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Biographical Note
Vernon MacKenzie (1906-1982) was the Chief of the Public Health Service's Division of Air Pollution. This interview focuses on the causes of pollution and the legislation that was enacted in order to counteract pollution during the Kennedy administration, among other topics.

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Oral History Interview

with

VERNON G. MacKENZIE

April 19, 1967
Washington, D.C.

By William McHugh

For the John F. Kennedy Library

McHUGH: Mr. MacKenzie, could you tell us how and when you came to your position as Chief of the Division of Air Pollution.

MacKENZIE: I had been associated with air pollution research activities as Director of Research and Development in the Division of Sanitary Engineering Services of the Public Health Service for a number of years prior to 1960 and, before holding that position, had been officer in charge of the Sanitary Engineering Laboratory in Cincinnati in the period from 1948 to 1954. Early in 1960 I was appointed as Chief of the Division of Air Pollution, the activities of which were rapidly growing in scope because of the realization that the air pollution problem was of greater national significance than had theretofore been recognized.

McHUGH: Did you feel the new Administration would change previous policies?

MacKENZIE: Yes, I did. In the previous Administration, although legislation had been passed in 1955 authorizing a program of research and technical assistance in that field, it was obvious that further activities on the part of the federal government were nec-

essary if this problem was to be dealt with adequately. The new Administration came in with a broader and more liberal viewpoint with respect to the participation of the federal government in social problems, and it seemed, therefore, that there would be a greater opportunity to give more adequate attention to this problem than had been the case immediately in the past.

McHUGH: Did you have any immediate evidence of this broader involvement?

MacKENZIE: Soon after the Kennedy Administration came in in Washington, there was evidence of an interest in broader legislation. This interest was further fostered by the participation of several committees in the Congress, notably the Senate Committee on Air and Water Pollution, which was set up at about that time under the chairmanship of Senator [Edmund S.] Muskie of Maine, and also in the Health and Welfare Subcommittee of the Committee on Interstate and Foreign Commerce in the House of Representatives, which was chaired by Representative Kenneth Roberts of Alabama.

McHUGH: I see. Did the White House ever become involved in the operations of your department?

MacKENZIE: The White House certainly was involved in the development of the legislation which was sponsored by the Administration and led to the enactment of the Clean Air Act in 1963.

McHUGH: Did you work with the legislative liaison people in the White House?

MacKENZIE: More directly I worked with the legislative liaison people in the Department of Health, Education, and Welfare, in the Bureau of the Budget, and they in turn were tied in with the staff in the White House.

McHUGH: Can you say who they were, the people that you

worked with? Wilbur Cohen, I . . .

MacKENZIE: Wilbur Cohen, of course, was prominent in this. Initially in the appointments in the Department of Health, Education, and Welfare, Mr. Cohen was designated as Assistant Secretary for legislation and from the beginning took a real interest in this as well as a number of other areas in which social legislation was desirable and needed.

McHUGH: Did you feel that you legislative liaison was effective?

MacKENZIE: Well, I think we can judge that by the results that have come since that time. The legislation that was enacted in the form of the Clean Air Act of 1963, in my view, has led to some real progress in dealing with this problem. It broadened the base of the federal program by making more definitive the authorities for dealing with the research and other technical aspects of the problem, and provided a greater degree of financial support for these.

But perhaps more importantly, it provided new machanisms for applying the results of research into the actual control of air pollution. This was done by stimulus of state and local governments agencies not only by providing them with technical assistance but by, for the first time, providing financial assistance for the development and improvement of their programs and also by the entrance of the federal government into the actual legal regulatory control aspects of air pollution to supplement in a number of ways the activities of state and local governments, particularly with respect to problems which are not readily within their reach legally. Thus, this new legislation provided for a partnership between all the levels of government so that the total effort could be made more productive.

McHUGH: What would be the type of problem . . .

