

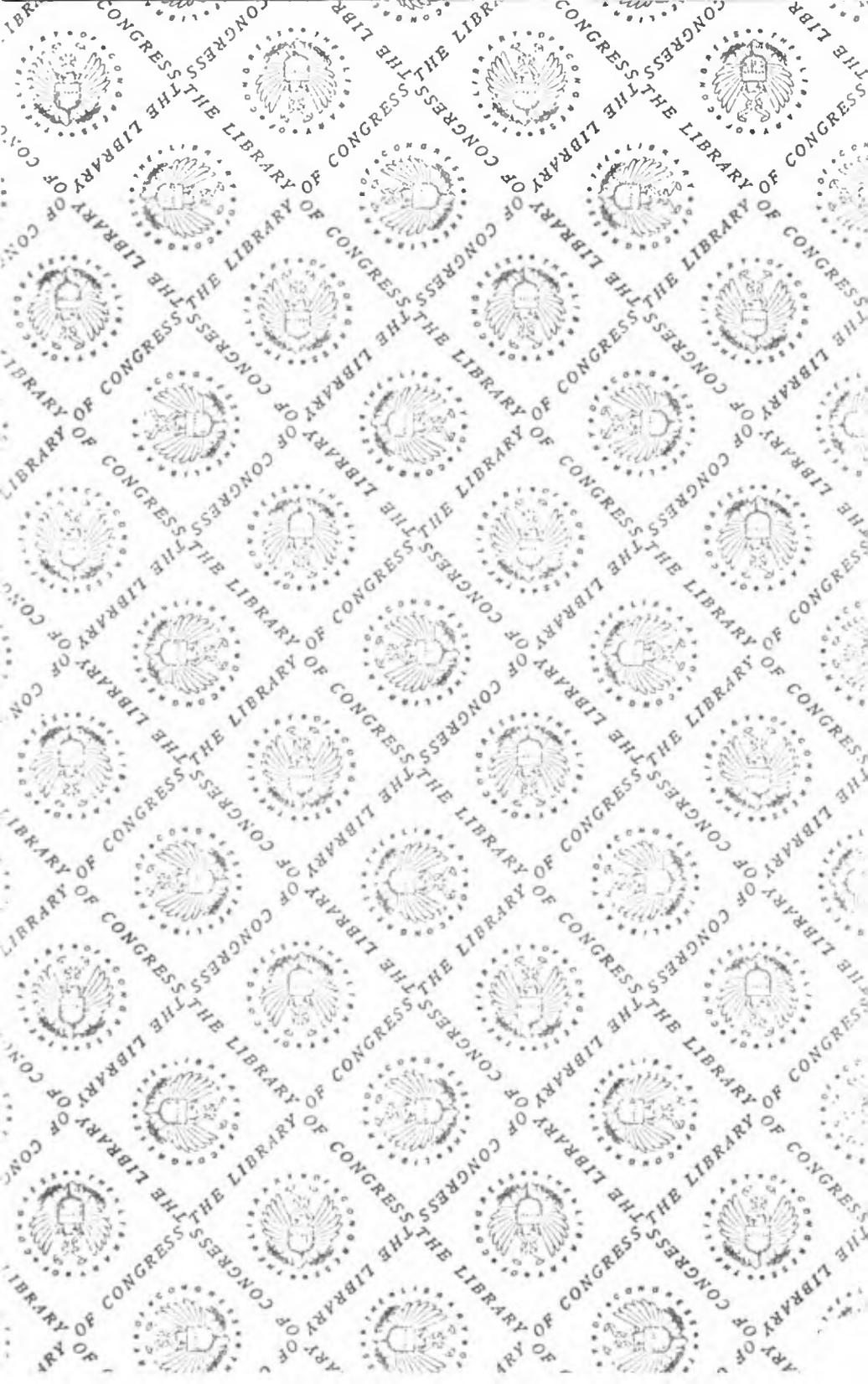
LIBRARY OF CONGRESS



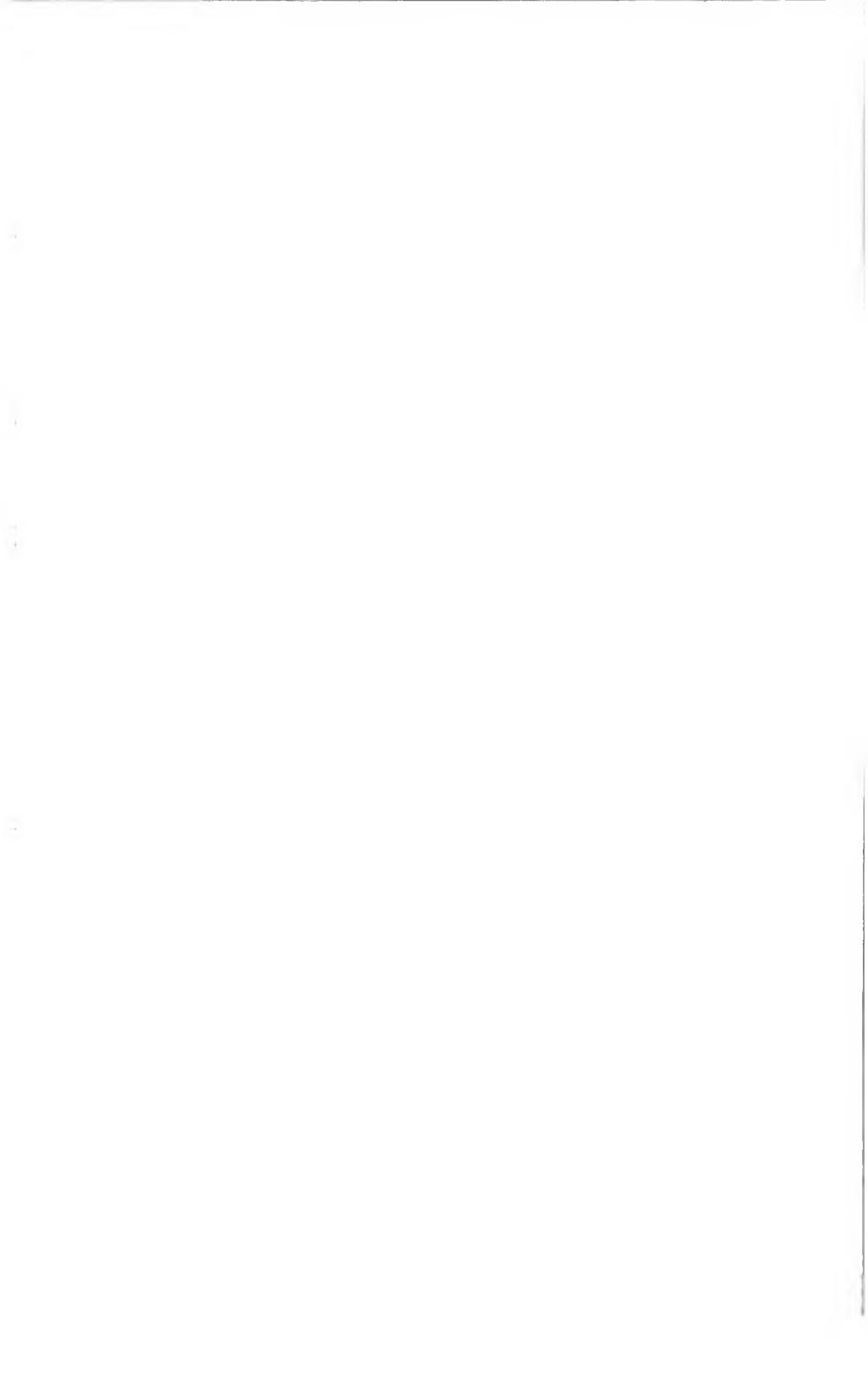
00017146464

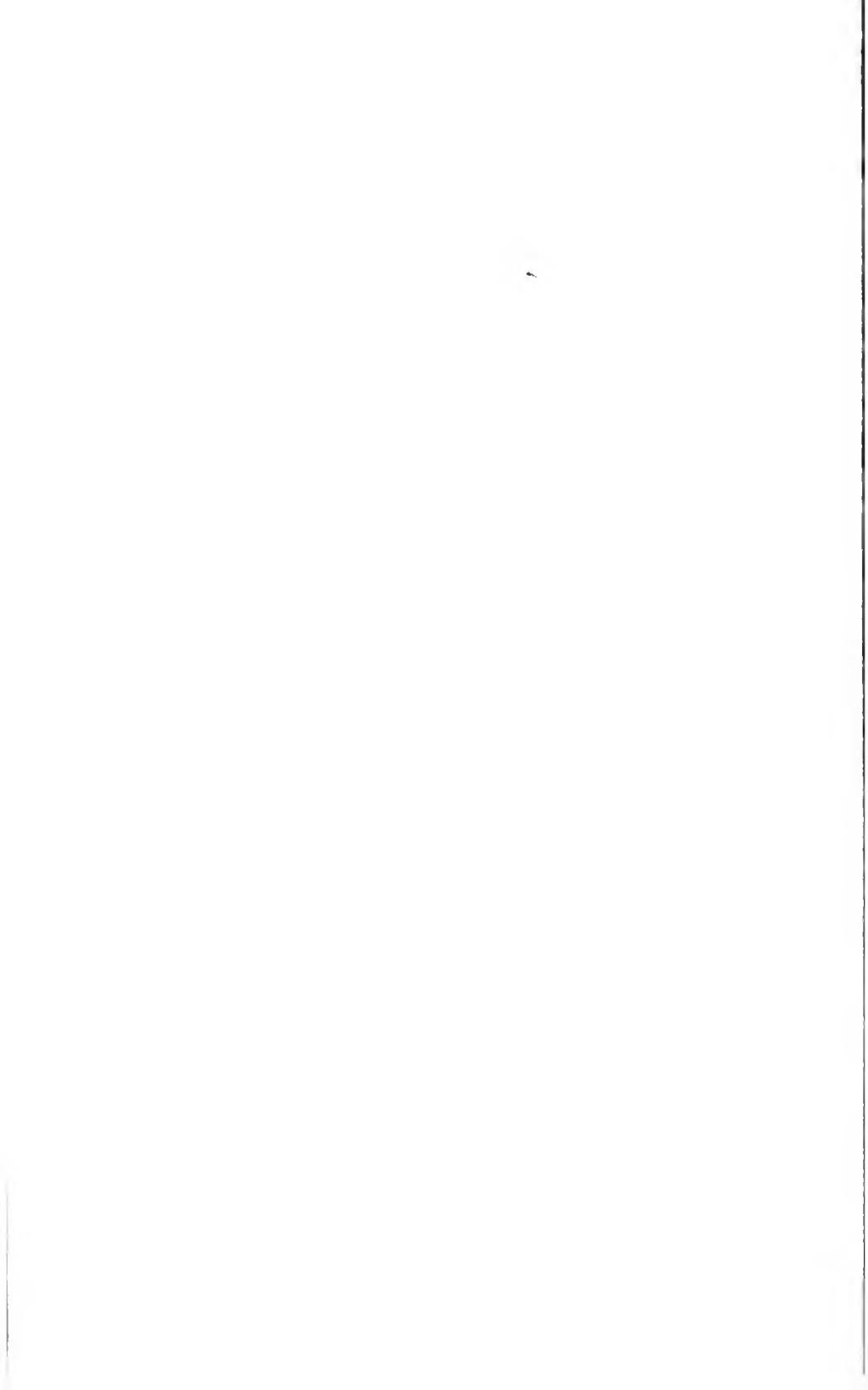












AIR POLLUTION CONTROL AND SOLID WASTES RECYCLING

HEARINGS
BEFORE THE
SUBCOMMITTEE ON
PUBLIC HEALTH AND WELFARE
OF THE
COMMITTEE ON
INTERSTATE AND FOREIGN COMMERCE
HOUSE OF REPRESENTATIVES
NINETY-FIRST CONGRESS

4 - JUN 1 1
Copy _____ 1970

FIRST AND SECOND SESSIONS

ON

H.R. 12934, H.R. 14960, H.R. 15137, and H.R. 15192
BILLS TO AMEND THE CLEAN AIR ACT TO AUTHORIZE APPROPRIATIONS
TO CARRY OUT SUCH ACT THROUGH FISCAL YEAR 1978

