the clearinghouse for further consultation, or if all issues raised are resolved through discussion between the applicant and the interested agency, applicants may complete and submit the application to the National Air Pollution Control Administration.

(3) If issues raised are not resolved through discussion, the clearinghouse may notify the applicant that it wishes to make comments on the completed application. Applicants must then submit the completed application to the clearinghouse before it is sent to the National Air Pollution Control Administration and allow the clearinghouse 30 days in which to file comments with the applicant.

#### *Submission of Application*

The notification to the clearinghouses, discussions to resolve issues while the application is under preparation, and the receipt of comments on the completed application (when necessary) are all actions to be completed *before* the application is submitted to National Air Pollution Control Administration. Applications received which have not been processed through the project notification and review system in accordance with these instructions will be returned to the applicant as incomplete.

## NOTIFICATION OF INTENT TO APPLY FOR FEDERAL ASSISTANCE

1. Name and address of applicant organization.
2. Geographic location of proposed project or activity (include entire area to be affected by proposal, when appropriate).
3. Brief description of proposal (cite type, purpose, scope, estimated cost, beneficiaries, or other characteristics which would enable the clearinghouse to assess the effect the proposal would have on other programs).
4. Federal agency and program under which assistance will be sought.
5. Estimated date when application will be submitted.

In addition to compliance with the project notification and review system, all applicants for Planning Grants are subject to the requirements for

## COORDINATION OF PLANNING IN MULTIJURISDICTIONAL AREAS

The purposes of coordination of planning in multijurisdictional areas (see Definitions below) are to encourage and facilitate State and local initiative and responsibility in developing organizational and procedural arrangements for coordinating comprehensive and functional planning activities; to eliminate overlap, duplication, and competition in State and local planning activities assisted or required under Federal programs and to encourage the most effective use of State and local resources available for development planning; to minimize inconsistency among Federal administrative and approval requirements placed on State, regional, metropolitan development planning activities; and to encourage the States to exercise leadership in delineating and establishing a system of planning and development districts (see Definitions below) or regions in each State, which can provide a consistent geographic base for the coordination of Federal, State, and local development programs. The procedures set forth below are to assure coordinated planning in multijurisdictional areas in accordance with the requirements of Part II of BOB Circular A-95 which incorporates and supersedes BOB Circular A-80.

*Definitions*

*Multijurisdictional area.*—Any geographical area comprising, encompassing, or extending into more than one unit of general local government.

*Planning and development district or region.*—A multijurisdictional area that has been formally designated or recognized as an appropriate area for planning under State law or Federal program requirements.

*Requirements for Applicants*

A. Applicants must demonstrate in the Planning Grant application that the proposed activity is consistent with and has been coordinated with related planning being carried on under other Federal programs or under State and local programs in any multijurisdictional area. The application must adequately:

(1) Identify other planning activities carried on in the multijurisdictional area (see Definitions above) including those covering a larger area within which such multijurisdictional area is located, sub-areas of the area, and areas overlapping the multijurisdictional area. Metropolitan or regional clearing houses (refer to Project Notification and Review System above) may assist in providing such identification. A Directory of Clearinghouses is maintained at each DHEW Regional Office listed in Appendix B. Applicants should request the names and addresses of the appropriate clearinghouse from which such assistance may be obtained.

(2) Show evidence of explicit organizational or procedural arrangements that have been or are being established by the applicant to assure maximum coordination of planning for such related functions, programs, projects and activities within the multijurisdictional area. Such arrangements might include joint or common boards of directors or planning staffs, umbrella organizations, common referral or review procedures, information exchanges, among others..

(3) Show evidence of cooperative arrangements that have been or are being made by the applicant respecting joint or common use of planning resources (funds, personnel, facilities, service, etc.) among related programs within the area.

(4) Show evidence that the planning activities are based on data, statistics, and projections that are the same or consistent with those used for other related activities.

B. Where the State has established planning and development districts or regions (see Definitions above), the applicant must conform to the boundaries of the established area, or justify any variation from the established boundaries. Where the State has not designated planning and development districts or regions, the applicant must give an explanation for the area in which the proposed planning activity will operate.

C. The completed application shall be submitted to the National Air Pollution Administration through the Office of the Governor of the State (or of all States if the proposed planning and development area crosses State lines). The Governor has 30 days in which to review the boundaries for the proposed planning activity and comment on the relationship to planning and development districts and regions established by the State or on the feasibility of the proposed areas where State districts or regions have not been designated.

#### *Submission of Application*

Planning Grant applications received by National Air Pollution Control Administration which are not in accord with the requirements for coordination of planning in multijurisdictional areas set forth above will be returned to the applicant as incomplete.

All applications should be addressed to the appropriate DHEW Regional Office listed in Appendix B.

Dr. MIDDLETON. The regional planning may not have been perhaps as good as some of us would like to see it. That does not detract from what the standards may be, because our guidelines require that there be compatibility; so there comes a time, if they did not collaborate in the development of standards, and they are incompatible, that the Secretary will not approve them until they become compatible.

So it is not that the State cannot have regional planning; it is the fact that the States' initiative to do so does not seem to take place very easily.

Mr. WHITE. But they will still be consistent with each other within certain limitations.

Dr. MIDDLETON. No limitations. They must be consistent.

Mr. MAYNARD. There was some discussion a few moments ago about personnel levels, there were some obvious funding questions that have come up, and many of them have been answered. It is a matter of common knowledge that the States are underfunded.

When you get the monitoring efforts and the enforcement efforts the number of people you have, and the quality of the people you have is pretty crucial.

Let's also say that the monitoring capability of the private sector is pretty respectable and so is the supply of competent expert witnesses.

The coal mine health and safety bill, to give you a specific example, involves the public not only by way of participation in the rulemaking process but also in judicial review following the rulemaking process.

There is an opportunity for review of the findings and again of the conclusions that were made.

I want to ask about your thoughts on that and then I also would just suggest to you that if there are not going to be enough Government personnel to handle these programs, or if there is going to be a shortage of Government personnel, it seems to me that one of the obvious things to do is to leave—not leave, but the only other choice really is to rely on private enforcement, private monitoring and things of that sort by the people who are most directly affected by it.

Dr. MIDDLETON. My immediate response is that to rely on the private sector for monitoring is excellent when it comes to monitoring effluents

from particular sources. I feel that there should be a significant private sector involvement in monitoring emissions. But when it comes ambient air quality monitoring, that ought to be done by public agencies.

Mr. BILLINGS. Citizen monitoring or industrial monitoring?

Dr. MIDDLETON. Industrial monitoring.

Mr. BILLINGS. You don't want to comment on citizen monitoring? You were getting at that, Bob?

Mr. MAYNARD. Ultimately the question is does a person who feels adversely affected have an opportunity to seek judicial review or to contest in advance a time limitation and an implementation plan or a level in the implementation plan?

It seems to me either the Government has to do it or the private sector has to do it. I am just inquiring as to your views on getting the private individuals involved in these programs.

Dr. MIDDLETON. As I indicated earlier, the administration bill did not include that.

Mr. MAYNARD. My next question really has to do with a scenario that goes like this: And implementation plan says that an individual must use a particular type of device for removing say particulate matter out of a stack.

Dr. MIDDLETON. No. The regulations typically are a performance standard. They would not specify a particular piece of hardware, and, as far as I am concerned, never would.

Mr. MAYNARD. Good. That was the question. Because I think if you got down to specifying individual rather than requiring that a specific objective be met, then this puts us in trouble.

Mr. BILLINGS. This is also a national emission standard.

It would be translated into performance, not specific equipment.

Dr. MIDDLETON. This would be the case.

Mr. MAYNARD. To move to the national emission standards, I don't know what the word is, but would your national standards take into account for example, just to take two, sulfur and particulate matters, or let's take any two national emission standards, and let's assume at the moment that under certain circumstances the combination of those two has a greater effect than either one of them singularly.

Would on this your national emission standards deal with that kind of a problem, assuming it is a problem?

Dr. MIDDLETON. Yes, they would. We have stated publicly that we would prefer when possible to deal with classes of pollutants and consider enhancement potentials so that we could deal with "air pollution" and not work solely on a pollutant-by-pollutant basis.

Mr. MAYNARD. The only other question I have: Senator Proxmire has a proposal in the field of water pollution and there are then other experts, Congressmen and others, who have spoken of pollution charges, really charges on the emissions.

I just wonder of you have any thoughts—this breaks up into about six variable, Federal or State either in addition to or in lieu of emission standards.

During the period of implementation for example?

Dr. MIDDLETON. We are looking at the whole issue of tax and incentive and disincentive plans broadly, as to their feasibility and

possibility of being useful in bringing about air quality improvements faster.

A very quick answer to one of your questions is that an effluent tax on water were used may have an advantage of over an effluent charge on air pollution, where the money collected may not be used for collection and treatment.

Mr. MAYNARD. It is a distribution problem.

Dr. MIDDLETON. A distribution problem, and also the assignment of land for particular purposes. Water tax in the rural areas is understandable. The Delaware River Basin, for example, is an area in which all of that fund can be applied, the nature of the air basin is usually such that the tax usefulness in that regard escapes me.

It is not saying it is not possible. It just has to be studied in more detail.

Mr. MAYNARD. It has been—it has to be handled basically from a higher level?

Dr. MIDDLETON. If it could be handled usefully on a regional basis, it may have applicability. I am not rejecting the whole thought. It has not been looked at critically enough to give you a decent answer.

Mr. BRAYMAN. The National Academy of Engineering issued a report last week on sulfur oxide. It said that there is no current technology to achieve the goal of controlling sulfur oxide.

Mr. BILLINGS. It says there is no commercially available process to control sulfur oxide.

Dr. MIDDLETON. It is an accurate statement if you accept the words as they are put together. Commercially, meaning full scale, meaning it has been tested and is available—in a store for purchasing—it is an incomplete, rather than an inaccurate, statement when it comes to the state of the art today.

I believe it to be a very conservative statement with limited application to the issue.

Mr. BILLINGS. When would it be an inaccurate statement?

Dr. MIDDLETON. I think it is inaccurate in the sense of what is available and how it can be used for air pollution abatement purposes now, at a scale, perhaps, smaller than the one that they purportedly are dealing with.

Let me clear it up this way: The Monsanto Co.'s Cat-Ox system has been tested on, I believe, somewhat less than a 50 megawatt power-plant. It obviously worked. We are in the process of arranging to demonstrate it on the next scale up of about three times that size. There is no evidence to think it is not going to work. Yet, as NAE defines it, it is not "commercially" available, even though it is offered for sale.

I dwell on it this long to be sure you understand the word "commercially available." There are things, even in addition to Monsanto process, that can be used, and we propose seeing that they are used.

Mr. BILLINGS. If you substitute the word commercial, the words "for sale," that is a deceptive statement.

Dr. MIDDLETON. It may not be meant deceptively, but it may be read by various parties in different ways.

Mr. GUARD. If the section had been appropriate, you would have been farther along in this field.

Dr. MIDDLETON. Yes, and I think we would be further along today if we could actually get the polluters together, to understand that there is a need to have the opportunity for large-scale demonstrations.

Miss WALLER. I would like to ask about State manpower needs. If the administration bill is implemented, are there estimates comparable to those you gave us on the Federal level, for States needs?

Dr. MIDDLETON. I think you would find, in the manpower report, that today there are less than 3,000 people in the State and local governments in air pollution control. By 1974, there needs to be 8,000.

Miss WALLER. Does the report deal with the adequacy of current manpower pools in each area and the needs for training, and so forth.

Dr. MIDDLETON. It does speak to the point that there needs to be an emphasis on providing skilled technicians to deal with air pollution control matters rather than emphasizing the graduate work and teaching aspects.

Miss WALLER. Has there been resistance by State and local governments to being included in regions?

Dr. MIDDLETON. Through the first 40 designations, there has been no opposition. In fact, it is the reverse. There is often a contest about how many counties should be included, and sometimes it is thought that we include too many counties because an air quality control region is different than a transportation region.

But there is virtually no contest about whether there should be an air quality control region.

Miss WALLER. There has been no resistance?

Dr. MIDDLETON. The only resistance we have had to date deals with some counties wanting to be included because they already are in a regional complex dealing with transportation. They do not understand why they should have a different system for air pollution control.

In the State of Arizona, there has been a desire to have many more counties included in the Phoenix metropolitan air quality control region than we originally conceived.

We have decided on a lesser number, because it would be more effective to have the remaining counties tied into an interstate air quality control region.

So where there have been differences, they have been based on jurisdictional interests or present organizational bases rather than on opposition to the system.

Miss WALLER. Thank you.

Mr. BILLINGS. There has been a lot of talk about lead and its adverse effect on catalytic control devices. Would this same thing apply to nickel and boron?

Dr. MIDDLETON. Yes. It is partly for this reason that the administration bill talks about regulation of fuel additives.

Mr. BILLINGS. We could assume then that if a standard were to be promulgated on the basis of emission control systems, lead would not be the only additive that would be affected. Other additives would also be affected.

Dr. MIDDLETON. Yes.

Mr. BILLINGS. Are there any others besides nickel and boron that we should be familiar with? You don't have to give it now.

Dr. MIDDLETON. Yes, there are some possible phosphate materials that are fuel additives.



Mr. BILLINGS. That would also have to go?

Dr. MIDDLETON. Phosphates, nickel, and sulfur compounds are next to the heavy metals that have adverse effects on catalysts.

Mr. GRUNDY. On this subject, I want to ask a nasty question. Recently in Science, there was an article on the fuel additive premetha phosphate, claiming that it was mutagenic in mice. Would you consider it realistic that if under the registration provisions for fuel additives, the data that was furnished showed that a substance was mutagenic or a carcinogen, do you feel the regulations should be opposed to using it?

Dr. MIDDLETON. Yes, if the additives also occurred in emissions.

Mr. JONES. Do the boron and these other elements have adverse effects?

Dr. MIDDLETON. Boron, as an element, has not been shown to have adverse effects. Excessive boron is damaging to agriculture. Some salts of boron may be toxic.

There is some concern that we be sure that the boron salts that are produced are innocuous salts. Some people still suggest that one can have some borates and chlorine boron combinations that would be very toxic to man.

It has not been demonstrated in exhaust effluent, as I understand it now, but there is a possibility.

Mr. BILLINGS. One other area in which we have testimony—it would be helpful to have in this record—is the question of production line testing.

If the committee specifically authorizes the authority which some members of the committee contend already exists, would the test procedures be applied on the production line?

Do you intend to design a quicky test of some kind which would expedite its procedure?

Dr. MIDDLETON. I can't tell you the whole answer. We are in the process of developing a protocol and a procedure for testing assembly line vehicles.

It will not be solely a quicky test, because it is our clear experience that any quick test is, by itself, inadequate, and is something that the motor vehicle industry has typically adjusted to and does so to be sure that they pass.

So that the purpose of an assembly line test is to be sure that the quality control is the right level, which means that in all probability, there will be a quicky test of all vehicles, but there will be some sampling to be sure that cars pass the full test.

Mr. BILLINGS. How long a test is the full test? 23 minutes?

Dr. MIDDLETON. Something like that.