MacKENZIE: Such joint effort applies particularly with respect to interstate air pollution problems, that is, a problem in which air pollution arises in one state and adversely affects health or welfare of people in another state. Up to that time, people who were adversely affected in this way--that is, by pollution arising in another state than that in which they were resident--had no legal recourse, but were completely at the mercy, shall I say, of the people in the offending state where the pollution arose.

Under the new law, as passed in 1963, the federal government took direct jurisdiction with respect to such interstate problems. In the several years that have elapsed since that legislation was enacted, steps have been taken legally to reduce these adverse effects of an interstate character in areas in which there is a resident population of approximately twenty-five million people. So I think this has led to something that is quite significant and has affected a large part of our population.

McHUGH: Did you actually bring suits against municipalities who were negligent?

MacKENZIE: These legal actions have not so much been taken against municipalities as they have been against the actual sources of pollution. And I might add that we have had, in my view, good cooperation from the administrative authorities in the states where these actions have been taken. I know of no instance to date in which there has been any fundamental difference in viewpoint as to what has needed to be done, and in practically every instance the conclusions reached as to the remedial measures have been unanimous as between the federal government and the representatives of the states involved.

McHUGH: Was there much interference by congressmen on the part of industrial interests within their states?

MacKENZIE: I wouldn't classify it so much as interference as I would perhaps of concern and intervention. Certainly it never did reach the stage that I

would classify as trying really to stop the action that needed to be taken. Perhaps the greatest effort of this kind has been in behalf of the fuel industries which are almost ubiquitously involved in pollution problems, and here I think the concern has been that actions taken in behalf of air pollution control might significantly affect the competitive position of various parts of the fuel industry or individual companies concerned with the production and sale of the different fuels. This sort of concern I think is to be expected; it must be dealt with; and it must be resisted. Obviously, congressmen coming from areas in which fuels production constitutes an important part of the economy are concerned about the well-being, economically, of their constituents. We have tried to reassure them that, in the long run, this country can have both clean air and a healthy economy; we do not see these as mutually exclusive. In the short run, on the other hand, some companies may suffer as compared to others.

McHUGH: Do you feel that you always had the backing of the Surgeon General [Luther Terry] and the White House in your efforts to enforce?

MacKENZIE: We have had excellent support, I would say, from the Surgeon General, from the Secretary of this Department, and from the White House, without question.

McHUGH: Were there ever any attempts to remove the air pollution control function to, say, the Interior Department, where they might feel they would get a more sympathetic hearing?

MacKENZIE: There have been no moves, either in Congress or elsewhere, of an overt nature to do this. There have been various rumors that have come up from time to time. We, when queried, have taken a strong position in this regard; we have believed that air pollution is important from the standpoint of preservation of health and, consequently, should be associated with the primary health agency in the federal government rather than

another agency, and particularly any agency that has as one of its missions the promotion of the well-being of segments of industry, whether this be associated with fuels or other industrial activities.

McHUGH: The Department of Commerce or . . . .

MacKENZIE: Any. I think that the two functions are incompatible. Certainly an agency that has as a mission the promotion of certain types of industry should not also be charged with the responsibility of policing that industry, if you want to put it in such terms.

McHUGH: I see. Was the Surgeon General able to set standards for permissible levels of noxious gases and pollutants? Is this a problem now?

MacKENZIE: This has continued to be a problem. In the 1963 Act, the Department of Health, Education, and Welfare was charged with responsibility for developing criteria of air quality. The Division of Air Pollution interpreted this mandate as requiring the assembly of scientific information which would relate exposure to particular pollutants and the effects which might occur as a result of such exposure, whether the exposure involved people, vegetation, building materials, metals, farm animals, or what. Development of such criteria have proceeded since that enactment, and the first of these was issued recently pertaining to oxides of sulphur pollution. Additional criteria are in process of preparation, are expected to be issued in the calendar year of 1967, and are concerned with carbon monoxide, oxidant-type pollutants and oxides of nitrogen.