H.R. 15848

A BILL TO AMEND THE CLEAN AIR ACT SO AS TO EXTEND ITS DURATION, PROVIDE FOR NATIONAL STANDARDS OF AMBIENT AIR QUALITY, EXPEDITE ENFORCEMENT OF AIR POLLUTION CONTROL STANDARDS, AUTHORIZE REGULATION OF FUELS AND FUEL ADDITIVES, PROVIDE FOR IMPROVED CONTROLS OVER MOTOR VEHICLE EMISSIONS, ESTABLISH STANDARDS APPLICABLE TO DANGEROUS EMISSIONS FROM STATIONARY SOURCES, AND FOR OTHER PURPOSES

(AND RELATED BILLS)

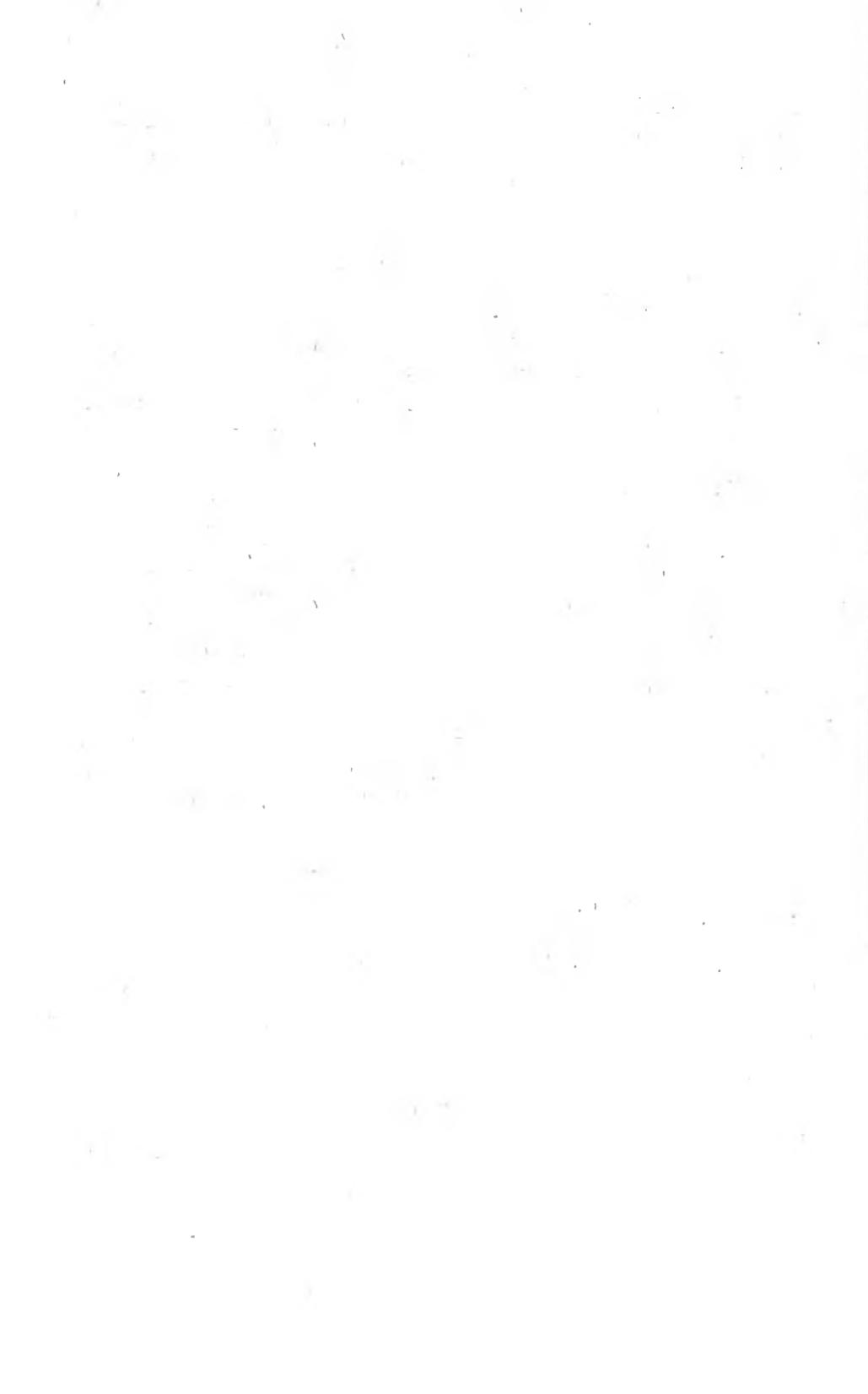
H.R. 15847

A BILL TO AUTHORIZE THE COUNCIL ON ENVIRONMENTAL QUALITY TO CONDUCT STUDIES AND MAKE RECOMMENDATIONS RESPECTING THE RECLAMATION AND RECYCLING OF MATERIAL FROM SOLID WASTES, TO EXTEND THE PROVISIONS OF THE SOLID WASTE DISPOSAL ACT, AND FOR OTHER PURPOSES

(AND RELATED BILLS)

DECEMBER 8, 9, 1969; MARCH 5, 16, 17, 18, 19, 20, AND
APRIL 14, 1970

Serial No. 91-49



**AIR POLLUTION CONTROL AND SOLID
WASTES RECYCLING**

HEARINGS
BEFORE THE
SUBCOMMITTEE ON
PUBLIC HEALTH AND WELFARE
OF THE
COMMITTEE ON
INTERSTATE AND FOREIGN COMMERCE
HOUSE OF REPRESENTATIVES
NINETY-FIRST CONGRESS
FIRST AND SECOND SESSIONS
ON

H.R. 12934, H.R. 14960, H.R. 15137, and H.R. 15192 .
BILLS TO AMEND THE CLEAN AIR ACT TO AUTHORIZE APPROPRIATIONS
TO CARRY OUT SUCH ACT THROUGH FISCAL YEAR 1973

H.R. 15848

A BILL TO AMEND THE CLEAN AIR ACT SO AS TO EXTEND ITS DURA-
TION, PROVIDE FOR NATIONAL STANDARDS OF AMBIENT AIR QUALITY,