Mr. BILLINGS. Under your conception of what you asked for in production lines, if in testing the Jaguar model of the Chevrolet you found that the cars which you tested with the longer test failed to meet the standard, would you then under your bill have production of that vehicle stopped until adjustments were made or production of the vehicle continued with the assurance that before they moved off the lot, the adjustments be made?

How would you handle that?

Mr. AUERBACH. The thinking is that manufacturers could continue production at their own risk, but that they could not sell vehicles without the certificate of conformity. If the certificate has been revoked, the manufacturer will have to show that a vehicle is in conformity before selling it.

Mr. BILLINGS. So you intend, at point of failure on your models, your test vehicles, to revoke the certificate until you are satisfied that the vehicles are again in compliance with the certificate?

It would not be your intent to arbitrarily stop production. You would leave it up to them?

Dr. MIDDLETON. It is an option which may be available.

Mr. GRUNDY. In line with this, if you rejected a certificate, would this mean revocation of that certificate for all vehicles that were manufactured, and at that point including those that came off the assembly line, say the preceding day?

How do you envision to handle this?

Dr. MIDDLETON. I think we envision having an adequate capability to insure that the motor vehicle companies have a capability to perform the tests properly.

Mr. BILLINGS. You would suggest that you utilize to the extent you find it useful their own capacity to test vehicles with the freedom to move in and out and test them yourselves?

Dr. MIDDLETON. Simultaneously testing ourselves, right, to be sure that the industry quality control is up to prototype.

Mr. JONES. I have one other question: Does NAPCA assume any responsibility for advising industries on whether design of new anti-pollutant equipment will do its job that it has been designed to do?

Dr. MIDDLETON. We would give estimates of what we think it would do, but will not attest to the fact that it meets particular standards.

Mr. BILLINGS. On the question of continued compliance beyond the point of sale, the question has been raised in here as to whether the determination of continued compliance should be made on the basis of the motor vehicle in the consumer's hands, or whether it should be determined on the basis of the vehicles which NAPCA continues to operate, production line vehicles, and under some kind of modular maintenance conditions to see if they comply. Do you have any views on which one of those would be a more useful and fair method of determining continuing compliance?

Dr. MIDDLETON. The disparity between the results of our own and the industry's testing and the performance of cars in the public hands must be related somehow or other to inadequate test protocol.

I think we should see that in that answer, but we don't yet have our final answer. But, certainly, our durability test is not what it should be, or these cars in the owner's hands would not be so poor. I am loath to answer you, simply because we don't have all the pieces that we need to have before we can say, "Yes, our cars should be on the basis of compliance."

I have a very keen feeling that until we know more about durability testing, the influence of fuels, and so on, that it would be wrong to have cars in NAPCA's hands being the basis for determining compliance as opposed to a surveillance test in the field.

Mr. BILLINGS. Would you review the language in S. 3229 relative to the continued compliance and advise the staff whether you feel that should be modified to give you the kind of flexibility to make a determination as to which is the best way to assure continued compliance?

Dr. MIDDLETON. Yes.

Mr. BILLINGS. We will appreciate it.

Mr. BILLINGS. Thank you very much.

(Whereupon, at 5:20 p.m. the subcommittee adjourned, subject to call of the Chair.)



## APPENDIX

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The following materials have been received for inclusion in the record:

(The letter which follows is Dr. Middleton's reply to a letter from Senator Randolph which was sent on Apr. 9, 1970. See p. 190, pt. 1, of these hearings for Senator Randolph's letter.)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
*May 19, 1970.*

HON. JENNINGS RANDOLPH,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR RANDOLPH: I am pleased to reply to your April 9 letter in which you requested our estimates of the costs of developing and demonstrating several sulfur oxide control processes. Please understand that the costs shown for private industry are our best estimates based on limited actual data, since this information is proprietary to the organizations involved.

Your letter specifically mentions Scientific Research Instruments Corporation. To our knowledge, SRI has not developed a sulfur oxides control process. Rather, they are working under a contract with National Air Pollution Control Administration (Contract No. CPA-70-50) to provide fundamental data on sulfur behavior during thermal treatment of coal. These data are being used to analyze various coal gasification or partial gasification processes for efficiency, economics, allowable circulation rates, etc.

Bituminous Coal Research, together with Chemico, has been working on an aqueous alkali carbonate process in the laboratory. This process is only in its earliest stages of development. We would estimate that about \$200,000 has been spent so far by Bituminous Coal Research and Chemico. If this concept proves to be technically sound, we would estimate that a total of \$15 to \$20 million would have to be spent to bring it to the stage of having been demonstrated. A proposal for funding small pilot-scale development at a cost of \$2.2 million to National Air Pollution Control Administration has been submitted by Chemico.

Chemico has, in addition to this aqueous alkali carbonate process, been developing a process based on the use of magnesium oxide slurry scrubbing of flue gas. Chemico and Basic Chemicals, Inc., have spent between one-half and one million dollars on this process so far. A proposal for a large scale pilot plant has been submitted to the National Air Pollution Control Administration, to be jointly funded by Boston Edison. This pilot plant if funded would cost approximately \$5 million and would be cost shared, 40 percent by the National Air Pollution Control Administration and 60 percent by Boston Edison. If this pilot plant suffices for demonstration, total development costs will be \$6 to \$8 million. If a larger demonstration plant is required, an additional \$7 to \$9 million will be required.

Combustion Engineering has been developing a process based on limestone injection followed by wet scrubbing. Funds for this work to date have been supplied by Combustion Engineering, Union Electric Company of St. Louis and Kansas City Power and Light (Kansas City, Missouri). A total of \$3 to \$5 million has been spent so far. Further development is required and the National Air Pollution Control Administration has an extensive program to evaluate major process engineering problems, solid and liquid waste disposal problems, and optimization of the process. The total that will be required by all parties is estimated at about \$19 million.

Monsanto Enviro-Chem Systems, Inc., has developed the Cat-ox process mainly with its own funds and some contribution from Pennsylvania Electric Company. This process has been operated on a sizable pilot plant. Total development costs to date have been about \$7 million. Monsanto has submitted a proposal for a demonstration plant costing an additional \$6.6 million, which would bring the

total development cost to \$13.6 million. The demonstration would be jointly funded by National Air Pollution Control Administration and Illinois Power on a 50-50 basis.

Stone and Webster and Ionics have spend about \$750,000 so far on a process for which a \$4.2 million proposal has been submitted to the National Air Pollution Control Administration. This proposal, presently being negotiated, calls for a jointly funded (National Air Pollution Control Administration and a consortium of utilities represented by Tampa Electric Power on a 50-50 basis) program to build and operate a large pilot plant. It is estimated that a total of about \$3 million would be required to bring this process to the point of having been demonstrated.

Westvaco is developing a process based on char sorption of sulfur oxides. This process is less advanced than others and therefore would require considerably more work to thoroughly assess its viability and economics. Westvaco has spent about \$750,000 so far of its own funds and has submitted a proposal to the National Air Pollution Control Administration calling for a small pilot plant at a cost of about \$1 million to the National Air Pollution Control Administration. This is presently being negotiated. Total development cost for this program would be about \$14 million.

Wellman-Lord has spent a total of about \$6 million of its own funds and funds supplied by several utilities, including Potomac Electric Power Company and Baltimore Gas and Electricity. The current status of this program is not clear. The sizable pilot plant at the Crane Station of Baltimore Gas and Electricity has been shut down because of technical problems.

It is anticipated that the demonstration costs for processes that reach that state of development will be in part borne by the ultimate users of the process, e.g., utilities and smelters, through cost-shared programs. For product producing processes, it may generally be said that processes that produce sulfur (the most desirable by-product of sulfur oxides pollution control processes) cost somewhat more to develop than do processes that produce sulfuric acid.

Low-sulfur fuels can provide relief in areas of severe pollution where industrial users are unable to use control methods such as flue gas cleaning. Coal cleaning-studies have shown the significant potential of this control method. National Air Pollution Control Administration has funded support studies totalling \$2.5 million to date, including a successfully completed conceptual design study for a demonstration coal-cleaning plant. Detailed design, construction, and operation of the plant, along with supporting studies, will cost an estimated additional \$13 million. The National Air Pollution Control Administration is attempting to gain coal industry participation in this activity.

A coal-cleaning plant would provide a cleaned fuel stream and a sulfur-rich stream that could be utilized in a special combustor equipped with a sulfur recovery system. The National Air Pollution Control Administration now has under way a feasibility study of such a combustor. Demonstrating the combustor and recovery system will cost at least \$10 million.

I trust this gives you a satisfactory picture of the total effort involved in developing an adequate array of unsable processes for sulfur oxides control. Further information on any of these processes is, of course, available, and can be provided at your request.

Sincerely yours,

JOHN T. MIDDLETON, *Commissioner.*

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THE HEALTH SCIENCE RESEARCH INSTITUTE OF NEVADA,  
May 14, 1970.

Senator JENNINGS RANDOLPH, *Chairman.*  
*Committee of Public Works,*  
*Washington, D.C.*

DEAR SENATOR RANDOLPH: I am enclosing herewith a Proposal entitled "A Method To prevent Air Pollution Build-Up in Populated Areas."

Please enter this Proposal as part of the hearing record for air pollution abatement systems.

Dr. Donald Soli and I discussed our plan with Mr. Richard Grundy while we were in Washington. Mr. Grundy's comments were most helpful to us in preparing the proposal. A copy has been directed to Mr. Grundy.

Our sincere thanks for your consideration.

Very truly yours,

LESTER M. MCKAY, *Director.*

# Air pollution build-up in populated areas\*—

## *A method to prevent*

Lester M. McKay, Reno, Nevada

I WOULD LIKE TO PAY TRIBUTE to Dr. Luther L. Terry for his contributions in air pollution control and to use a portion of his speech presented to the National Conference on Air Pollution in 1962 while he was Surgeon General of the United States Public Health Service:

"Since modern man can determine the nature of his environment, he must learn to accept responsibility for its deficiencies in much the same way that he accepts responsibility for his individual acts. Otherwise, our repeated pleas for cooperative effort and shared responsibilities have a hollow sound. If a crime is committed, we are quick to bring the immense weight of civilization to bear upon the guilty one, but what about the crime that we commit as a group? These are offenses we commit against ourselves—often in good faith and with the most highly sanctioned of motives.

"From this point of view, Donora was a crime. The deaths from chronic diseases associated with environmental factors which occur daily are also crimes. Who is to blame? Where are the culprits? What should we do to apprehend them? Where?—Everywhere. WE ARE ALL GUILTY—not health officials alone, nor legislators, nor businessmen—but ALL of us!

"Certainly now, when we can and do determine—by chance or by choice—the structure of our environment, we cannot blame the vagaries of nature for its defects. The time

is past. WE are responsible. Let's get on with it! Let's clean the air!" Thank you, Dr. Luther Terry!

Hundreds of millions of dollars have been and are now being spent to research cause and effects of air pollution. Many facts have been documented and there is now no doubt that man must search diligently for the solution.

Senator Gaylor A. Nelson (D.-Wis.) told the Senate, when he introduced S-2410, bill providing \$500 million a year to assist abatement of air pollution, "The majority of our state and local governments have done nothing in the past twelve years." We know the causes and many of the effects.—It is imperative that we come up with a workable solution! This proposal offers a plan, though unique, which could very well prove to be the "woods" we have failed to see because of the "trees!"

### **Cause**

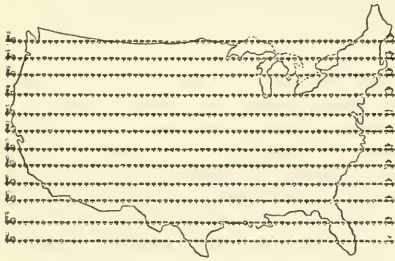
Air is the most important substance in your life. You might exist many days without food and a few days without water, but without air you could not live long enough to read this proposal.

Science is radiant with farflung successes and clouded by the ever-increasing difficulty in providing the most necessary of all commodities for life (clean air). As the outcry against pollution rises to its highest pitch we hear increasing demands for controls even where no control devices have been developed. The challenge is great, for the problem of air pollution is an inseparable part of one

\*From the Health Research Institute, Washoe Medical Center, Reno, Nevada.

of the most important needs of our time: the creation, in our era of accelerating change, of a healthful environment worthy of our high level of economic development and scientific achievement.

It is not necessary to recapitulate all of the contributors to air pollution. The better known sources in order of the magnitude of their contribution are: 1 — TRANSPORTATION, 2 — MANUFACTURING, 3 — ELECTRIC POWER GENERATION, 4 — SPACE HEATING, 5 — BURNING OF REFUSE. These five major sources alone are dumping one hundred forty two million (142,000,000) tons of garbage into the American atmosphere every year. We might compare this to one train of standard 50 ton coal cars 36,000 miles long—or 12 unbroken trains the length of the United States!



Nature has provided man with a limited amount of life sustaining air—no more and no less is available. Nature has also provided an atmosphere dispersion system which has handled the job of clearing our air supply very well until the past few decades. However, we have arrived at a point in time when the capacity of the atmosphere to assimilate airborne wastes is much to frequently overwhelmed.

With all of our technical know-how and ability to travel, communicate, and live and work in comfort during the most adverse of weather conditions we are, as of this date, *entirely* at the mercy of the elements to dispose of the aerial garbage we continue to dump into the atmosphere. If the yardstick of man's achievement is based on his degree

of independence of the elements, our score in this one area is zero and falling even more.

### Effects

The adverse effects of air pollutants are by no means limited to the health of man. The most timid estimate of economic losses due to air pollution suggests that the cost to the United States alone exceeds eleven billion dollars (\$11,000,000,000) each year\* (\$65.00 for every man, woman, and child). This estimate *does not* include costs of medical care for people who have respiratory diseases associated with air pollution, nor do they include factors such as lost earnings or reduced productivity, which are almost invariably associated with illness and absence from work.

In addition to its effect on health, air pollution causes extensive economic damage through its effects on animal and plant life, through corrosion and soiling of materials and buildings, depreciation of property values, interference with air and surface transportation through reduction in visibility and losses of unburnt fuel.


Damage to "Salad Crops" has actually forced many truck farmers out of business along the eastern seaboard. Los Angeles smog drifts into the fertile San Joaquin Valley blighting ten million dollars (\$10,000,000) in crops annually. Crop damage in many industrial areas including Spokane, Washington; Anaconda, Montana; Ducktown, Tennessee; Chicago, Illinois; St. Louis, Missouri; Tampa, Florida, and others were well documented by Thos. L. Kimball in "Air Pollution" in 1966.

Dr. Morley Kare, a University of Pennsylvania researcher, indicates that entire species of animals may be lost as a direct result of air pollution. This is especially true for our wildlife where feeding, breeding and environment cannot be controlled.