This authority for development and promulgation of criteria was, according to the law, intended to serve as guideposts to state and local agencies with whom the primary responsibility has rested for the actual promulgation of legally enforceable standards. Scientific information would be useful to them in arriving at their decision as to

the standards which they would legally adopt as requirements.

McHUGH: Did the difficulty of arriving at those criteria--was that caused to any extent by political pressure?

MacKENZIE: I think it should be obvious that the promulgation of criteria of this kind could be expected to have a great deal of influence on the state and local government actions which would be taken in enforcing air pollution control. Consequently there was a great deal of interest--and there is continuing a great deal of interest--on the part of fuel and other industries that might be affected by the actions taken in controlling the pollutant from the facilities which they operate. This, in turn, has been expressed through discussions and inquiries from many sources, including members of Congress, the embassies of foreign governments that might be concerned with fuels or other materials which they export to the United States, the Department of State because of such international relations, as well as a number of other government agencies having missions associated with economic development of such industries and associated matters.

McHUGH: How do you handle those pressures which, I'm sure, as you say, must be very numerous?

MacKENZIE: Well, I think the only way to handle the pressures is to be completely open and aboveboard about everything that is being considered and be free at all times to not only consider the viewpoints of others but to discuss with them. I do not mean by this necessarily any yielding of fundamental objectives. Nevertheless, unless these other interests can be assured that the actions taken for the control of air pollution are truly in the interests of public health and welfare, then certainly their resistance might be greatly increased. On the other hand, if they can be fully assured that these actions are being taken in an objective manner in the

public interest, then I think this resistance is minimized.

McHUGH: Would this problem relate particularly to requirements that these companies remove sulphur content from fuel at the refinery and things of that sort?

MacKENZIE: This has been one of the prime areas of concern and discussion because the sulphur problem in the United States has been so widely dispersed and affects so many areas and people. There is an enormous tonnage of sulphurous pollution that is discharged to our air every year, currently in the order of about twenty-five million tons of sulphur dioxide annually, 80 per cent, approximately, of which comes from the combustion of sulphur-containing fuels, primarily coal and heavy fuel oil. The remaining 20 per cent comes from oil refining, from the smelting of metals, and a few miscellaneous industrial sources. So that this affects many, many areas and affects many, many people; it affects also many industry interests.

McHUGH: Is there any information available on the long-term effects of exposure of a population to this sulphur dioxide?

MacKENZIE: Yes, we have had this problem under study intensively for more than ten years. It had received some study prior to that time, both within the Public Health Service and by other organizations, so that there is a vast amount of information available.

I think the element that has made this controversial is the fact that all of the evidence that can be produced might be classified as circumstantial in nature. This is true because, obviously, we cannot experiment with human beings and subject them to the pollutional insults about which we are anxious to get information. We cannot do this purposely and then observe what happens; we can only observe what happens in communities when the air is pol-

luted and gather information about the extent of disease or other effects on the people, the course of illnesses of a chronic nature as these may be affected by exposure to such pollution, or to experiment with animals in the laboratory under more controlled conditions and then attempt to relate what one sees in the laboratory with the animal experimentation to see if it correlates with what one observes in communities. When you get through with this whole process you have gathered a great deal of information which then must be interpreted with some degree of judgment. This is why I call it circumstantial evidence.

McHUGH: I believe that before the Congress there was testimony, I think Dr. [Robert A.] Kehoe testified, for instance, on the effects of lead from gasoline on the population, and he interpreted data which they gathered in Cincinnati as indicating that, well, there were no serious health hazards. But there was a researcher, I believe from the University of California, who disagreed with him and also a doctor from the Harvard School of Public Health who arrived at rather opposite conclusions. Was this honest confusion?

MacKENZIE: Yes. I would not want to impugn the motives of the individuals who have looked at these things and come up with somewhat different viewpoints. In some instances, I think this is completely honest and completely objective. In other instances, I think people are motivated by different considerations.