EXPEDITE ENFORCEMENT OF AIR POLLUTION CONTROL STANDARDS,
AUTHORIZE REGULATION OF FUELS AND FUEL ADDITIVES, PROVIDE
FOR IMPROVED CONTROLS OVER MOTOR VEHICLE EMISSIONS, ESTAB-
LISH STANDARDS APPLICABLE TO DANGEROUS EMISSIONS FROM
STATIONARY SOURCES, AND FOR OTHER PURPOSES

(AND RELATED BILLS)

H.R. 15847

A BILL TO AUTHORIZE THE COUNCIL ON ENVIRONMENTAL QUALITY
TO CONDUCT STUDIES AND MAKE RECOMMENDATIONS RESPECTING
THE RECLAMATION AND RECYCLING OF MATERIAL FROM SOLID
WASTES, TO EXTEND THE PROVISIONS OF THE SOLID WASTE DIS-
POSAL ACT, AND FOR OTHER PURPOSES

(AND RELATED BILLS)

DECEMBER 8, 9, 1969; MARCH 5, 16, 17, 18, 19, 20, AND
APRIL 14, 1970

Serial No. 91-49

Printed for the use of the Committee on Interstate and Foreign Commerce

KF27
I5568
1969f

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

HARLEY O. STOOERS, West Virginia, *Chairman*

SAMUEL N. FRIEDEL, Maryland
TORBERT H. MACDONALD, Massachusetts
JOHN JARMAN, Oklahoma
JOHN E. MOSS, California
JOHN D. DINOELL, Michigan
PAUL G. ROGERS, Florida
LIONEL VAN DEERLIN, California
J. J. PICKLE, Texas
FRED B. ROONEY, Pennsylvania
JOHN M. MURPHY, New York
DAVID E. SATTERFIELD III, Virginia
BROCK ADAMS, Washington
RICHARD L. OTTINGER, New York
RAY BLANTON, Tennessee
W. S. (BILL) STUCKEY, Jr., Georgia
PETER N. KYROS, Maine
BOB ECKHARDT, Texas
ROBERT O. TIERNAN, Rhode Island
RICHARDSON PREYER, North Carolina