Air pollution soils and damages buildings and other structures, as well as clothing and home furnishings, thus adding to expenses for cleaning and replacement. Some things, however, cannot ever be replaced. During my recent tour of Europe, I sadly viewed the

\*U.S.P.H.S. Bulletin No. 1560



Pollutant		Health Effects
SO <sub>2</sub> Sulfur dioxide H <sub>2</sub> SO <sub>4</sub> Sulfuric acid	SO <sub>2</sub> H <sub>2</sub> SO <sub>4</sub>	Sulfur dioxide and sulfuric acid irritate the nose and throat in concentrations as low as 15 parts per million. In the bronchial tubes, the lining membrane becomes swollen and eroded, and clotting may occur in the small arteries and veins.
CO Carbon monoxide	CO	Acute carbon monoxide poisoning results in lowered concentrations of oxygen in the blood and the body tissues.
O <sub>3</sub> Ozone	O <sub>3</sub>	Ozone irritates the air passages, causing chest pain, cough, shortness of breath, and nausea.
NO <sub>2</sub> Nitrogen dioxide	NO <sub>2</sub>	Exposure to high concentrations of nitrogen dioxide can result in acute obstruction of the air passages and inflammation of the smaller bronchi.
3, 4-benzopyrene		This and similar compounds are known to cause certain types of cancer under laboratory conditions.
H H     H-C=C-H Olefins	H H     H-C=C-H	These substances have an irritating effect on certain body cells, and are especially apt to cause eye irritation.

effects of airborne chemical attack on many of the beautiful buildings and statues. Many of these internationally famed treasures, which have thrilled millions for generations, will completely disintegrate and be lost to the world within a few years unless the rate of deterioration is checked substantially. This tragic loss could not be estimated in dollars.

In our own American cities the effects on buildings can best be realized by the frequent painting requirements and by comparison during the cleaning process.

Nowhere is the paradoxical effect of scientific progress on the welfare of man more acutely revealed than in the problem of environmental pollution. Our knowledge of health effects of air pollution has been amplified considerably through three types of investigations:

1. Statistical studies of past illness and death as correlated with geographic locations and other factors associated with air pollution.
2. Epidemiological studies of death and respiratory function as related to variations in air pollution.
3. Laboratory studies of responses by animals and, in some cases, by human beings, to exposure to various known pollutants or combinations of pollutants.

There is no longer any doubt that air pollution is a hazard to health and that it is

causally related to many chronic and acute cardiopulmonary diseases. Right heart failure is a direct result of pulmonary disease.\*

The table above shows a list of the more commonly known contaminants and their known effects on health. I would like to call special attention to the fifth item which is 3, 4 - Benzopyrene. This is the compound generally accepted as the carcinomatous producing by-product of cigarette smoke.† However, a nonsmoker, living in cities such as Birmingham, St. Louis, Chicago, and others, by merely breathing, inhales an equivalent of this compound as is present in the smoke from over 50 cigarettes, or 2½ packs per day!

Death and morbidity resulting from intense air pollution are well documented. The classic examples of intense air pollution "episodes" are well known. They include the episodes in the Meuse Valley of Belgium; Donora, Pennsylvania; in New York City and in London. During these periods of intense air pollution, brought about by stagnating weather conditions, the number of deaths attributed to air pollutants, not to mention the survivors which were affected, ranged from 20 fatalities in Donora to nearly 5,000 in London.\*\*

\*U.S.P.H.S. Publication No. 1560

†Dr. Luther Terry's Report

\*\*N.T.A. Bulletin—Jan. 1965  
Franklin Field, O.D.

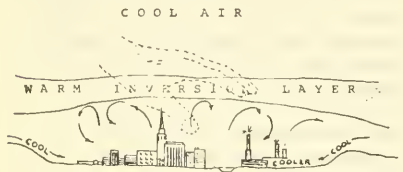
### Solution

The solution to complete air pollution abatement cannot be resolved by one simple system. It will take a number of contributing factors working effectively together toward the same goal—*Clean Air for Survival!*

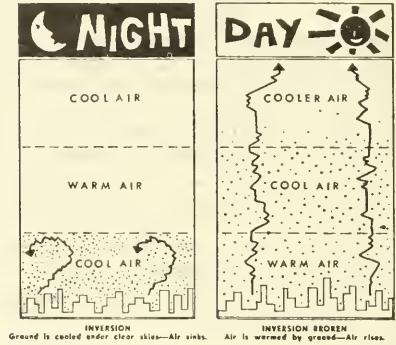
Limiting the types and amounts of contaminants which can be discharged into the atmosphere by improved heating methods, more efficient engines, atomic power, electric autos, better methods of trash disposal and other means are necessary and very important steps in the right direction. However, merely placing limits on the amounts of contaminants is not the complete answer. This is especially true during prolonged inversion periods when the air is trapped in an area permitting even small amounts of contamination to build up to a dangerous level of concentration.

A system of evacuating significant amounts of low level contaminants at or near the source, and even more effectively during inversion periods, can be accomplished in most cities by modifying already existing facilities. Since 90 per cent + of the pollutants are dumped into the atmosphere at, or below, 25 feet off the ground and most of this within 1 foot, as in the case with automobiles, it appears logical that an effective system would be one which would take advantage of the ideal time, (when the total volume of affected air is minimal and close to the ground), and to dispose of the problem before it raised to contaminate such a great volume of air that we become entirely at the mercy of the elements and the dispersing mechanisms of nature.

The following diagram shows the problem during a frontal inversion period.

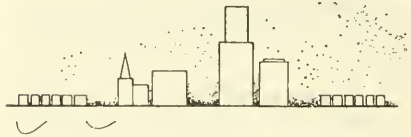


This figure shows the condition during nighttime inversion.



At nighttime, when the surface of the earth radiates its warmth out to space, the ground cools quickly. In turn, the air in contact with the earth's surface is chilled. By morning, the lowest layers of the air have been considerably cooled while aloft the air temperature has changed little. The result, as shown in the above figure, is a temperature inversion which will begin to break up as the ground is once more warmed by the sun's heat. This type of inversion is usually one of lower altitude level than a frontal inversion.

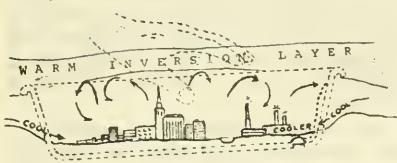
The nighttime inversion holds all of the auto exhaust, heating exhaust and other contaminant buildup. We are entirely dependent upon the sun to come up to warm the ground which in turn, warms the surface air causing an upward draft.



This figure shows how the heaviest concentrations are held close to the ground, especially at street surface levels.

Now, let us make the picture even a little clearer by showing a container or tub for this lid of inversion air to cover:

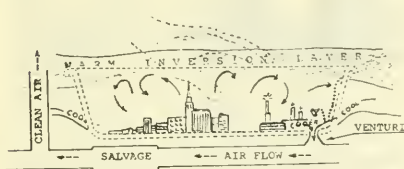
## COOL AIR



Assume, for the moment, that we have a tubful of dirty water and it is to our advantage to replace it with clean water. How would we do it? Would we boil the water, causing it to steam and eventually evaporate away? That is exactly the process which takes place when the sun comes up to warm the ground (bottom of the tub), which warms the air (water in the tub), causing it to become lighter and rise upward—hopefully, taking the filth with it. Or, would we attempt to bail the dirty water out over the rim as we would a sinking boat? We would do neither of these. We would simply “PULL THE PLUG.”

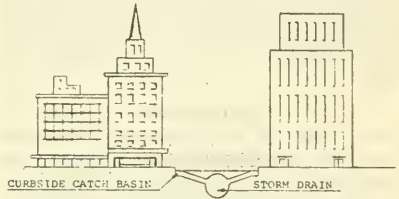
Below is shown this practice being put into use. How would this work since we are really concerned with air, not water?

## COOL AIR



During an inversion period the air trapped under the inversion layer is quite stable and usually free from turbulence or wind currents. Since air has weight, the gravitational attraction of this stable air is toward the center of the earth. The next figure illustrates the condition which exists under most streets in planned cities. Note that the heaviest concentration of contamination is close to the street surface. The buildings between the streets act as barriers, funneling the contaminated air toward the street. Note, too, the storm drains which have been installed to carry off rain and flushing water. These drain pipes range in sizes up to 20 feet

in diameter in some cities. The drains are connected to the street surface by curbside catch basins and connecting pipes. Since the



storm drains are closer to the earth's center than the street surface there is a greater natural gravitational attraction for the stable polluted air toward the lower space. **HERE IS OUR DRAINPIPE FOR LOW LEVEL CONTAMINATION.**

Unfortunately, most of the time this avenue of escape is plugged up with cool dormant air. So, how can we utilize this system? Nature, again, has shown us a way in a limited manner by providing rain. As the rain water enters the storm drains via the catch basin inlet and flows through the storm drains it provides the motivating power through surface tension, cohesion and adhesion, which causes the air in the drain pipe above the water level to move. As the air moves in the drain pipe, the air from the street surface rushes in to take its place carrying with it air-borne contaminants. Even this limited movement of air has a significant affect on the smog condition which existed before the rain.

There are several additional factors which play important roles in the overall effect of this lower-than-street-level system.

1. As the air passes through the small catch basin opening and into the smaller connecting tube, the velocity of the air is **INCREASED**. When it then enters the larger opening of the drain pipe the velocity is **DECREASED** suddenly. This causes an immediate drop in temperature as a result of the “venturi” effect. Coincidentally, Daniel Bernoulli discovered this effect while working in the sewers of Paris in the 1700's. Bernoulli's venturi effect is one of the standby's of engineering today.

2. In addition to the drop in temperature which may result from the venturi effect, there is usually an additional drop in temperature in the underground tubes. This accelerates condensation which, in turn, enhances the coalescence of molecular bodies causing them to become heavier than air and sink.

3. When the contaminated air enters the storm drain, we now have the air, with the air-borne contaminants, contained where we may apply our skills toward reducing the contamination level through water baths, electronic precipitators, filters, or whatever. This was impossible to accomplish so long as the contaminated air remained in the atmosphere.

4. Reclamation of valuable components which, when permitted to be dispersed by the atmosphere were hazardous to animals and plants alike, now becomes an economic feasibility. Air pollution represents a prodigious waste of potentially valuable resources. The harmful sulfur dioxide that is vented into the American atmosphere, for example, contains well over three hundred million dollars (\$300,000,000) worth of sulfur at today's prices.<sup>1</sup>

This engineering approach toward reducing significant amounts of life-threatening air-borne pollutants can be included in city, state and national planning at construction and power requirement costs consistent with our current demands for personal convenience, social advantages, and technological standards. In many metropolitan cities the existing storm drains would require minimal modification.

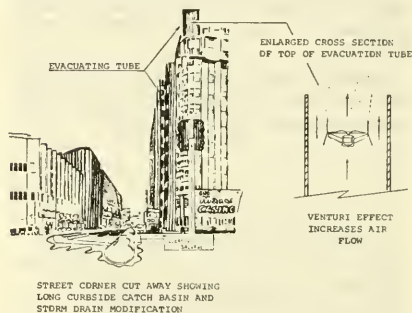
Our next step is to determine how we might achieve the most effective results utilizing underground conduits as combination storm and air pollution sewer systems. Two methods might be employed to effect control:

1. Since many cities confronted with an air pollution problem do not have access to lake, ocean or river water, we must, in those cases, depend on electricity to move the air. This is not the overwhelming task it might first appear to be.

<sup>1</sup>FORTUNE, November 1965  
Faltermayer, Edmund K.

A good-sized street (including the sidewalks) would be 100 feet wide. Assuming there are 10 city blocks to the mile, this means that the total street and sidewalk area in each block is equal to 100 feet x 528 feet or 52,800 sq. ft.

We mentioned earlier in this presentation that automobiles emit their contamination within one foot off the ground. Domestic space heating wastes are emitted usually within 25 feet, and in fall and spring most of this is during the cool of night. Let us establish, as a starting point, that we desire to lower the street level air at the rate of one foot per minute. This means that every city block would require electric power enough to move 52,800 cubic feet per minute. With this minimal amount we would be lowering the street level air 60 vertical feet per hour, or 720 vertical feet during the nighttime hours, or 1,440 vertical feet in 24 hours.



This demonstrates one possible method of installing the system in a city. Note in the drawing that we have installed the evacuating tube in an existing building, and that the space required is comparable to an elevator shaft.

By placing the exhaust fan near the top of the evacuating tube as shown, we gain added air flow through venturi effect, i.e., a 72" fan enclosed in a 73" tube can move 44,900 C.F.M. of free air with a 2 h.p. motor (Robbins & Myers "Propellair" Model 6504-K as certified by A.M.C.A.). By suspending a short section of the 73" tube with the fan enclosed in an evacuating tube 12 ft. in diameter, the fan still moves 44,900 C.F.M. through the short

section of 73" tube. However, the air which is forced to move through the smaller (venturi) tube now becomes the force which caused the surrounding air in the larger tube to move. The rate at which the total volume is moved by this "venturi effect" is proportional to the velocity of the venturi tube air (the inner tube), the temperature of the air and the resistance within the complete system.

Between the storm drain and the exhaust end we have removed the troublesome contaminants and evacuated the air back into the atmosphere above the low level contamination. Again, note that we are not attempting to change all of the air in the city, but merely "collecting" the low level contaminated air where it originates, and staying ahead of the problem so it cannot contaminate too much air.

2. In those areas where water is plentiful it would be advantageous to pump water to the highest points in the storm drain system, permitting gravity to return the water to the lowest point, thereby supplying a form of water power. Creating turbulence in the water on its return trip would increase the movement of air. A combination of water and electric power would have the added advantages of maintaining lower temperatures within the storm drains, accelerating condensation of the contaminated air, and supplying water baths where necessary.

In addition to supplying a movement of air, it will be necessary to redesign our catch basin inlets into the storm drain and to install a greater number than is usually installed to control storm water alone. The new design would necessarily include the most effective venturi features whereby we might take all advantages the venturi effect affords.

For you who might question the cost of this type of future city planning, consider what it could mean to the economy of the world and the number of jobs it would create

which would not be dependent on war or peace: construction, fans and motors, cement and metal pipes, filters, precipitators — I could go on and on. In addition, atomic power is in our future to supply the added need for electricity. If we don't look ahead toward clean air, we will have nothing to look ahead to!!

### Summary

A method for significantly reducing concentrations of low-level air-borne contaminants in populated areas has been described. Advantages leading toward the healthy well-being of man, plants and animals, and the influence toward economic improvement include the following:

1. The atmospheric phenomena referred to as frontal and nighttime inversion which now prevents the normal atmospheric dispersion mechanism to effectively maintain a clean air condition would, in this method, become an ancillary force enhancing the effectiveness of the method described.

2. The contaminants would be "collected" at or near their source. This would prevent the build-up of contamination and the spreading of toxic materials.

3. Valuable components would be deposited in storage tanks or containers making salvage operations economically feasible.

4. Deterioration of buildings, homes and structures due to air-borne chemical reaction would be greatly reduced.

5. This system, if put into general use, would create a new demand for products and services of manufacturers, builders and suppliers. The magnitude and diversification of this new demand would result in a *peace-time* economic condition never before enjoyed by man.

6. *Most important*—This system would help man in his effort to maintain an atmosphere in which he, his plants and his animals could exist. •

## 32-2 Air Pollution—Major Threat to Man: Cause—Effect—Solution

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Air pollution is definitely causally related to many chronic and acute cardio-pulmonary diseases such as bronchitis, asthma, lung cancer and other chronic obstructive diseases. Right heart failure is a direct result of pulmonary disease. Incidences where high concentrations of air pollutants have caused death and morbidity in widespread parts of the world are well documented. Our concern about this ever rising worldwide health problem has inspired this work.