Inevitably, I think an individual in my circumstance, whose primary interest is to protect the health of the people, would tend to be conservative in that direction. I would not under any circumstances want to take a chance on this. Whereas another individual who is primarily connected, let us say, with a business enterprise which might be contributing to the pollution might consider that such an enterprise certainly is in the public interest in that it is contributing to the overall economy and well-being of the nation, and inasmuch as no adverse effect of this kind had been fully proved, then nothing should be done

about it. These are different viewpoints. I think, personally, that you can have the industry and protect the public both, but I tend to be conservative in protecting the public.

McHUGH: There is some indication, or at least it has been said that the main benefits from the use of lead in fuel can be had using about half the present amounts of lead that are permitted by law. Was legislation ever considered to reduce the amount of lead in gasoline?

MacKENZIE: I don't believe any legislation has been seriously considered along these lines. There has been much discussion of the particular point that you have raised here with fuel representatives in the petroleum industry. It is quite true that the initial amounts of lead alkyl compounds added to gasoline produce the greatest effect in increasing the octane number of the gasoline and its quality, therefore, for burning in internal combustion engines. Of the total amount which is used currently, you could probably get 80 per cent of the octane inprovement by using, let us say, half of the amount that is now being used. We think this may have to come about as increasing numbers of automobiles are used and, consequently, greater and greater quantities of fuel and this, in turn, resulting in more discharge of pollutants from the automobiles and particularly those pollutants, such as lead, which are not burned in the combustion process but essentially come out in the same quatity from the exhaust as is put in in the fuel.

McHUGH: Is there anything known of the long-term effects of lead in the atmosphere in cities as caused by automobiles?

MacKENZIE: The toxicity of lead has been studied for many, many years. Lead was known to be toxic back in times of classical Greece, so that the

toxicity of lead and the symptoms of lead poisoning have been known for an extremely long period. The concern here is the degree to which exposure to lead in the atmosphere may result in some physiological damage.

We have not in our studies been able to find any evidence of overt lead poisoning due to pollution of the atmosphere. We do find, however, that the amount of lead that has been absorbed by people, as this is measured by the concentration of lead in the blood, varies quite directly with the air pollution exposure that people have in cities as compared to rural areas, and from one occupation to another. For instance, the rural housewife will have a very low level of lead in her blood, and this will increase in concentration through those individuals who live regularly in the city and perhaps reach a maximum among individuals whose occupational exposure in the city might result in their absorbing greater amounts of lead, such as traffic policemen, taxi drivers, downtown city postmen, and so on. One can see in the concentrations of lead in the blood a very definite gradation in this manner.

McHUGH: As you say, the toxicity of lead is well known, but just what the long-term effects are apparently is uncertain. Was this a subject of concern with industry people when you talked with them? Were they aware of this?

MacKENZIE: This is a matter of continuing concern with industry at the present time. We have been studying this problem now for a number of years, and we have not found evidence that any significant lead poisoning is occurring, as I said. Nevertheless, the blood levels in some of the occupational groups that are most highly exposed in urban communities are in amount not too much below the levels with which lead poisoning has been associated in the past. Consequently, we have felt that we must keep this under close observation, and we are also looking more intensively at groups in the population that might be expected to be more adversely affected, such as children, individuals with kidney disease and pregnant women.

McHUGH: Is there any point at which you can act on this problem or do you have to await new legislation?

MacKENZIE: If this were actually to be controlled, we do not have authority under present law to require this. If we find actual evidence which would indicate the need for limiting the use of lead as a motor fuel additive, I am sure that we would have no problem in getting the necessary legislation to control this.

McHUGH: Do you feel that you have made a substantial effect on the public understanding of the problems of pollution during the Kennedy period?

MacKENZIE: The public awareness of the problem has grown very, very greatly over the past decade, and particularly in the last, I would say, six years approximately. The numbers of articles in the public information media--in newspapers, magazines, radio, television--has increased very greatly. The correspondence which we receive here has, likewise, multiplied very greatly. I have not taken any recent count on the quantity of correspondence coming in from the public, but this probably runs close to a thousand letters a month at the present time.