WILLIAM L. SPRINOER, Illinois
SAMUEL L. DEVINE, Ohio
ANCHER NELSEN, Minnesota
HASTINOS KEITH, Massachusetts
OLENN CUNNINOHAM, Nebraska
JAMES T. BROYHILL, North Carolina
JAMES HARVEY, Michigan
ALBERT W. WATSON, South Carolina
TIM LEE CARTER, Kentucky
O. ROBERT WATKINS, Pennsylvania
DONALD G. BROTZMAN, Colorado
CLARENCE J. BROWN, Ohio
DAN KUYKENDALL, Tennessee
JOE SKUBITZ, Kansas
FLETCHER THOMPSON, Georgia
JAMES F. HASTINGS, New York

W. E. WILLIAMSON, *Clerk*

KENNETH J. PAINTER, *Assistant Clerk*

Professional Staff

JAMES M. MENDER, Jr.
WILLIAM J. DIXON

ROBERT F. GUTHRIE
KURT BORCHARDT

SUBCOMMITTEE ON PUBLIC HEALTH AND WELFARE

JOHN JARMAN, Oklahoma, *Chairman*

PAUL O. ROGERS, Florida
DAVID E. SATTERFIELD III, Virginia
PETER N. KYROS, Maine
RICHARDSON PREYER, North Carolina

ANCHER NELSEN, Minnesota
TIM LEE CARTER, Kentucky
JOE SKUBITZ, Kansas
JAMES F. HASTINGS, New York

CONTENTS

PART 1

| | Page |
|-----------------------|------|
| Hearings held on— | |
| December 8, 1969..... | 1 |
| December 9, 1969..... | 103 |
| March 5, 1970..... | 171 |
| March 16, 1970..... | 267 |
| March 17, 1970..... | 395 |

PART 2

| | |
|--|----------|
| March 18, 1970..... | 479 |
| March 19, 1970..... | 511 |
| March 20, 1970..... | 603 |
| April 14, 1970..... | 747 |
| Text of— | |
| H.R. 12934 and all identical bills..... | 1 |
| H.R. 15847 and all identical bills..... | 171 |
| H.R. 15848 and all identical bills..... | 173 |
| Report of— | |
| Bureau of the Budget on— | |
| H.R. 12934 and H.R. 14960..... | 2 |
| H.R. 15847..... | 181 |
| H.R. 15848..... | 181 |
| Council on Environmental Quality on H.R. 15847..... | 182 |
| Health, Education, and Welfare Department on H.R. 12934 and H.R. 14960..... | 2 |
| Interior Department on— | |
| H.R. 15847..... | 182 |
| H.R. 15848..... | 183 |
| Justice Department on H.R. 15848..... | 184 |
| National Aeronautics and Space Administration on H.R. 15848..... | 184 |
| Statement of— | |
| Adamson, John F., vice president, engineering and research, American Motors Corp..... | 823 |
| Anderson, Thomas A., executive vice president, Quaker State Oil Refining Corp..... | 491, 501 |
| Anthony, Myron V., chairman, Air Quality Committee, Manufacturing Chemists Association..... | 463 |
| Auerbach, Irwin L., Special Assistant for Legislative Affairs, National Air Pollution Control Administration, Environmental Health Service, Public Health Service, Department of Health, Education, and Welfare..... | 193 |
| Barton, Frank W., director, Department of Environmental Health, American Medical Association..... | 587 |
| Beadle, Buell W., vice president, research and development, Farmland Industries..... | 491, 496 |
| Bennett, Hon. Charles E., a Representative in Congress from the State of Florida..... | 395 |
| Bernitt, Elmer W., vice president, safety and quality assurance, American Motors Corp..... | 161 |
| Blanchard, Lawrence E., Jr., executive vice president, Ethyl Corp..... | 551 |
| Bowditch, Dr. Fred W., director, emission control, General Motors Corp..... | 103, 747 |
| Burke, Carl, assistant chief engineer, advance engineering and research, American Motors Corp..... | 161 |
| Caccispaglia, Frank C., Jr., executive secretary, Commerce Technical Advisory Board, Department of Commerce..... | 262 |
| Chapman, Dr. John S., chairman, Council on Environmental and Public Health, American Medical Association..... | 587 |
| Chenea, Dr. Paul F., vice president, research laboratories, General Motors Corp..... | 103, 747 |