**Method.** Two methods of air contamination control were evaluated.

1. A means of actually using the downward pressure of the atmosphere during nighttime and frontal inversion periods, which presently prevents evacuation of pollution as an ancillary force above ground enhancing the effectiveness of suction below ground in the storm drains and sewer lines in a populated area. We are re-visiting, in part, a principle discovered by Daniel Bernoulli in the sewers of Paris in 1735.

2. Demonstrating that modern technical know how and equipment can help us to eliminate the antiquated chimney.

1. Scale models of two American cities; one at sea level, the other at 5000 feet elevation were built. Features permitting us to simulate atmospheric inversion conditions, a means to introduce air pollutants and a system comparable to the storm drain systems of the cities were incorporated in the model. A system of drawing air through the underground tubes and a means to flow water at a given rate were also included. A gas chromatograph was used to evaluate concentrations of contaminants.

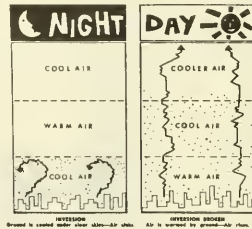
2. A full size domestic fireplace was built without a chimney, so the flue gasses could not empty directly into the outside air. However, a safety outlet was provided in case of a power failure. The flue outlet was constructed horizontally along one wall, and room air was circulated around the flue system utilizing the heat normally lost into the atmosphere. The flue gasses were directed through a water trap and an electronic air cleaner before emptying into a vented septic system.

#### Application.

1. Nighttime inversion conditions were simulated in the model representing Reno,

Nevada, U.S.A. where the elevation is approximately 5000 feet and the temperature change is often over 50° F. in 24 hours. Domestic heating is required almost every night, even during the summer and early morning smog conditions usually exist.

Figure 1 illustrates the condition. Temperature differentials within the model were controlled with refrigeration, heater wires and heat ray.



Contaminants were injected into the model at ground levels of each respective source. The air was activated in the storm drain system; first, with a volume control fan and then by the use of friction of running water through the system. In each case the contaminated air was effectively evacuated as suggested in Figure 2 much like "pulling the plug" from a bathtub full of dirty water.



In comparing this to a city it appears feasible that each curbside drain and each inlet into the drainage system, after activating the air flow, would then become a venturi which literally suctions the cool heavy surface air into the drainage system. Several known laws of physics pertinent to gas and air flow go into effect during this process.

VALLEY STREAM, N. Y.,  
May 18, 1970.

Mr. LEON G. BILLINGS,  
*Subcommittee on Air and Water Pollution,*  
*New Senate Office Building,*  
*Washington, D.C.*

DEAR MR. BILLINGS: I am sorry I did not get back to you during my stay in Washington, but the uproar that followed the Task Force press conference made me think that additional comments, from one of us would not be very welcome. Since my return Scott has informed me that you are still interested in our comments and the Senator has expressed an interest in working together with us to produce good legislation. With these statements in mind, I am glad to give you the best comments I can as an individual, speaking for myself only and for no other member of the Task Force.

I enjoyed our meeting quite a bit because you seemed willing to take the time for a full discussion. I am glad that you have come to the position that air quality is not source relatable and have decided that enforcement cannot be made to depend on excess ambient air pollution concentrations. I hope that you will be willing to take the next step which I suggested, that the abatement be undertaken directly without regard to air quality criteria or standards. Although ambient air levels have theoretical value as guides to control, technology has not advanced far enough to make the effort put into criteria and standards worth the time expended on them. As desirable as the idea of using criteria to force new technology might be, such a method is essentially dishonest, for it relies on criteria which are full of holes and standards which cannot be accurately measured. The public deserves more honest, straightforward guidance from its political leaders.

My replacement for the air quality approach (and I see the air quality approach as something entirely distinct from the regional approach) would be application of available technology backed up by tough disclosure and subpoena powers to find out what is available or nearly available. NAPCA simply must be given the strongest power to find out what companies are doing and can do so that they and the states can give the term "all available technology" meaningful content. If the information is procured, the struggles you fear about what is economically reasonable need not occur.

The same aggressiveness would be ideal in the area of fuel substitution. The Senator's leadership in this area over the last two years has not been as vigorous as its importance warrants—he should be speaking out against the idea that low sulfur fuel is unavailable. A full scale Senate investigation would certainly procure for both NAPCA and the state control authorities the kind of data which they need to determine fuel accessibility, mining costs, transportation costs, and the like. You might also want to look into the oil import system—its air pollution ramifications have not been widely discussed.

It seems that with publicity and strong leadership control of the dangerous pollutants—*asbestos, cadmium and beryllium*—could be achieved through direct congressional enactment rather than through the timid process of administrative discretion. While we should provide for discretion to deal with other pollutants found to be hazardous, we simply cannot wait until the measurements are in before regulating these three substances. We may not have these measurements for years, and during these years many people may die. To some extent the burden of proof must be shifted to industry to show that its emissions are harmless, especially in cases where non-epidemiological evidence indicates a real problem.

These considerations also apply to control of lead pollution. If we wait for accurate ambient air—health effects correlations, we may be endangering the lives of many people. The political problem would not appear to be that great; after all, the auto companies are working to get lead out of gasoline, and if they can be moved anything is possible. It seems to me that regulation can and should be justified, not only on the basis of established data, but on the fear that our lack of knowledge hides deadly results. What possible good can lead be when it is incorporated into the flesh of human beings?

I strongly believe that new legislation must contain a new regulatory philosophy in which the Congress forces polluters to prove their emissions are harmless rather than requiring the government to show that they are dangerous. The air quality approach and administrative decisions about which substances cause

damage gives NAPCA the burden of making all the hard regulatory choices, and amounts to an abdication of decision-making by the Congress. Recognizing, however, that you have proposed a specific bill which retains the 1967 approach to regulation, I have made a number of suggestions that I believe would improve that bill. Before going on to more specific comments on S. 3546, however, I would just say that those industries which align themselves against strong pollution legislation should be exposed publicly for what they are. This is something I would think the Senator could do; his leadership need not come solely through legislation.

The following are suggested changes in language:

*P. 1, line 8.* Strike out remainder of Sec. 2 after the word "designate" and add "within three months pursuant to section 107 of the Clean Air Act, as amended, all those air quality control regions which he has announced an intention to designate in the Federal Register prior to enactment of this section."

This language clears up the ambiguities in the word "immediately" by giving a definite time cut off and in the phrase "all air quality control regions" by defining which regions must be designated. To enable NAPCA to carry out this mandate, you should consider dropping the requirement that it consult with "appropriate state and local authorities" before designating regions. This consultation takes excessive time; while it might have been worth the time when the states were first becoming acquainted with the machinery of the Air Quality Act, the consultation has less use now.

*P. 2, line 9.* After "hearings" insert "held not less than 30 days after the proposed region's boundaries are made public."

I think such a provision would protect the public by giving it ample time to study state proposals.

*P. 3, lines 3 and 9.* After "hearings" on these two lines insert the provision suggested above.

Rather than insert this 30 day clause throughout the present statute and S. 3546, you might add a definitions section to title I wherein you state that "hearings for purposes of the title mean hearings held not less than thirty days after the responsible agency makes the proposals which will be the subject of the hearings public." This definition would make it clear that hearings held within thirty days of the submission to the public of a proposal are not legal hearings under the act. If you decide rather to insert the thirty day provision every time the word hearings is mentioned, I would recommend that you amend the present 108(c)(1) to require a thirty day wait before hearings on standards in regions designated by the Secretary.

I am surprised that 3546 requires implementation plan hearings when the state designates the region but not when the Secretary does so. I do not believe you intended this discrepancy. Although Dr. Middleton once expressed an opposite view in an interview, it is absolutely essential that the people be present at hearings on plans. Later in the interview the Commissioner more or less changed his mind and agreed that battles over control strategy are intensely political and should not be left to the unsafe hands of control agency employees and industry engineers. A provision for implementation plan hearings in Secretary-designated regions should also contain the 30 day grace clause.

*P. 3, subparagraph (B).* Rephrase subparagraph as follows: "Such state standards protect health as defined in the relevant air quality criteria document and reflect the views expressed at the public hearing concerning protection against economic damage and a margin of safety for health; such state implementation plans require the incorporation of all the control techniques described in the control techniques documents unless the use of the techniques will cause severe economic harm to a whole community or a state and failure to use them will not endanger health as defined in the criteria."

This proposed revision responds to a variety of problems, foremost among them the vagueness of the current term "consistent with." Under the present terminology, NAPCA could reject a standard which was not consistent with some low level contained in the criteria at which a materials effect had been noted. It could also accept a standard higher than the lowest criteria number because it was consistent with some other figures in the criteria. The revision will make NAPCA's job easier by giving it a clearer basis for accepting or rejecting a standard. Such a clearer legal basis will make its decisions on standards and plans less controversial.



You might object to the phrase "health as defined by the criteria," but this language merely reflects NAPCA's current determination not to accept any standards which provide for numbers worse than those in the criteria. NAPCA's decision to uphold health is a sound one which accords with the 1967 legislative history in the House and Senate reports. To prevent controversy, it would be wise to spell out more clearly NAPCA's ability and responsibility for defining health in the criteria. A change in 107(b) requiring criteria to recommend a series of health and other levels would also help to give NAPCA clear responsibility to reject standards which do not at least protect health.

*P. 3, subparagraph (C).* I see no point to this paragraph whatsoever. In our conversation you stated that air quality was not source relatable. If that is the case, how can an implementation plan, which after all provides for control of sources, be shown to be capable or not capable of achieving a given level of air quality. To put the matter more concretely, no one really knows whether a plan which calls for a given degree of stack gas cleaning, some fuel substitution, and some relocations will achieve a particular standard or not. For this reason, the Secretary will not be able to make the determination required by the subparagraph. If you include this language, you will put NAPCA in the unhappy position of telling you it cannot do the job, or pretending to do the job through the use of fudged diffusion models and other advanced obscurities.

As a lawyer for a state or industry unhappy with the Secretary's action on a plan, I might be able to make a nice fee showing that the Secretary's acceptance or rejection of the plan was erroneous because evidence did not exist to support his determination that the plan would or would not achieve a given level of air quality. Once I made that point, my client might no longer have to worry about federal enforcement of regulations contained in the plan.

These fears of giving the Secretary an impossible task would cause me to delete this subparagraph and replace it with some language that implementation plans should provide for the installation of new control devices which are developed except when installation of those devices will cause severe economic hardship to a community or a state.

*P. 3, subparagraph (D).* This subparagraph has the same faults as (C).

*P. 3, subparagraph (E).* This subparagraph comes as close as anything in the bill to a non-degradation clause. Perhaps the revision of paragraph (B) suggested above will take the place of a non-degradation clause by requiring that all structures subject to the plan use the control techniques contained in the control techniques documents.

The matter of non-degradation involves policy decisions beyond the scope of a review of the bill's language, but some decision will have to be made on the matter. What does the "protect and enhance" language in the preamble to the Clean Air Act mean? The only attempt to interpret that vague language is contained in page 18 of NAPCA's *Guidelines for the Development of Air Quality Standards and Implementation Plans* which recommends but does not specifically require states to set standards that assure no significant deterioration in air quality.

The Task Force Report says that the Air Quality Act provides a license to pollute up to a certain level. The bill can meet this charge by providing that control equipment, zoning, and other devices be used to prevent degradation of air quality.

*P. 4, subparagraph (F).* Replace "including authority comparable to that in subsection (k)" with "including a system of emergency alerts that provides for shutdowns of major polluters and effective interjurisdictional and interstate communications." 108(k) does not provide an adequate guide to effective state emergency action because it provides only for court injunctions. A good alert system, such as New Jersey's must contain a step by step control strategy to be enforced in the first instance by administrative rather than court order. Decent intergovernmental communications are also necessary to ensure that two states such as New York and New Jersey are not working at cross purposes during an emergency. You might want to ask the NAPCA abatement bureau about the Staten Island incident that took place early the Summer of 1969; it will convince you, if you need to be convinced, that communications and administrative orders, rather than court injunctions, are the key to effective emergency plans.

108(k) should itself be expanded to cover serious chronic problems. The federal government currently lacks the authority to deal expeditiously with the really bad mill towns or other situations which demand quicker relief than the regional approach or the normal abatement conference can provide.

*P. 4, line 7; p. 5, line 2.* The "standards and plan shall be the standards" language plagues the present statute and should be eliminated in any new legislation. To be sure, 3546 generally makes it clear when you are referring to ambient air standards and when to air quality standards that also include plans. However, the use of the word "standards" in two contexts is not necessary and can only cause confusion. I would say in lines 6 and 7, p. 4 "shall be the air quality standards and implementation plan applicable to such region. . . ." This language should be repeated on p. 5, line 2.

If for some reason you deem it desirable to keep the standards and plan equals standards language, I would include somewhere in the bill (perhaps along with the definition of hearings suggested in the comment on p. 3, lines 3 and 9) a clear definition of air quality standard, ambient air quality standard, implementation plan, and emissions regulation. This definition would also have to explain that the term "standards", when used without any prefatory words, refers to ambient air quality standards alone, not the combination of standards and plan. (This explanation would fit the use of the single word "standards" contained in the present bill.)

*Pp. 6-8* contain many places in which the word "plans" would be inserted.

*P. 11, line 2.* After "subsection" insert "including orders to comply with emissions standards."

Paragraphs 7 and 8 set forth simpler procedures for violations of emissions regulations than for other violations, in that violators of emissions requirements are not entitled to a hearing before the Secretary. (p. 9, lines 13-18). The suggested language would emphasize the fact that violators of emissions standards also have a right to judicial review.

*Pp. 13-14, subparagraph (B).* I would seriously consider the addition of minimum fines, perhaps \$1,000 for a first offense and \$2,500 for subsequent offenses. The pattern of fines in the enforcement of building codes shows the danger of allowing judges to impose fines as low as they feel appropriate. The ridiculously low fines handed out for violations of the Refuse Act of 1899 also point up the need for minimum penalties.

When I mentioned this suggestion to you, I got a rather doubtful response, but the suggestion has a good deal of merit. If the Senator presses it he might scare industry enough to get agreement somewhere else; in any case I see no reason, either of politics or of good sense, not to press for minimum penalties.

*Pp. 14, line 11.* After "investigation" insert "or for taking measurements of emissions."

The specific mention of stack measuring by industry in the second sentence of paragraph 11 might lead courts to conclude that the Secretary does not have authority under the first sentence to take his own measurements. It should be stressed that the Secretary need not rely on industry measurements but can take his own when he sees fit. This suggested provision seems to me to be extremely worthy of your consideration; I would be surprised if you found any reason for not adopting it or something similar to it. Industrial ethics being what they are, at least among some entrepreneurs, it seems essential that the Secretary have the absolutely clear power to do his own stack testing when for some reason he wants to ascertain the facts himself.

I believe it essential that the Secretary have the power to require reports prior to the entry of a final order against a polluter. With a limited staff of investigators, he will frequently have to rely on industry sources to find a violation and enforce regulations. Furthermore, without power to require continual reports regardless of the existence of final orders, the Secretary will have no way of forcing industries to install those telemetered stack devices which you seemed to think so important.

This requirement of reports would not infringe the 5th Amendment because reports are testimonial evidence, such as fingerprints or bloodtests, rather than communicative evidence such as confessions. Even if there are 5th Amendment problems reports could still be used as evidence in civil injunction suits brought in accordance with section (10) (A) on pp. 12-13 of S. 3546.