McHUGH: This is, I take it, substantially more than you would ordinarily . . . .

MacKENZIE: Substantially more than what used to be the case. Yes.

McHUGH: You mentioned the opposition of the fuel industry. The Pollution Control Officer of Los Angeles County testified in 1963 that most of the industries were cooperative with them, but that the automobile industry had the attitude that you could go take a flying leap. Would you agree with that statement?

MacKENZIE: We have had dealings with the automobile industry with respect to the pollutant emissions from motor vehicles for ten or twelve years now. When we first started exploring the problem with them, certainly the attitude was that which you describe. More recently, the automobile industry, in my view, has adopted a more progressive attitude and has agreed--or at least its top management has agreed--in public statements that pollution from these sources must be controlled. We have had acceptance by the automobile industry within the last two years of the necessity of federal regulation of pollutant emissions from newly manufactured automobiles, and the industry has gone ahead in improving the design of its engines to the point where there is no question, in my view, that they will comply with the federal requirements which have been promulgated pursuant to the authority in the Clean Air Act.

McHUGH: You proposed, I believe, or one of the things that was proposed was the use of these blow-by devices. Now these remove something like 30 per cent of the pollution?

MacKENZIE: The blow-by device, so called, either eliminates or greatly reduces the hydrocarbon emissions from the crankcase of the automobile engine. This source of pollution comes primarily from the leakage of carbureted gasoline-air mixture down past the cylinders into the crankcases from which it is vented into the atmosphere. The blow-by device rather than venting this to the atmosphere returns it to the intake of the engine, so that it can be passed through again and get burned in this process.

We originally proposed to the automobile industry in 1961 that these devices which can eliminate about 25 or 30 per cent of the hydrocarbon pollution be installed voluntarily by the industry. This actually was done beginning with the 1963 model year. The industry claimed that they needed this degree of lead time in order to incorporate this in their manufacturing process. So the industry did this voluntarily under the threat that if

they did not we would seek legislation that would compel it. We did not have to seek the legislation because they went ahead and did this.

McHUGH: All the automobile companies did comply?

MacKENZIE: Yes.

McHUGH: I see. Could you tell me how your relations were with the Bureau of Mines? Were they holding up their end of the rope on air pollution?

MacKENZIE: The Bureau of Mines has been an active partner in some of the research that we have been carrying on over the past ten years. Each year the Public Health Service has supported research projects relating to fuel technology or control of emissions from fuel combustion, whether this be from combustion of oil or coal or in an internal combustion engine. This is only a part of the program, however, of the Bureau of Mines, which is concerned, also, under other authorities, with improving the economic circumstances of the mining industries related to fuel and minerals. So that they have been active in the air pollution program primarily as concerned with the conduct of research which we have supported.

McHUGH: In some coal mining areas the burning of large culm banks was a strong source of pollution. Were they able to curtail that?

MacKENZIE: We have not found a good solution to this. This remains an area in which there is a need for further technical development. These are very recalcitrant problems to deal with. To give you an idea of what this may mean, a coal waste bank, or pile, may contain fifty, a hundred, two hundred million cubic yards of material. This is generally waste rock that is produced in the mining process but contains anywhere up to 40 per cent or so of coal. Now these waste piles con-

tain enough combustible materials so that they will burn, and sometimes they catch on fire spontaneously; they smolder thereafter for many, many years. In fact some coal banks of this kind have been burning for twenty-five years or more, and some of these are located in close proximity to urban communities. One city in Pennsylvania, for example, has had a burning culm pile within a quarter of a mile of the downtown business section which has burned for fifteen to twenty years. This certainly does not promote health, welfare, or beauty or convenience in any such area.

McHUGH: Was there any way that your department could move in on a problem like that?