Statement of—Continued

| | Page |
|--|------------------|
| Coffey, John J., senior associate, natural resources and environmental quality, Chamber of Commerce of the United States..... | 512 |
| Collier, Hon. Harold R., a Representative in Congress from the State of Illinois..... | 185 |
| Commoner, Dr. Barry, Washington University..... | 440 |
| Coughlin, Hon. R. Lawrence, a Representative in Congress from the State of Pennsylvania..... | 190 |
| Dell, William C., vice president, Combustion Power Co., Inc..... | 727 |
| Derwinski, Hon. Edward J., a Representative in Congress from the State of Illinois..... | 187 |
| Diggs, Dr. Donald R., technical director, Petroleum Chemicals Division, E. I. du Pont de Nemours & Co..... | 831 |
| Dole, Hon. Hollis M., Assistant Secretary, Department of the Interior. | 606 |
| Farbstein, Hon. Leonard, a Representative in Congress from the State of New York..... | 396 |
| Finch, Hon. Robert H., Secretary, Department of Health, Education, and Welfare (presented by Hon. John G. Veneman, Under Secretary)..... | 277 |
| Flynn, Roger, director, domestic operations, Air Transport Association of America..... | 862 |
| Foote, William, Acting Deputy Commissioner for Transportation and Motor Operations, General Services Administration..... | 92 |
| Gammelgard, Peter N., senior vice president for public and environmental affairs, American Petroleum Institute..... | 591 |
| Gerhold, C. G., assistant to the president, Universal Oil Products Co..... | 671 |
| Goodling, Hon. George A., a Representative in Congress from the State of Pennsylvania..... | 271 |
| Gunness, Robert C., president, Standard Oil Co. of Indiana..... | 243 |
| Hayes, Denis Allen, coordinator of environmental action..... | 639 |
| Hayes, Earl T., Acting Director, Bureau of Mines, Department of the Interior..... | 238 |
| Hechler, Hon. Ken, a Representative in Congress from the State of West Virginia..... | 414 |
| Heinen, C. M., chief engineer, emissions control and chemical development, Chrysler Corp..... | 144, 802 |
| Hesselberg, Howard E., coordinator of air conservation, Ethyl Corp..... | 551 |
| Hirschler, Daniel A., director of automotive research, Ethyl Corp..... | 551 |
| Horton, Hon. Frank J., a Representative in Congress from the State of New York..... | 270 |
| Humphreys, Robert R., assistant to the vice president, Federal affairs, Air Transport Association, of America..... | 862 |
| Jensen, Donald A., director, Automotive Emissions Office, Ford Motor Co..... | 127, 783 |
| Johnson, Charles C., Jr., Administrator, Environmental Health Service, ¹ Public Health Service, Department of Health, Education, and Welfare..... | 5, 193, 276, 293 |
| Johnson, Dr. Kenneth, staff engineer, Manufacturing Chemists Association..... | 463 |
| Kleppe, Hon. Thomas S., a Representative in Congress from the State of North Dakota..... | 479 |
| Logan, Harry A., Jr., president, United Refining Co..... | 491, 503 |
| Logan, John O., president, Universal Oil Products Co..... | 671 |
| McDuffie, Malcolm, president, Mohawk Petroleum Corp..... | 491, 492 |
| MacNee, James, associate counsel, Office of General Counsel, Ford Motor Co..... | 127 |
| Mallatt, Russell C., coordinator for air and water conservation, Standard Oil Co. of Indiana..... | 243 |
| Mayne, Hon. Wiley, a Representative in Congress from the State of Iowa..... | 603 |
| Merrigan, Edward L., attorney, National Association of Secondary Material Industries..... | 691 |
| Middleton, Dr. John T., Commissioner, National Air Pollution Control Administration, Environmental Health Service, ¹ Public Health Service, Department of Health, Education, and Welfare..... | 5, 193, 276, 293 |
| Mighdoll, M. J., executive vice president, National Association of Secondary Material Industries..... | 691 |

¹Formerly Consumer Protection and Environmental Health Service.