*Pp. 16-17, paragraph 13.* After thinking over your discussion of the citizen suit provision, I have still come to the conclusion that the provision is nearly worthless if it does not allow attorneys' and experts' fees to be awarded. The telemetered stack testing of which you spoke does not exist now and will probably not exist for a long time, given certain industry resistance to such a practice and the slowness of the states to install telemetered stack devices. When it does come

into existence, an attorneys' fee provision will in no way interfere with its operation, since the simplicity of the cases would just mean that awards of fees would be low.

For the next few years, when telemetered systems do not exist, the costs of bringing citizen suits will be so high that none will be brought unless fees paid for expert stack testing and for attorneys' fees can be recouped. In other words, leaving fees out is not a compromise; this omission renders the whole provision almost completely worthless for the foreseeable future. Even when telemetered devices come into existence, the suits will cost something to bring and provision must be made for recouping that something.

Citizen suits work so well in securities regulation because they bring in enough money to make them profitable for an attorney. If the corporate plaintiff's attorney could only secure an injunction and no money, he would not bother to bring suits, because he would lose money doing so, and the value of private regulation as an adjunct to S.E.C. regulation would just about completely disappear.

As an alternative to award of fees, you could provide a statutory damage remedy for violation of control regulation. Perhaps the plaintiff would automatically recover \$500 dollars at a minimum plus whatever damage he could show that the excess pollution caused him or the class he represents. Something along these lines or along the lines of awarding fees must be added to make this paragraph more than a hollow promise; if you do not add one of the two suggestions, you might just as well spare yourself the battles with the lobbyists and delete the paragraph from the bill. I will be quite disappointed, however, if you do not add the attorneys' fees provision and would be more than willing to do the research necessary to answer any questions you might have on the subject.

Once you add the fees provisions, you still need to give citizens some legal authority for getting information about industrial emissions levels. I would suggest that local control agencies be required to inspect the suspected offending plant upon request of a citizen who is about to file a suit. In the alternative, the citizen could hire his own man to go into the plant and take the readings so long as that man registered himself in advance with the local control agency. Neither the control officials nor the hired experts should be required to announce in advance when they would be taking their stack readings. If a plant manager knows the inspector is coming, he can run the plant at less than normal capacity the day of the inspection and make his emissions picture look far better than it actually is.

The model for these suggestions with regard to inspection is the private rent withholding provisions of the Massachusetts General Laws; Under these provisions, a tenant who believes his apartment contains violations of the building code can call the local Housing Inspection Department and have them inspect his place. If they find violations, he can place his rent in escrow until repairs are made. This wise provision ensures that afflicted people, not office professionals, set enforcement priorities. An effective citizen suit section, with provision for fees and inspection, would carry the same principle over to the abatement of air pollution.

One final remark on this—the Massachusetts law does not empower courts to issue writs of mandamus which would force reluctant control officials to undertake the inspection required of them. I would include such a power in 3546 to prevent control agencies from delaying or not making at all the inspections which citizens request of them.

*Pp. 17-18, section 4.* As the Task Force Report states, this section does not empower the Secretary to impose penalties for violations of the regulations. Since courts will not imply a power to impose criminal sanctions, this section ought to be amended to state what penalties follow from violations of the regulations. In the Selective Service Act the penalties are set out in the statute although the content of the regulations is left to the military. That pattern must be followed here if this section is to have more than advisory effect.

I am still troubled by the phrase "latest available pollution control techniques" in line 19; it does not give a court very much to work with. You could either give the courts and NAPCA latitude by stating that only "reasonably available" control techniques need be employed, or you could get specific and require the use of techniques which do not add more than 10% to capital investment or 5% to operating costs. You may feel that the "reasonably" is implied, but you will make your aim clearer to the court and to NAPCA if you express your intention directly, assuming you prefer broad administrative and judicial latitude in specific investment ratios.

In conclusion, I will say that you might find some of these comments rather overly concerned about making language explicit. This stems in part from a lawyer's desire not to take chances and in part from a concern to avoid the loose language which plagues portions of the current act. In a course I took last year, we were told to think of legislative language as a series of instructions to courts and administrative bodies. I am concerned that these instructions be as clear as possible and that they be conveyed fully by the language of the statute without undue reliance on the far less authoritative words of a committee report. I do not trust legislative history because Congress only passes a statute; it does not vote on or approve the language of a report.

Finally, if you decide to stay with the air quality approach, I hope that maximum feasible control is required so that there is no license to pollute up to the air quality standards. Air quality measurements should, as you said last week, tell us when new control techniques are needed to protect health; they should never be used as an excuse not to employ existing control equipment.

Sincerely,

PETER BUCHSBAUM.

THE UNIVERSITY OF NORTH CAROLINA,  
THE SCHOOL OF PUBLIC HEALTH,  
Chapel Hill, June 1, 1970.

HON. EDMUND S. MUSKIE,  
Chairman, Subcommittee on Air and Water Pollution,  
Committee on Public Works,  
U.S. Senate, Washington, D.C.

DEAR SENATOR MUSKIE: Since I understand that the record of the recent hearings on air pollution legislation is still open, I am herewith submitting, for inclusion in the record, two papers I have recently prepared which are relevant to the matters under consideration.

One is a paper entitled "Air Pollution Control Regulation in the 1970's", which was presented on May 27, 1970 at the Symposium on "Pollution Problems of Our Environment" of the Joint International Meeting of the American Chemical Society and the Chemical Institute of Canada at the Royal York Hotel, Toronto, Ontario, Canada.

The other is a paper entitled "Air Pollution Emission Standards—Stationary sources" which will be presented on June 16, 1970 at the Plenary Session on "National Emission Standards" of the 63rd Annual Meeting of the Air Pollution Control Association at the Chase-Park Plaza Hotel, St. Louis, Missouri.

Sincerely,

ARTHUR C. STERN, *Professor.*

#### NATIONAL EMISSION STANDARDS FOR STATIONARY SOURCES<sup>1</sup>

(By Arthur C. Stern, Professor, Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina, Chapel Hill, N.C.)

##### *National Emission Standards Report to the Congress*

On March 13, 1970, the Secretary of Health, Education and Welfare transmitted to the Congress of the United States a comprehensive report on the need for and effect of National Emission Standards for Stationary Sources, (1) in compliance with Section 211(a) of Public Law 90-148, The Clean Air Act, as amended. Because this report has not been widely available heretofore because the Congress did not order it to be printed until April 27, 1970, I will broadly summarize its contents. Approximately a half of the report is devoted to discussion of emissions from industrial sources, more specifically, the following industries: aluminum reduction, beryllium manufacture, carbon black, cement, coal cleaning, coke, copper smelting, cotton ginning, ferroalloys, grain milling and handling, grey iron foundries, iron and steel, lead smelting, municipal incineration, nitric acid, petroleum refining, phosphate feed supplement, phosphate fertilizer, phosphoric acid, pulp and paper, rendering, soap and detergent, steam-electric power plants, sulfuric acid and zinc smelting. For these industries, the report gives some basic information concerning the processes involved, the emissions therefrom, the number of plants, their geographic distribution, capacity, rate of growth, case histories of air pollution studies involving some of them, and a cost estimate of the application to them of emission standards nationally.

<sup>1</sup> For presentation on June 16, 1970 at the Plenary Session on "National Emission Standards, 63rd Annual Meeting, Air Pollution Control Association, Chase-Park Plaza Hotel, St. Louis, Missouri.

*Mathematical Model*

Another quarter of the report describes a mathematical model of seven hypothetical major sources, viz: a by-product coke plant, an integrated steel plant, a cement plant, a grey iron foundry, a petroleum refinery, a steam-electric power plant and a municipal incinerator, located along a river in a rectangle 6 km long by 2 km wide, in a rural area; and these same plants in an urban area. (Fig. 1) This model is analyzed with respect to the computed particulate matter and sulfur dioxide concentrations in the area, treated both as an open plain and as a valley 2½ km wide. The concentrations are computed from these hypothetical major and area sources both individually and collectively. This section of the report discussed the consequences to health and welfare of these computed concentrations, the reductions in computed concentration that would result from the imposition on the major sources of emission limits for sulfur dioxide similar to those in force in St. Louis and Los Angeles; of process weight limits for particulate matter similar to those for San Francisco; of fly ash emission limits similar to those in Maryland; of incinerator limits similar to those for Federal facilities, and of arbitrary limits for coke ovens. This section of the report concludes with an analysis of the costs of such control and a cost-benefit analysis of these controls.

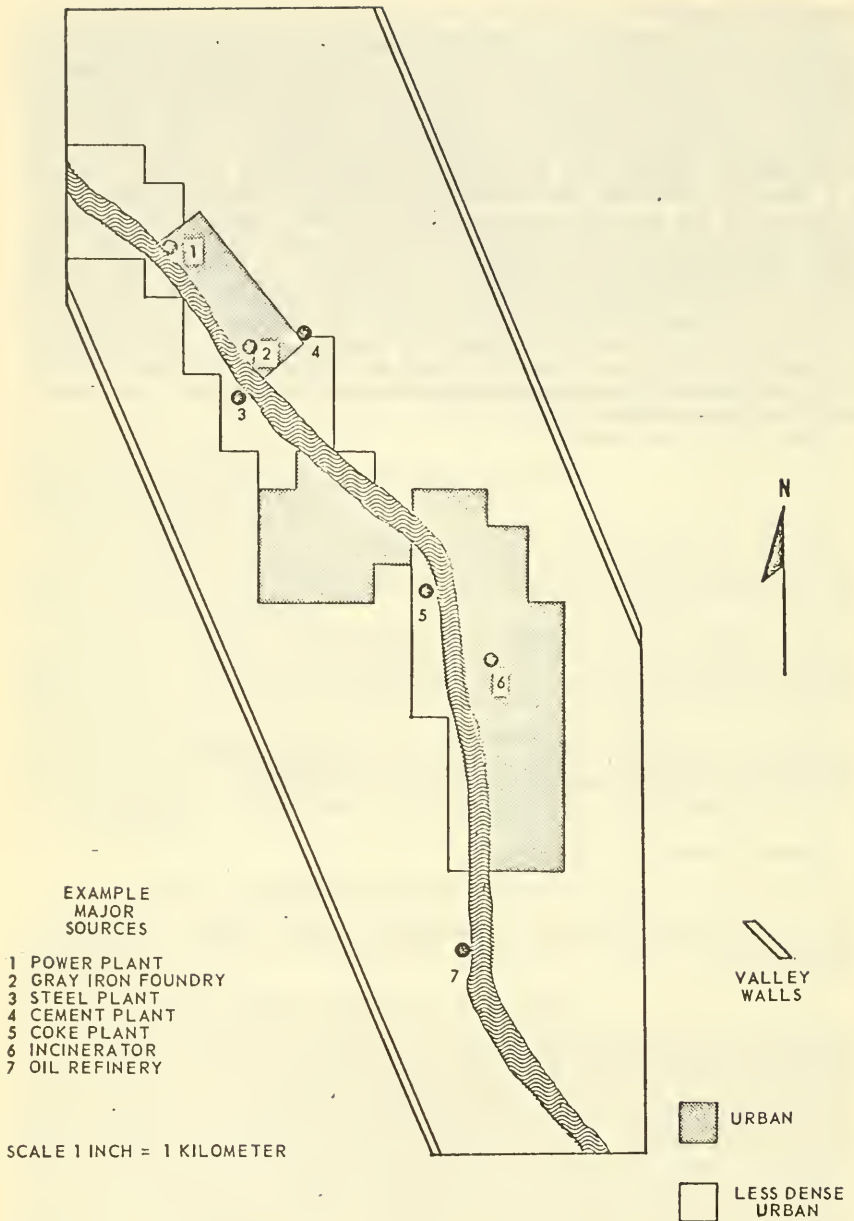


Figure 1-a. Basic regional profile: urban area.

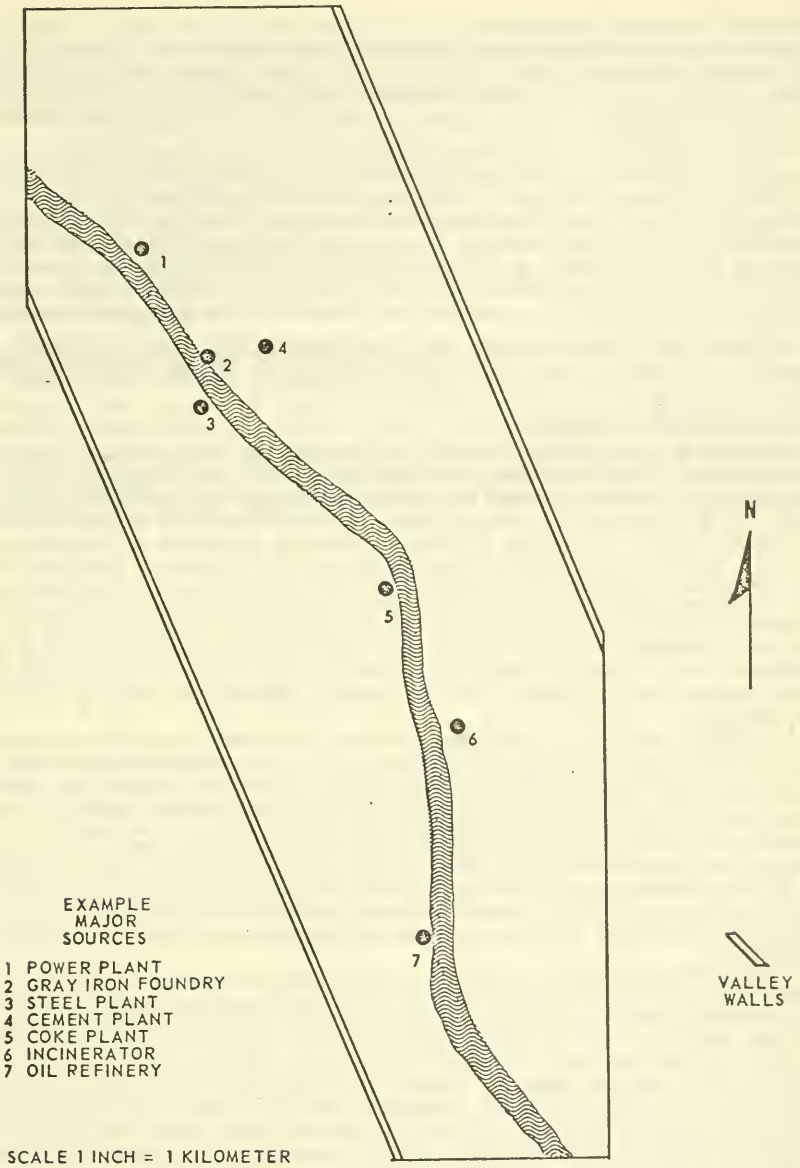


Figure 1 -b Basic regional profile: rural area.