MacKENZIE: We have been conducting research on this problem for a number of years. We are currently supporting demonstration projects using various methods to try to extinguish the fires. Let me recount two or three of the ways that are currently under study: In one we have been continuously sprinkling a pile of water, and have driven the fire far down into the pile, so that no fire is now apparent. There are still hot spots down inside the pile that we can measure by thermocouples that are put in. After cutting off the water for a year, the fire has not returned to the surface, although the heat apparently is increasing down in the pile, so that we haven't been able to completely extinguish the fire, but we have driven it down so that is is no longer the type of problem that it was before, giving off much fumes.

There are a number of other projects which are concerned with methods of sealing the piles to keep the air out because if you can keep the air from penetrating into the piles, presumably the fire will go out because it's no longer being fed with an air supply. This is being done with various types of soils and by using plastic foams and similar materials. In another project we're seeing what can be done about physically digging out the burning parts of the pile using very large excavating equipment and extinguishing the fire in this way.

McHUGH: Do you feel that the companies involved have

been as cooperative as they could be in this?

MacKENZIE: Personally I think it would have been desirable that the private industry put more of its own resources into studying means of dealing with this problem. They have not done this. The money that has been put up to try to effect solutions has come from public sources.

McHUGH: There simply has been no way under existing laws to get compliance with them. Is that right? Or is this a matter of the state . . . .

MacKENZIE: This is a matter of the states' regulation. There is no federal regulation about this type of pollution at the present.

McHUGH: Was there any other major source of opposition in your program during the Kennedy years?

MacKENZIE: No, I don't think so. I might say something about the sources of support because I think these are equally of interest and perhaps of greater significance. Support from public organizations and from the public generally has been excellent. As public awareness of this particular problem grew, the interest in doing something about it grew correspondingly. The associations representing public agencies, such as the various municipal and county associations, those representing state government, have been strong supporters of further federal activity in this area in cooperation with the other levels of government. A number of nonprofit associations in the public health field, such as the American Public Health Association, the National Tuberculosis Association, have been strong supporters because of their interest in matters of public health and their knowledge, I would say, of the technical elements that are concerned in the problem.

McHUGH: Have they been effective as some of the fuel lobbies in affecting legislation?

MacKENZIE: I would say yes.

McHUGH: One thing that I've noticed in Washington--I suppose a lot of people have--is the amount of pollution that is spewed out by jets on takeoff. Was any legislation ever considered to control that problem or is that . . . .

MacKENZIE: There has been no legislation considered on this. We have made a number of studies of the problem of smoke pollution from jet aircraft, two studies particularly--one at the Los Angeles International Airport and the other one at the Kennedy International Airport in New York City. These two airports together with O'Hare Field in Chicago, are the three which are most heavily used in the United States. We have made measurements along the takeoff and landing flight patterns to determine whether or not additional pollution of suspended particulates in the air could be detected in these areas as compared to areas off to one side or the other of the takeoff or landing pattern. We have not been able to detect this. Neither have we been able to confirm the soiling of laundry or of patios or other outdoor areas used by householders along these landing and takeoff lines. It's obvious that these aircraft are contributing generally to the total pollution load in the cities, but we have not been able to detect specific additions deriving from them in the immediate areas where one might expect this to show up if it were very significant. Consequently, we have not made this a major issue because we feel that there are many other . . . [BEGIN SIDE II TAPE I] . . . problems that deserve a higher priority.

McHUGH: On state relations, did any of the state health departments refuse to cooperate with you?

MacKENZIE: We have had no refusals to cooperate. I think perhaps our greatest problem with

some of the state agencies has been in connection with the requirements that we have imposed with respect to eligibility to receive federal grant funds. We have required that state and local government organizations, to be eligible for such grant assistance, should develop what we call a workable program for controlling air pollution. This necessitates the adoption of appropriate laws or regulations which would be legally enforceable in order to control the pollution. We have insisted that they have appropriate technical staff to deal with the problem. Some of the state organizations would have preferred that our requirements be somewhat less stringent, but in the long run I think this has been to their benefit as well as the public's generally, and, for the most part, they have come around to this view also.

McHUGH: You testified in 1963 that only six states had programs that they were actually enforcing. Can you say why this was so? That seems to be a very small number.

MacKENZIE: Actually, I think this is due to the fact that we're living in a time in which the development of problems and actions needed to control them is being foreshortened. If you contrast the development of and actions for controlling water pollution as against air pollution, you will see this difference in time scale to which I am referring.

The water pollution program first began to get public attention about the turn of the century--around 1900--and the first federal law was, I believe, enacted in 1899 to control water pollution. Now in the past sixty or more years, the water pollution program developed in greater degree, and at the same time there were periodically new federal laws that were passed for dealing with it.

In contrast to this longer time period, air pollution has only been of major significance and concern for less than twenty years. The first serious episodes in which people actually died during them and larger numbers were made ill date back to the late 1940's primarily. Federal legislation with respect to air pollution only dates back

to 1955 when the first law was passed. In a period of less than twenty years, air pollution legislation has gone through about the same course that water pollution legislation did in something over sixty years.

In the same way, in the states it took half a century or more for the states to develop water pollution control programs. The first state having an air pollution control law and a program was Oregon in 1952. Since 1952 there have been, as of now, about thirty-three states that have adopted air pollution regulatory legislation. So that this is what I mean in saying that the time scale is being foreshortened here. This is because our population and our economy grows at a much faster absolute rate now than was the case fifty years ago. We add to our economy perhaps thirty billion dollars a year or more in absolute increase, whereas back forty years or so ago we were only adding perhaps 5 per cent of that amount each year.

McHUGH: You also stated in 1963 that you felt that there was no technical reason for the existence of plumes of smoke, and you felt that no further delay should be tolerated, and yet even in this area there are quite a number of power plants which still emit smoke. Can you give any reason for that?

MacKENZIE: Lethargy, apathy--there are no other reasons; there is no technical reason for it. In some areas this has been completely cleared up. Unfortunately, in the majority of urban areas it has not yet been completely cleared up. But I think it is in process of being cleaned up. The progress, I think, is notable at the present time as compared to what it was five years ago. I would agree with what I said in 1963 that there's no good reason for it.

McHUGH: Do you think this is a lack of understanding on the part of the public to any degree that they haven't taken more direct action to have something done about this--for instance, in Washington even in 1963, I believe, there was testimony as to the effect of not specifically from industrial uses but of the level of pollution from auto exhausts, and there was con-

flicting testimony then, as there is now, and still the level remains apparently about the same.

MacKENZIE: Well, with respect to the automobiles, I think we're definitely on a course of real and effective action. We have not found any way of really dealing with the problems of existing cars. There is, however, a real impetus to correct emissions from newly manufactured automobiles. And this, I am confident, will result in a gradual decrease in the quantity of emissions from motor vehicles, to continue probably for the next fifteen or twenty years as the existing automobiles that have not had pollution control systems on them get phased out and replaced by newly manufactured cars incorporating the pollution control systems.

I'm not sure that we have a completely satisfactory long-range answer to this because if one looks ahead for the next twenty years, say, the numbers of automobiles that may be so great that the current type of automobile engine may have to be replaced with a different propulsion system that would have inherently less pollution potential.

McHUGH: There seems to be some indication that gasoline turbines would produce substantially less pollution. Do you know why the . . . .

MacKENZIE: Yes, this is true. We have tested turbine engines as used in automobiles. You may recall that one manufacturer put out for trial a number of automobiles driven by turbine-type engines. The turbine engine does discharge very significantly less pollution than does the piston-type engine--in amounts varying from 10 to 15 per cent of what a comparable piston-type engine might do. This is certainly one possibility for further development.

McHUGH: Is there any impetus on the part of the government for a development of this sort? I suppose that it would take the cooperation of industry.