*Existing Emission Standards*

Another one-eighth of the report is devoted to a discussion of a number of typical emission regulations currently in effect in various jurisdictions in the United States. This portion of the report concludes with a sub-section entitled, "Trends in Emission Standards" that contains two paragraphs especially worth quoting: the first one in full:

"Recent trends have been to prevent air pollution by requiring application of maximum feasible control technology. Standards which limit the concentration of effluent emissions are rapidly being replaced by those which limit total mass emission rates by requiring that control be increased as the size of the pollution potential of the source increases. In the past, the large, experienced control agencies have been unable to prevent air pollution by using standards based on dispersion and resulting ground-level concentration of pollutants. Newer standards improve air quality by applying limits directly to the source of pollutants." the second one, in part:

"Sulfur oxides have previously been controlled by somewhat outmoded concentration standards; standards based on potential emission rate appear to be more suitable."

*National Emission Standards*

Although the seven-eighths of the report described above was responsive to the Congressional directive of Section 211(a), it does not discuss national emission standards. It, instead, discusses the national application of local emission standards, which is an entirely different thing. The only section of the report which addresses itself to the matter of national emission standards is the one-eighth of the report that constitutes Section 3 "Means for Selection of Emission Control Measures". I will draw freely from this section for the remainder of this paper for one very practical reason. I wrote it as a consultant to the contractor that assisted NAPCA in the preparation of the report, and it best represents my thinking on the subject. It appears in the report essentially as I wrote it, with a few deletions, some of which I will re-introduce in this paper, and some editorial improvements on my literary style by persons unknown to whom I am duly appreciative.

At present, there are no national emission standards for stationary sources in the United States. The closest approach to it are the standards applicable to Federal installations nationally. Implementation plans for meeting air quality standards in air quality control regions do not develop national emission standards. Instead, they develop local emission standards, which are acceptable to the Secretary of Health, Education and Welfare, which is quite a different thing. To obtain some forms of Control Agency Development Grants from the Department of Health, Education and Welfare, state or local agencies may have to specify that they have, or will try to enact, emission standards acceptable to the Department. Such standards, when enacted, are again state or local, rather than national standards.

The emission standards in both the above instances are arrived at essentially by negotiation between the federal and state or local governmental agencies, whereas true national emission standards are promulgated by the federal government and are not subject to state or local negotiation. This does not mean that a state or local jurisdiction may not enact and enforce emission standards more restrictive than national emission standards. Presumably, this could be done on state or local initiative without negotiation with the federal government since national emission standards would set an emission ceiling above which no state or locality could set limits, but below which it could be free to exercise local judgment in setting its limits. This right, I believe, would be implicit unless Congress specifically directed otherwise in its enactment of such standard-setting authority. The only caveat to this might be in federally designated air quality control regions, in which such more restrictive deviation from the national emission standard would presumably have to be consistent, although not necessarily uniform, within the region, whether the region be interstate or intrastate.

*Types of National Emission Standards*

National emission standards may be of two general types: uniform or variable. Uniform standards apply alike to all states and localities, regardless of their meteorology, topography, present air quality, population density and state of industrialization. Uniform national standards are expressed in the form of tables or graphs already familiar to us by virtue of their previous use in state or local



standards. Since some of our state or local emission standards are themselves quite complex, involving ranges of capacities, stack heights, distances, and other variables, uniform national emission standards would be equally complex. The only variables a uniform national standard could not have are discriminators based on geographic area such as:

- (a) Existing air quality with respect to the subject pollutant.
- (b) Estimated emission of the subject pollutant.
- (c) Emission density (estimated emissions/area).
- (d) Number of sources in the area.
- (e) Source density (number of sources/area).
- (f) Population in the area.
- (g) Population density (population/area).
- (h) Population and industrial growth projections.

#### *Variable Standards*

Where area discriminators of this type are incorporated in a standard, it becomes a variable, rather than a uniform standard.

A few State and local emission standards presently incorporate some of these discriminators, usually by specifying different standards for agricultural, residential, commercial and industrial areas; or as in the case of the Pennsylvania potential emission rate regulation for particulate matter (Fig. 2) for different area classes. A variable national emission standard would include area discriminators allowing each jurisdiction in the United States to determine for itself into which area class it falls. (Fig 3.)

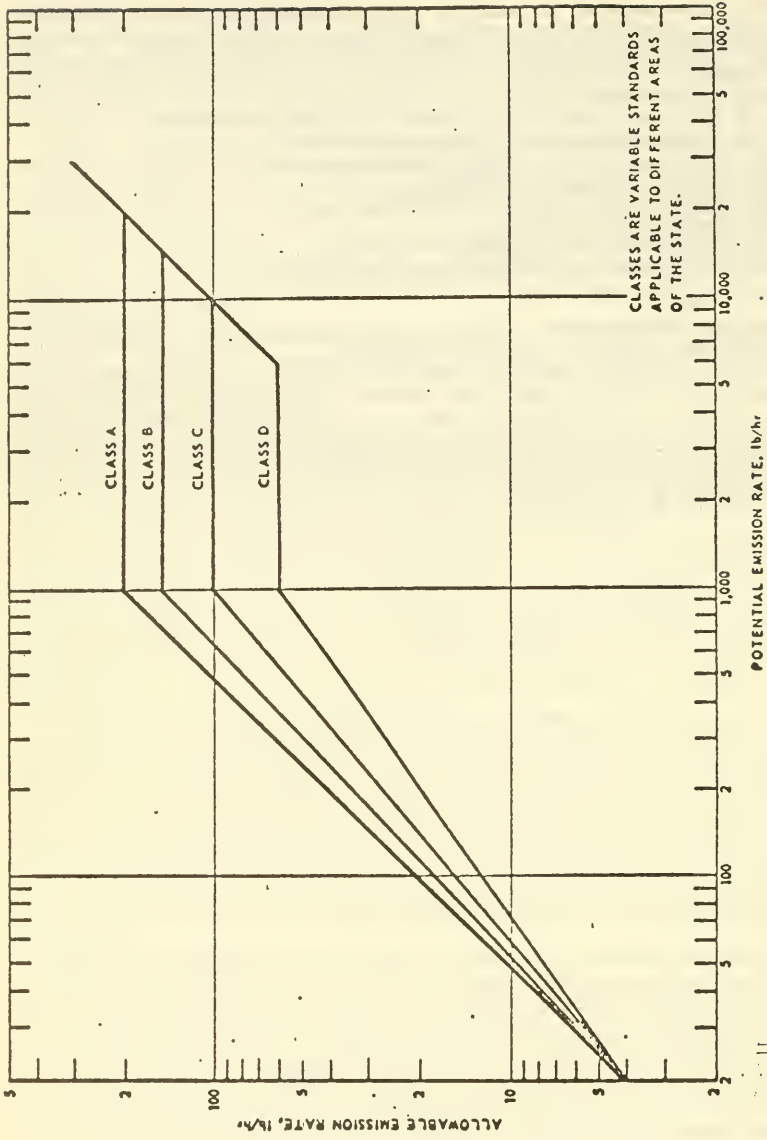


Figure 2 Pennsylvania potential emission rate regulation for particulate matter

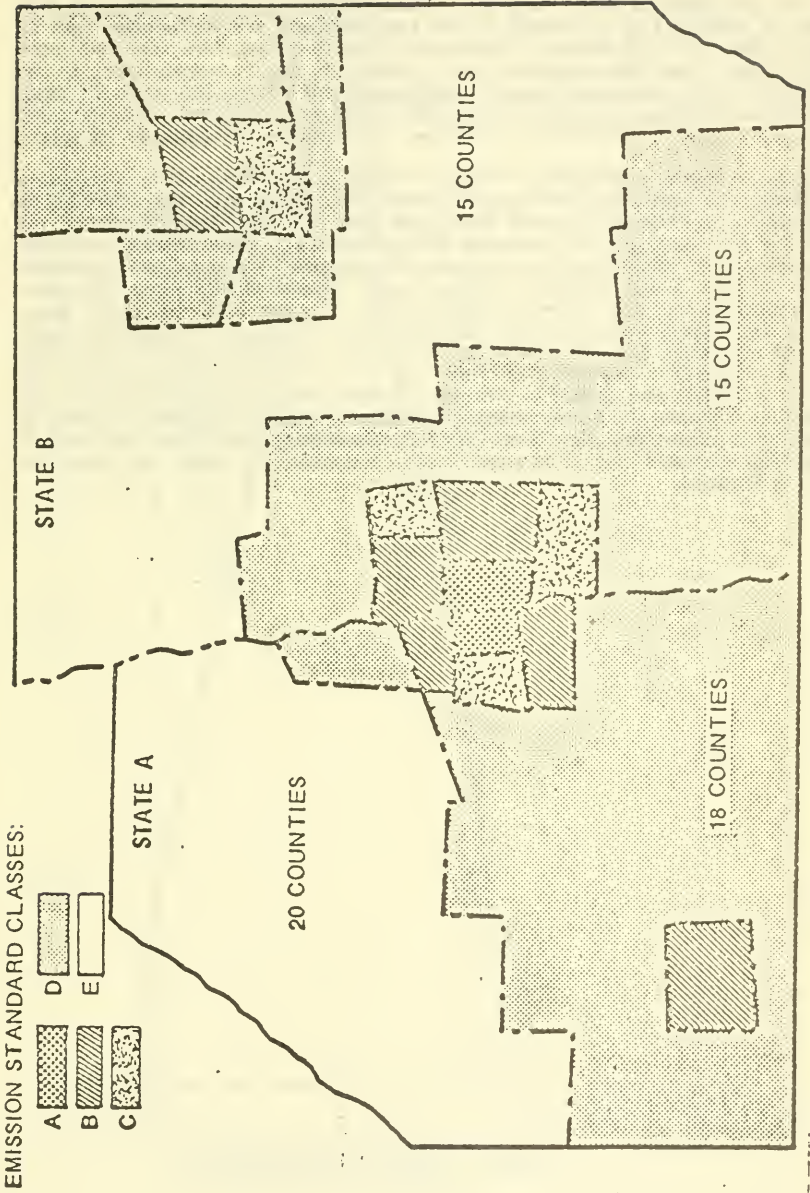


Figure 3 Tailoring emission standards to existing air quality.

A few examples of what such area class identifying tables might look like appear in Section 3 of the report to the Congress and are reproduced here as Tables I and II. Not included in the report to the Congress were some still more complex area class discriminators I had included in my manuscript such as the combination of a population density weighting factor (Table III) with air quality ratio to produce a weighted air quality ratio as a composite discriminator (Table IV) that a community could use to determine its emission standard class.

There are cogent arguments for both variable and uniform national emission standards. The arguments for variable standards are the same ones that led to the deletion of national emission standards from the 1967 amendments to the Clean Air Act. Many of you remember that provisions to enact national emission standards were included in the amendments proposed by the Johnson Administration in 1966. These provisions elicited much debate at that time. The principal argument that led to their deletion by the Congress, after the public hearings on the proposed amendments, was that it was improper to apply the same limits to a plant in the open spaces of Wyoming as to a like plant in New York City, i.e. that air in Wyoming is clean and can be dirtied, whereas the air in New York is dirty and should be cleaned. Concepts such as those of Tables I and IV provide a means for accommodating national emission standards to areas as diverse as Wyoming and New York City by reclassifying such areas with respect to emission standard classes at regular time intervals, e.g., every ten years, as shown in Figure 4.

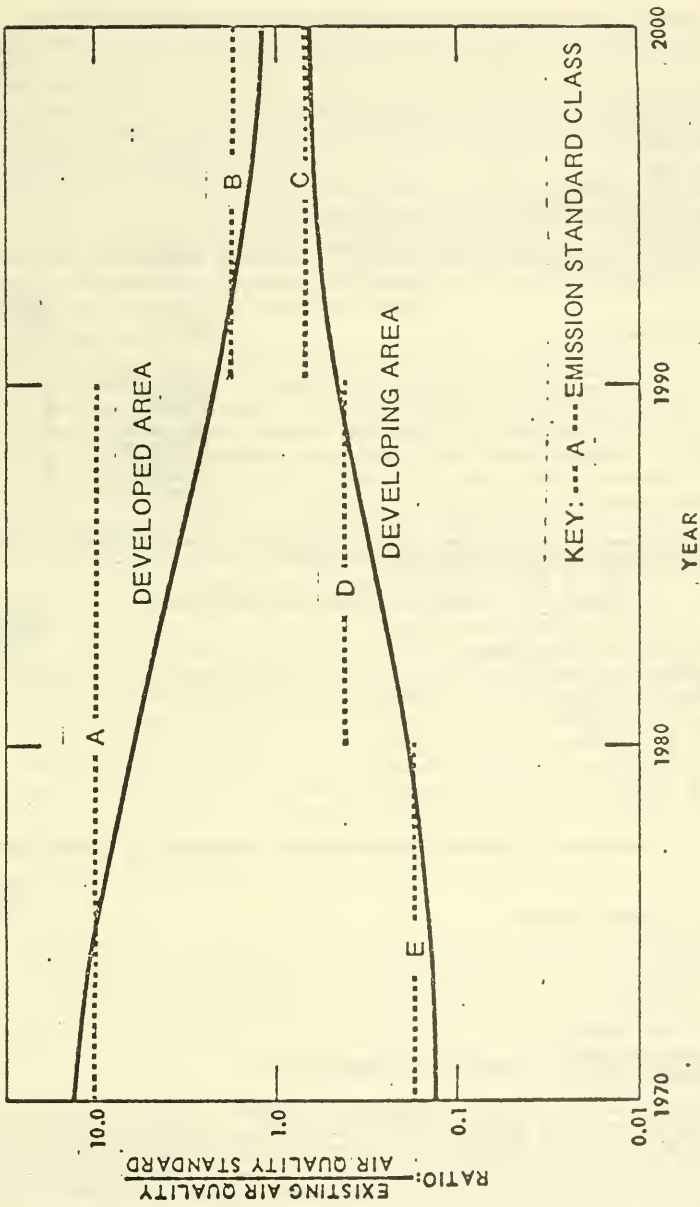


Figure 4 Change of emission standard class with time.

TABLE I.—*Emission standard classes based on existing air quality*

Ratio: <sup>1</sup>	Emission standard class
2.5 and over -----	A
1.0 to 2.49 -----	B
0.5 to 0.99 -----	C
0.1 to 0.49 -----	D
0.0999 and under -----	E

<sup>1</sup> Existing air quality divided by air quality standard.

TABLE II.—*VARIATION OF EMISSION STANDARD CLASSES WITH ATMOSPHERIC AREAS*

Atmospheric area name	Emission density	Emission standard class
Appalachian.....	1,000 and over.....	A.
	100 to 999.....	B.
	10 to 99.....	C.
	10 and under.....	D.
South Florida.....	1,000 and over.....	B.
	100 to 999.....	C.
	10 to 99.....	D.
	10 and under.....	E.

Note: Assignment of emission standard classes is continued for the other six areas: Washington coastal, California-Oregon coastal, Rocky Mountain, Great Plains, Great Lakes, and mid-Atlantic coastal.