MacKENZIE: There is some evidence of interest on the

part of industry in looking at these matters particularly with respect to the development of electric propulsion systems, either through rechargeable batteries or fuel cells or a combination of electric drive with mechanical drive. We think this is something that needs to be looked at and are currently exploring approaches. We are also, however, not putting all of our eggs in that basket, but are looking at different types of mechanical propulsion systems, such as the turbine drive which you mentioned, and others. We think both of these need to be looked at with respect to the long-term problem of pollution from motor vehicles.

McHUGH: Mr. MacKenzie, do you think that to any degree the steel industry, perhaps because of its very size, has been able to get off the hook? Many of their plants still produce great amounts of fly ash and smoke pollution. Is this also a local problem? Is there anything . . . .

MacKENZIE: Yes, this has been a local problem in a number of places, particularly in the steel manufacturing centers. In a number of cities the pollution control authorities have negotiated agreements with the steel plants that are located within their jurisdictions to cut back on the pollution coming from steel manufacture over a period of years.

These steel-making furnaces, of course, are very large installations, and the correction of the pollution emissions from them costs a large amount of money in absolute terms; in terms of cost per ton of steel produced, it is entirely minor. Nevertheless, for a large steel manufacturing company, this may mean expenditures in the range from ten million to a hundred million dollars. Consequently, the steel companies have wanted to schedule such expenditures over a period of time to which they could accommodate themselves. In general, the time periods that have been negotiated for this corrective action between the local city authorities and the steel companies have varied from, I would say, five to eight years. Some real progress is being made in this regard. The only problem

that I have seen is that I know of no instance in which the steel companies themselves have taken voluntary action in the absence of any pressure from public authority on them to do so.

McHUGH: I see. But you feel that under the circumstances there is nothing further that the government can do?

MacKENZIE: I think some real progress is being made. There are a few places in which needed action has not yet been taken.

McHUGH: What is it you're referring to in particular?

MacKENZIE: Geographic--a few geographic locations where this has not yet been accomplished.

McHUGH: I was up on Lake Michigan last year--up in that area, I mean. The amounts of pollution coming from steel operations up there are certainly amazing.

MacKENZIE: It's very great. The steel manufacturing plants located in Chicago and in the Gary-northern Indiana area have all negotiated agreements which will cut back significantly on those sources of pollution within the next six or seven years.

McHUGH: As an end goal, how much of that pollution will they be required to remove, do you know offhand?

MacKENZIE: From the steel manufacturing furnaces themselves--and this is the source of the brown smoke which you see, which is primarily iron oxide given off in the steel manufacturing process--this will require a reduction of such emissions of 95 per cent or more.

McHUGH: How about that other 5 per cent--what degree of nuisance is involved in that?

MacKENZIE: What we are talking about is corrective action to the point where no more iron oxide emission would be noticeable. There is equipment that is readily available that can do this, but because of the size of the furnaces and the quantity of gases that are involved here, the installations become very big. They are expensive to install, therefore, and this has, I guess, been the source of the reluctance to do so.

McHUGH: Would there be any point in providing a tax incentive for installing such equipment?

MacKENZIE: I personally have felt that in some instances this would be quite helpful. Certainly this type of expenditure is not one which such an industry as steel has much incentive to put in on its own account. By providing a more rapid amortization, for tax purposes, of the equipment that is necessary, I think the resistance to its installation can be decreased, and the companies can recover their capital more quickly to be used for other purposes. In the long run, the public pays for it in any event, either through the cost of the product which is being made as this product is sold and used, or in the way that we are now discussing--through the tax system. In any event, it gets back to the point where the public pays the bill. I don't see that it's worse to pay the bill in one way than it is to pay it in the other.

McHUGH: Do you have any further comments on the operations of your department during the Kennedy Administration?

MacKENZIE: I would only like to comment that I think the Kennedy Administration initiated a new outlook and a reorientation of federal programs as these are concerned with social matters and the improvement of our society generally. This, in my view, is a milestone.

McHUGH: Thank you very much, Mr. MacKenzie.