TABLE III.—*Population density weighing factor*

Population per 1,000 square miles:	Population weighting factor
10 million and over.....	7
1 million to 9,999 million.....	6
100,000 to 999,999.....	5
10,000 to 99,999.....	4
1000 to 9999.....	3
100 to 999.....	2
99 and under.....	1

TABLE IV.—*Emission standard class based on weighted air quality ratio*

Weighted air quality ratio: <sup>1</sup>	Emission standard class
10 and over.....	A
5 to 9.9.....	B
1 to 4.9.....	C
0.1 to 0.99.....	D
0.099 and under.....	E

<sup>1</sup>  $\left( \frac{\text{Existing air quality}}{\text{Air quality standard}} \right) \times \text{population weighting factor.}$

It should be noted that the approaches embodied in both Tables I and IV require the use of an air quality standard in arriving at emission standard class. Therefore, before any such selection procedure could be incorporated into federal legislation or regulation, there would have to be parallel or prior enactment of procedures to either establish national air quality standards, or State and local air quality standards, covering all areas in the United States, conforming to federal review for consistency with federal criteria.

#### *Non-Degradation*

It should be apparent that the nation cannot, at the same time, adopt the approach shown in Figure 4 and a non-degradation policy with respect to the air over all parts of the nation. There are those who have interpreted the statement in Section 101(b)(1) of the Clean Air Act, as amended, that national policy shall be to "protect and enhance the quality of the nation's air resources" as a

directive for a national non-degradation policy. With our present technology, a strict non-degradation policy would keep all additional automobiles, homes, resorts and factories out of any presently undeveloped or developing areas. If the Congress really meant this, it was certainly talking out of both sides of its mouth, since in 1967, it, at the same time, rejected national emission standards, ostensibly because it felt that uniform national emission standards might not allow undeveloped areas to develop.

Non-degradation certainly has an appropriate place in the scheme of things, but it appears to be more properly a state role. If national emission standards were enacted, a state could determine that certain areas of the state (or, in fact, the state as a whole) would be required to be in a more restrictive class, permanently or decade by decade, than that into which they would fall by application of a national standard. It could thus maintain its own non-degradation policy for its resort and agricultural areas.

#### *Uniform Standards*

Neither the approach embodied in Table II, nor uniform national emission standards (Tables V and VI), require that there be prior enactment or development of national, State, or local air quality standards. The approach of Tables V and VI, uniform national emission standards, also requires no area class discriminator. Table II employs two area class discriminators; one, emission density, which discriminates on the basis of the state of development of an area, as reflected by the number, size, type and character of its homes, institutions, automobiles, and factories; another, which discriminates on the bases of the general meteorology and topography of the area, i.e. the atmospheric areas of the United States which have already been officially designated (2) (Fig. 5), as required by Section 107(a) (1) of the Clean Air Act, as amended. Since its enactment in 1967, there has always been question in my mind why Congress added Section 107(a) (1) to the Act. There is no indication elsewhere in the Act as to why these areas were to be designated or how they were to be used. It may be that the Congressional drafters of the amendments to the Act may have this type of use in the back of their minds.

# ATMOSPHERIC AREAS OF THE UNITED STATES

(Section 107 (c) (1), Clean Air Act, as amended)

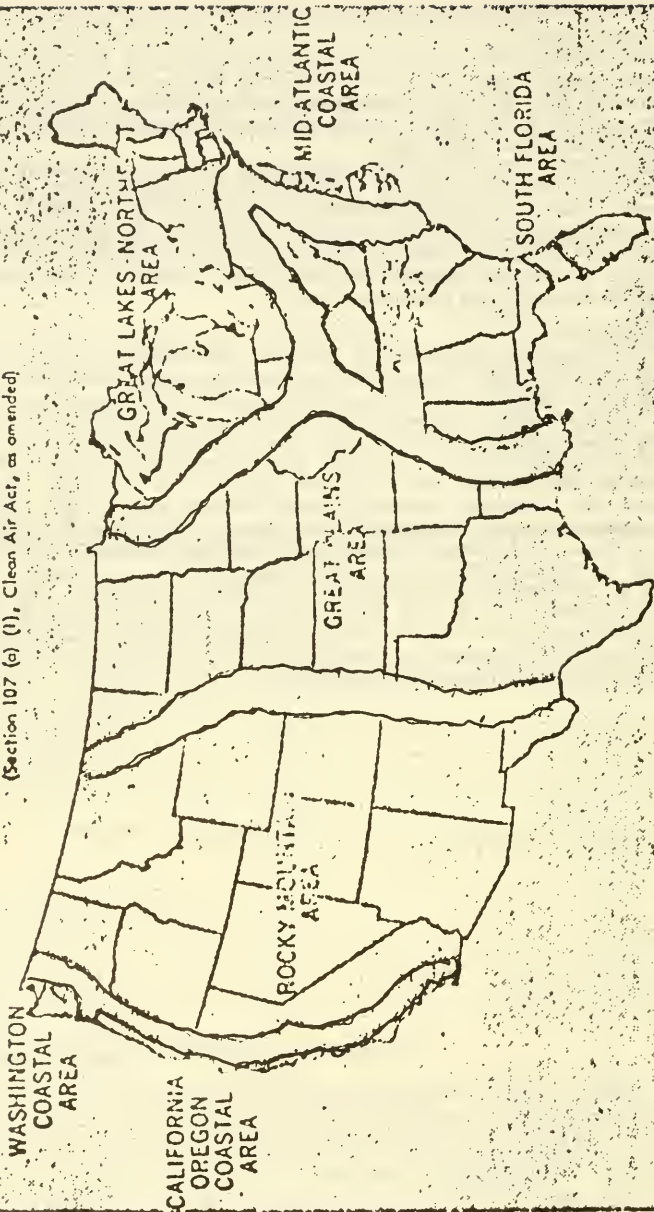




TABLE V.—UNIFORM NATIONAL EMISSION STANDARDS

Designation of standard	Source characteristics	Remarks
Minimum.....	Average installations in the United States.....	Readily achievable with little cost burden but of little real value.
Good practice.....	Better installations in the world.....	Achieved in better installations.
Best feasible practice.....	Best installations in the world.....	Highest achievable by current technology.

TABLE VI.—APPLICATION OF A SLIDING SCALE TO UNIFORM NATIONAL EMISSION STANDARDS

Productive capacity of source <sup>1</sup> (arbitrary units)	Emission limit <sup>1,2</sup>	Remarks
1 to 99.....	25	"Minimum" standard=25.
100 to 499.....	20	"Good practice"=18.
500 to 999.....	15	
1,000 to 4,999.....	10	"Best feasible practice"=10.
5,000 and larger.....	10	(3).

<sup>1</sup> Continuous "sliding scale" between stated values.

<sup>2</sup> Per unit volume of productive capacity.

<sup>3</sup> The alternative approach would be to prohibit units larger than 5,000.

### *The Competitive Factor*

The argument most frequently heard for national emission standards is that they would eliminate from our free enterprise system any competitive advantage that would accrue to the owners of a factory, and to the jurisdiction in which it would be located, by virtue of that jurisdiction electing to allow the factory to emit more pollution into its air than in another competitive jurisdiction, ostensibly for the purpose of attracting new industry or holding on to existing ones. In the weeks preceding Earth Day, I heard this argument voiced repeatedly on TV, radio and the press by members of the present federal administration and members of the Congress of both parties. It should be recognized that this posture is inconsistent with that accepted by the Congress in 1967 when it stood firmly for the right of Wyoming to apply a less restrictive emission limit than that for New York City, in effect giving its blessing to some areas of the nation having a competitive advantage over others in the costs for air pollution control they impose on their industry. One thing is certain, we can't have it both ways at the same time. If we mean no competitive advantage, we mean uniform national emission standards of the type of Tables V or VI.

### *Recommendations of Report*

In the light of this, let's examine the position of the present federal administration and of the Congress more closely. The National Emission Standards Report to the Congress recommends:

- (1) No portion of any state to be without applicable air pollution control standards;
- (2) National air quality standards uniform across the nation;
- (3) National emission standards for major new stationary sources of air pollution based on the application to the fullest extent possible of the technology available at the time of their construction; and
- (4) National emission standards for both existing and new sources of pollutants that are or may be extremely hazardous to the public health.

I will discuss these in reverse order.

### *Hazardous Pollutants*

Air and Water News (3) quotes HEW Undersecretary John Veneman as testifying in the Congressional Hearings on the administration's new air pollution control bill that the candidates for the category of pollutants extremely hazardous to health are: asbestos, beryllium, cadmium, biological aerosols and chlorinated hydrocarbons. On the strength of this statement, those not in the industries emitting the pollutants mentioned can dismiss this provision as being laudable in intent, but essentially without impact on the major air pollution problems in the nation.

### *Application of Best Technology*

The impact of national emission standards for major new sources depends largely on the definition of the word "major." If Table VI is taken as an example of a statement of national emission standards for a range of sizes of plants, the word "major" could be interpreted to mean either only the largest size range listed in the table, or any size range above the smallest size range of the table. Obviously, the greater the size range encompassed, the greater the impact of such standards, and vice versa. The elimination of the word "major" would allow the full range of sizes to be included. It hardly makes sense to say that national emission standards shall apply to a large cement plant but not a smaller one. It would seem that if the intent is to nationally apply better control technology, there should be no size discriminator limiting this intent. Likewise it will make a tremendous difference to the course of air pollution control in the United States whether the definition of "major source" includes or excludes categories of small stationary sources, which, because they are present in large numbers, constitute major sources of pollution nationally. If it is our national intent that best available control technology be applied to such sources, we must make sure that the applicable legislation explicitly says so.

Application of best technology at the time of construction has several implications. First, by virtue of the advance of technology with time, it implies periodic revision of emission standards derived therefrom to keep up with such advance. Second, since such application is intended to apply only to new plans, the spectre of retroactivity to plants built at an earlier date disappears. Third, by typing into best control technology, such standards would not be derived from consideration of the air quality standards of the nation, the state or the region.

I mentioned non-degradation earlier in connection with air quality standards. However, it is not in that connection, but rather in connection with emission standards, that the real non-degradation battle lines will be drawn. Non-degradationists in this latter sense, and I must confess I am one of them, say "Why discharge any pollutant into the air when we have an adequate economically feasible technology to avoid so doing"—the adequacy and economic feasibility proven by the incorporation of this control technology in the best new plants of the industry, or of comparable industry. Others, and I would hate to label them by the derogatory term "Degradationists," call this "control for control's sake" and argue for the right to dump wastes into the air up to its assimilative capacity as measured by air quality standards. This argument is going to go on for a long time to come and certainly will not be settled by our discussions here today.

### *Role of Air Quality Standards*

If we elect to ignore air quality standards in our selection of national emission standards for stationary sources, one may ask, why have air quality standards at all. The answer is that if the application of best control technology does not bring air quality to within air quality standard limits, we have to know it and be prepared to do something about it. What we can do is best exemplified by what we have done with respect to the automobile. Based on careful analysis, we have concluded that even the application of best present control technology will not bring pollutant levels associated with automotive emissions within air quality limits. We have therefore, set future automotive emission limits at better than best present technology, and in effect, told the auto makers, "Either advance control technology or stop making automobiles." The same strategy can be applied to stationary sources should it be needed; again, in effect saying, "The next plant of this type built has to have better than our best present control technology or don't build it." Even though we may elect to apply the best control technology concept to our domestic, commercial and institutional sources, for instance, by requiring no visible emission, we may still wish to apply the air quality standards approach to determine the allowable sulfur content of fuels these sources may burn.

If the nation is to be committed to a course of action involving uniform national emission standards, differences between state, regional or local air quality standards and a uniform national air quality standard would have very little real impact on the course of control activity or effectiveness in these jurisdictions. An individual jurisdiction can argue that its situation is unique to itself and that, therefore, its air quality standard should reflect its uniqueness. This argument may well be valid but its significance and importance to the ultimate cleanup of the air is small compared to the problems created in having each jurisdiction go through the motions of developing a set of standards unique to itself. This argues

for the recommendation of the National Emission Standards Report (1) that there be national air quality standards uniform across the nation.

#### *Slowdown?*

Although, as we have seen, I support the major recommendations of the National Emission Standards Report (1), I reject the statements in the Report that imply that recharting our national course along these lines will result in a slowdown of State and local air pollution control activities. I can think of no course of action better designed to slow down State and local control activity than a continuance of the present course of action of regional designation, regional air quality standard adoption and regional implementation as required by the 1967 amendments to the Clean Air Act.

Since I have recently discussed this elsewhere (4), I will not further elaborate here.

#### *Conclusion*

By way of conclusion, lest we think we are pioneering in the development of the concept of national emission standards, please be disabused of the notion. National emission standards have for years been the keystone on which most of the other developed nations of the world have based their air pollution control philosophy. We in the United States could do no worse than to discover later what other countries have discovered earlier.

#### REFERENCES

(1) National Emission Standards Study—Report of the Secretary of Health, Education and Welfare to the United States Congress—91st Congress, 2nd Session, Senate Document No. 91-63. U.S. Government Printing Office, Washington, D.C. (1970) XIX+146 pp.

(2) Definition of Atmospheric Areas, Federal Register, Vol. 33, No. 10, p. 548-9, January 16, 1968.

(3) Air and Water News, Vol. 4, No. 12, p. 2, McGraw-Hill, Inc. New York (March 23, 1970).

(4) Stern, Arthur C. "Air Pollution Control Regulation in the 1970's", Presented at Symposium on "Pollution Problems of Our Environment", Joint International Meeting of American Chemical Society and the Chemical Institute of Canada, Toronto, Ontario, Canada (May 27, 1970).

CONNECTICUT STATE DEPARTMENT OF HEALTH,  
March 27, 1970.

Memorandum to: New England Congressional Delegation.

From: Louis J. Proulx, Jr., Chief, Air Pollution Section, Connecticut Department of Public Health, Chairman, New England Staff for Coordinated Air Use Management.

Subject: Public Law 90-148.

This letter is written on behalf of the New England Staff for Coordinated Air Use Management (NESCAUM). This Conference group, of which I am presently Chairman, is comprised of New England and New York state public health officials responsible for state-wide air pollution programs. NESCAUM has several major objectives in the advancement of regional cooperation. Uniform air quality evaluation techniques including air sampling, analysis, and reporting of data are being studied and developed. Region-wide interchange of data on air quality is being developed between members and with appropriate agencies within each state. There is close cooperation between the states in determining and identifying actual and potential multi-state air pollution problems. There has also been serious and objective study on such matters as interstate compacts and federal and state legislation.

The Clean Air Act has been of significant value in the development of our state and local programs. When Public Law 90-148 provided for maintenance grants, the intent of this statute was to provide continuing maintenance of up to 50 percent for state and local programs. It does not seem that it was the intent of Congress to penalize the states as this statute is actually administered. However, Section 105(b) PL 90-148 states ". . . No agency shall receive any grant under this section during any fiscal year when its expenditures of non-Federal funds . . . will be less than its expenditures were for such programs during the preceding fiscal year . . ."

This clause has been interpreted by the National Air Pollution Control Administration to mean that any reduction however small, in expenditures below that of the previous year would mean a total loss of federal funds. Because of this interpretation by the National Air Pollution Control Administration, every state and local program must, at least, be funded at exactly the same level as the preceding year to continue to receive federal funds. This, at times is difficult to accomplish particularly when legislatures have a tendency to make across-the-board reductions.

An amendment could provide for adjustments in the amount of federal aid when expenditures have been decreased by action of the legislature. Any such decrease should result only in a proportional decrease in federal grant moneys.

Therefore, we recommend that PL 90-148 be amended in a way which would allow agencies to be able to carry on their program without fear that a minimal reduction in their budget would affect their entire federal grant.

We respectfully recommend that Section 105(b) have added to it the following:

"If an agency receiving grants under this statute should have a decrease in the amount of state or local funding, this will result only in a proportional decrease in federal grant funding."

AMERICAN MINING CONGRESS,  
Washington, D.C., April 15, 1970.

Hon. EDMUND S. MUSKIE,  
*Chairman, Air and Water Pollution Subcommittee,*  
*Senate Public Works Committee, Washington, D.C.*

DEAR MR. CHAIRMAN: The American Mining Congress appreciates the opportunity to comment on the proposed amendments to the Clean Air Act of 1967 now under consideration by the Senate Public Works Subcommittee on Air and Water Pollution.

Attached is the statement of David Swan, Vice President-Technology, Kennecott Copper Corporation, and chairman of the Environmental Matters Committee of the American Mining Congress. We respectfully request that this statement be included in the record of the Subcommittee's hearings.

Sincerely,

J. ALLEN OVERTON, JR.,  
*Executive Vice President.*

STATEMENT OF DAVID SWAN, VICE PRESIDENT-TECHNOLOGY, KENNECOTT COPPER CORP., ON BEHALF OF THE AMERICAN MINING CONGRESS

Mr. Chairman and members of the committee, I am pleased to submit this statement for the record of the hearings of this Committee on behalf of the American Mining Congress, a trade association of United States companies that produce most of the nation's metals, coal and industrial and agricultural minerals. Its membership includes also more than 200 manufacturers of mining and mineral processing equipment and supplies as well as financial institutions with a business interest in the mining industry.

We wish to begin by paying tribute to those Senators and Representatives who demonstrated an early recognition of the importance of preserving and enhancing air quality. The interest of these federal legislators dates well before 1955 when the nation's first law on air pollution was enacted. Within recent years, activities in the House and Senate have been successful in spurring a growing awareness of the problems of air pollution throughout the United States.

In recent months, we have witnessed a growing effort on the part of the Executive Branch to reinforce and accelerate the national drive for better, cleaner air. As businessmen and as citizens, the members of the American Mining Congress are in full accord with these efforts of both the Administration and the Congress.

Because of the nature of the mining and mineral processing industry, the member companies of the American Mining Congress have long been concerned with the quality of the environment in the areas in which they operate. The environmental effects of proposed operations are carefully considered in the planning and engineering of every mining and processing facility developed. This consideration occurs not only because of statutory requirements but also because industry, as a part of the community, accepts the obligation to operate in a socially responsible manner. Both through their own resources and those of manufacturing suppliers, AMC members have been at the forefront of the

development of measures to protect environmental quality, including air quality, and of the technology needed to do so.

It is from a background of long experience and technological familiarity with the air quality programs of the mining and mineral processing industry that the following comments are offered.

THE BASIC SCHEME OF THE 1967 CLEAN AIR ACT SHOULD BE PRESERVED

Although there are some who maintain that progress achieved under the 1967 Clean Air Act has been unduly slow and the achievements meager, we do not believe this to be the case. An objective analysis of the reasons for the less-than-expected achievement, however, does not suggest that the basic scheme of federal-state responsibility under the Act is faulty; rather, it suggests—in the light of what has been experienced and learned over the past three years—that the expectations of accomplishment may have been unduly optimistic.

Federal authorities charged with responsibility for the development of criteria have found the task far more technically complex than could have been imagined. The states have found that the development of standards involves technological capability which is not always immediately available and that the development of public understanding requires an investment of time and effort in education far greater than anticipated. In view of these facts, we believe the accomplishments to date have been substantial.

Some 30 air quality control regions have already been designated. Commissioner John T. Middleton, of the National Air Pollution Control Administration (NAPCA), has indicated that, by the end of the summer, a total of 91 regions will have been designated. In addition, NAPCA has published criteria and control techniques documents on five major pollutants: sulphur oxides, particulates, carbon monoxide, photochemical oxidants and hydrocarbons.

It is, however, in the state and local field that the greatest progress can be seen. Through the stimulation of the 1967 Clean Air Act, along with its Grants-In-Aid Program, activities of state and local governments have been intensified, and public interest and awareness have become increasingly evident. All 50 states have air pollution laws, many of which have recently been amended or are in the process of being amended, and at least 150 of the major communities in the nation have air pollution control laws or regulations in effect. Our member companies have been working closely with state and local officials in their efforts to implement these laws. It is only through public understanding and cooperation that air pollution control laws will be truly effective.

The difficulties which have been encountered in achieving the purposes of the Act will not be alleviated by discarding its basic scheme. The legislative history of the Act is a record of the most thoughtful studies by the Congress of alternate means by which to accomplish the desired objective. After extensive consideration, the Congress specifically rejected a national scheme in favor of placing primary responsibility for the solution as close as possible to the problem, relying on the individual states to develop and enforce standards appropriate to the widely differing conditions existing in the various states.

That decision, we submit, is still sound. In any action to amend the 1967 Act, the Congress should not undermine its basic plan.

Consistent with our belief that the Clean Air Act should be extended on the basis of the soundness of the original concept, the American Mining Congress:

*A. Endorses the proposal to require immediate designation of all air quality control regions previously named pursuant to Section 10 of the Clean Air Act*

However, we do not see the need to require each state to designate air quality control regions for all areas outside federally designated areas. With the designation of the 91 regions named to date, over 70 percent of the nation's population will be in federally designated air quality control regions. The remaining population will be in smaller communities or rural areas where air pollution problems are minimal. Thus, the proposal to require the states to designate all of their areas as air quality control regions, prepare standards and submit implementation plans would require considerable time and effort on the part of the state and federal governments, without corresponding public benefit and perhaps to the detriment of more essential work in critical areas.

*B. Endorses the proposal to simplify and streamline the federal approval procedure of state ambient air quality standards and implementation plans*

One of the earlier witnesses before your Subcommittee had a proposal which we feel has considerable merit. Speaking for the Chamber of Commerce of the

United States, Mr. Herbert S. Richey, President of the Valley Camp Coal Company, proposed a simplification of Section 108(c) (1) of the present Clean Air Act. Under Mr. Richey's proposal, Section 108(c)(1) would be amended to eliminate the evaluation of each individual state's implementation plan. Instead, the states would submit, along with the regional standards and a means of enforcement, a timetable for the achievement of air quality standards. This proposal has merit whether such standards are regional or national. The Secretary would then review the standards, enforcement mechanism and timetable, approving them if he determines that the provisions are consistent with the purposes outlined in Section 108(c) (i) of the Clean Air Act.

*C. Opposes the proposal to establish national emission standards*

The American Mining Congress is strongly opposed to Section 8 of S. 3466 which would add a new Section 112 to the Clean Air Act to permit the Secretary of HEW to issue national emission standards and regulations. This proposal should be rejected for the following reasons:

First, there has been no demonstrated need for the federal government to promulgate national emission standards. There is no reason to believe that the federal government is in a better position than state and local air pollution control agencies to promulgate emission standards or regulations, even for new stationary sources of air pollution. With respect to pollutants which are extremely hazardous to health, the states—at the present time—have regulations in effect covering specific pollutants of a demonstrated hazardous nature which are common in their particular locality and not in others.

Second, uniform national emission standards are not justified by either economics or science. It is obvious that some areas of the country require more restrictive emission control than others to meet a specified air quality standard. Emission standards should reflect the local environment.

Third, a proposal for national emission standards is completely contrary to the stated findings and purposes of the Clean Air Act, especially Section 101(a) (3) where Congress found that "the prevention and control of air pollution at its source is the primary responsibility of states and their governments." In addition, it should be emphasized that, in 1967, when the latest amendments to the Clean Air Act were enacted, there was extensive discussion concerning the establishment of national emission standards. Congress rejected this concept and instead called for a study of the feasibility and desirability of such standards and instructed the Secretary of HEW to report back within two years. To date, the full report has not been publicly issued, and we suggest that any action on this matter be postponed until such time as the report is published and all concerned have had an opportunity to evaluate its conclusions.

*D. Supports a careful study of possible national ambient air standards but withholds judgment on the advisability and need therefor, pending the outcome of such a study*

Because of differing strong opinions on this matter, there is a definite need for an independent scientific group to take a careful look at the entire concept of the issuance by NAPCA of national ambient air quality standards.

The study should carefully examine the question of why it is necessary to have "federal national ambient air quality standards" in place of the present system of issuing criteria. The statement is made frequently that air quality standards, as such, are not enforceable. If this is the case, why do we need standards in place of criteria? Perhaps this is merely a matter of semantics.

The American Mining Congress suggests that the joint National Academy of Science—National Academy of Engineering Environmental Studies Board be directed specifically to make this study. It is only on the basis of such an objective scientific study that any realistic evaluation can be made of the need for national ambient air quality standards.

*E. Opposes the proposal to regulate fuel composition*

The purpose and function of the Act is to achieve appropriate standards of air quality, not to determine technically how those standards shall be met. In the various contexts in which fuel consumption may contribute to air pollution, alternative approaches are or can be made available to achieve compliance with standards. Modification of fuel composition is only one alternative. Selection of the most economic and effective alternative is a proper function of, and should be left to, the private sector so long as compliance with applicable standards is achieved.

*F. Opposes the proposal in S. 3546 that the five-year evaluation of air quality standards should result in no reduction in previously established air quality standards*

S. 3546 provides that Section 108(c) be amended in a number of respects. One amendment would require the Governor of a state to hold public hearings every five years for the purpose of reviewing air quality standards and, where appropriate, to revise and adopt improved air quality standards. In addition, it would be restrictive in that, "No revised air quality standards shall reduce the ambient air quality of any designated region or portion thereof to which such standards are applicable below the quality established by the air quality standards for such regions or portions thereof prior to such revision."

We seriously question, on technical grounds, the desirability of this latter provision. We are sure that there will be situations where mistakes are made in the promulgation of air quality standards. We believe the states should be free to revise air quality standards on the basis of new information and should not be precluded from such action by federal law.

*G. Opposes the proposal in S. 3546 to require certification by the Secretary of HEW of new construction*

The American Mining Congress seriously questions the desirability of the proposal in S. 3546 to add a new subsection to Section 108 of the Clean Air Act to require the Secretary to issue regulations to insure that the "latest available pollution control technique" is used for new construction and also to require the Secretary to certify new construction in compliance with the regulation.

We believe that this Section, as drafted, would raise serious impediments to necessary construction and would be almost impossible to administer.

In the first place, the meaning of the phrase "the latest available pollution control technique" is unclear. When does a control technique become available and how can one be sure that it is the latest? Furthermore, the Section does not consider the technical and economic feasibility or desirability of applying the latest available pollution control technique when previously existing alternatives might serve as well.

We also question the latter part of this Section which would require federal certification of new construction. Many state and local laws today have provisions for permits for new construction. Such permits, if they are necessary, should be handled locally and not duplicated on the federal level, which is far removed from the problems and issues peculiar to a particular area. The federal certification program would also promise to place a heavy administrative burden on Washington.

This Section would, in effect, give the Secretary of HEW nationwide authority over the location of new plants and the construction of new facilities. We believe delegation of such power is in opposition to our traditional free enterprise system.

We strongly urge the Congress to reject this proposal.

Three other proposals, while not necessarily inconsistent with the basic scheme of the Clean Air Act, are of important concern: (1) the penalties proposed for violation of standards; (2) the proposal to permit class actions in cases of violation of standards, and (3) the proposal to authorize judicial review of the decisions of the Secretary of HEW only by the Court of Appeals, without first resorting to the District Court on these matters. With regard to these proposals, the American Mining Congress:

*H. Supports the concept of penalties for violations but urges a flexible range of penalties bearing a reasonable relationship to the nature of the offense*

While penalties are a necessary element of enforcement procedure, experience suggests that an effective penalty is one which bears some reasonable relationship to the significance and magnitude of the offense, as well as the circumstances in which it occurs. Recent history indicates that, when the only available penalty for an offense is perceived by the public and law enforcement officials to be disproportionate to the offense, the law either is not enforced or is enforced with discrimination. The penalties proposed—fine and/or imprisonment—may well be appropriate for repeated violations with evidence of venality or willful negligence. They are excessive, we submit, in cases where the offender has made a bona fide effort and a control mechanism fails through no fault of his own. The wide spectrum of potential fact situations requires a flexible range of penalties.

*I. Opposes the proposal to allow class actions in cases of violations of air quality standards*

The proposal to permit class actions, by contrast, is not essential to the achievement of air quality. Indeed, it may be counterproductive.

The promulgation of standards, and their enforcement, is a public function performed in behalf of the citizens by their chosen representatives. Class actions would be redundant of effective government function.

More importantly, the notion of permitting class actions introduces a concept of adversary relationship—between the public and government or between the public and industry, or other institutions—which will inevitably create division when cooperation is essential; antagonism when understanding is critical. Virtually every citizen—individual and institutional—is contributing to air pollution and other environmental degradation in one manner or another. There is little distinction between the effluent of a private automobile and a commercial vehicle; between a neighborhood's combustion of household waste and a corporation's combustion of its office waste. Essential to the correction of pollution of the air is a recognition by every individual of his own responsibility, as well as cooperation and understanding on the part of all citizens in achieving the desired result.

Private class actions, as invitations to harassment of corporate institutions—as well as barratry—will, we suggest, inhibit rather than advance the cause of air quality in the United States.

*J. Opposes the proposal to eliminate judicial hearings on decisions of the Secretary of HEW*

S. 3546, as introduced, would substantially amend the procedure set out in Section 108(c) of the Clean Air Act concerning abatement of air pollution. Under S. 3546, any decision of the Secretary of HEW would be subject to judicial review by the United States Court of Appeals of the circuit in which the violation occurred or by the Court of Appeals for the District of Columbia. The following provision in Section 108(c) (4) of the present Clean Air Act has been eliminated:

In any suit brought under the provisions of this subsection, the court shall receive in evidence a transcript of the proceedings of the hearing provided for in this subsection, together with the recommendations of the hearing board and the recommendations and standards promulgated by the Secretary, and such additional evidence, including that relating to the alleged violation of the standards, as it deems necessary to complete review of the standards and to determination of all other issues relating to the alleged violation. The court, giving due consideration to the practicability and to the technological and economic feasibility of complying with such standards, shall have jurisdiction to enter such judgment and orders enforcing such judgment as the public interest and the equities of the case may require.

Elimination of this Subsection, with judicial review only by the Court of Appeals, means that the decision of the Secretary of HEW is final and affected individuals are denied the right to a court proceeding of the matter.

It is basic that every citizen of the United States is entitled to have his rights concerning his life, person and property determined by due process of law. The essential elements of due process of law are notice and an opportunity to be heard and to defend in an orderly proceeding adopted to the nature of the case before a tribunal having jurisdiction of the cause. The opportunity for a hearing requires that the person affected be allowed a hearing before an *impartial tribunal* where he may contest the claim against him and be allowed to meet it on the law and facts and show, if he can, that it is unfounded.

Thus, we strongly believe that the present provision in the Clean Air Act providing for suits in the District Courts should be retained. In this way an impartial tribunal is guaranteed and the formal rules of evidence observed. While we understand the desirability of providing for an accelerated enforcement process, we do not feel that it should be at the expense of any individual's basic rights, whether such individual be a person or a corporation.





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