Statement of—Continued

| | Page |
|---|----------|
| Mikva, Hon. Abner J., a Representative in Congress from the State of Illinois..... | 485 |
| Misch, Herbert L., vice president-engineering, Ford Motor Co..... | 127 |
| Miller, Hon. Clarence E., a Representative in Congress from the State of Ohio..... | 273 |
| Mollohan, Hon. Robert H., a Representative in Congress from the State of West Virginia..... | 2 |
| Mullan, Joseph W., director, Air Pollution Control, National Coal Association..... | 645 |
| Myers, Hon. John T., a Representative in Congress from the State of Indiana..... | 274 |
| O'Hara, Donald C., executive vice president, National Petroleum Refiners Association..... | 491 |
| O'Mahoney, Hon. Robert M., Commissioner, Transportation and Communications Service, General Services Administration..... | 92 |
| Pelly, Hon. Thomas M., a Representative in Congress from the State of Washington..... | 267 |
| Peterson, Harry N., attorney, Department of Legislation, American Medical Association..... | 587 |
| Pruch, Henry, vice president, Kendall Refining Co..... | 491 |
| Quillen, Hon. James H., a Representative in Congress from the State of Tennessee..... | 190 |
| Rampacek, Carl, Acting Assistant Director for Minerals Research, Bureau of Mines, Department of the Interior..... | 606 |
| Reid, Hon. Ogden R., a Representative in Congress from the State of New York..... | 268 |
| Richey, Herbert S., member of the board and chairman, Natural Resources Committee, Chamber of Commerce of the United States..... | 512 |
| Saperstein, Sidney, Assistant General Counsel, Department of Health, Education, and Welfare..... | 276, 293 |
| Schaefer, Dr. Vincent J., director, Atmospheric Sciences Research Center, State University of New York..... | 390 |
| Schwengel, Hon. Fred, a Representative in Congress from the State of Iowa..... | 413 |
| Scott, Hon. William L., a Representative in Congress from the State of Virginia..... | 275 |
| Seybold, Leo, vice president, Air Transport Association of America..... | 862 |
| Smith, Dr. Richard, president, Combustion Power Co., Inc..... | 727 |
| Spear, W. W., Washington representative, Standard Oil Co. of Indiana..... | 243 |
| Steinfeld, Dr. Jesse L., Acting Surgeon General, Public Health Service, Deputy Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare..... | 5 |
| Taylor, Ross E., assistant chief engineer in charge of advance engineering, Engine Division, Ford Motor Co..... | 127 |
| Terry, Sydney L., vice president—engineering, Chrysler Corp..... | 144, 802 |
| Thomas, W. H., Washington representative, Universal Oil Products Co..... | 671 |
| Thomson, Hon. Vernon W., a Representative in Congress from the State of Wisconsin..... | 188 |
| Tribus, Dr. Myron, Assistant Secretary for Science and Technology, Department of Commerce..... | 262 |
| Tuesday, Dr. Charles S., head, Fuels and Lubricants Department, Research Laboratories, General Motors Corp..... | 747 |
| Vaughan, Richard, Director, Bureau of Solid Waste, Environmental Health Service, Department of Health, Education, and Welfare..... | 276, 293 |
| Veneman, Hon. John G., Under Secretary, Department of Health, Education, and Welfare..... | 276, 293 |
| Voss, William C., vice president—administration, Northwestern Refining Co..... | 491, 499 |
| Watkins, J. Wade, Director of Petroleum Research, Bureau of Mines, Department of the Interior..... | 238 |
| Welch, C. E., Environmental Quality Committee, E. I. du Pont de Nemours & Co..... | 831 |
| White, Dr. Philip C., general manager of research, Standard Oil Co. of Indiana..... | 243 |

| | Page |
|---|--------|
| Additional material submitted for the record by— | |
| Air Transport Association of America, Stuart G. Tipton, president, statement..... | 863 |
| American Motors Corp.: Research and engineering budget figures..... | 168 |
| Chamber of Commerce of the United States, booklet entitled "Improving environmental quality—business-led action to improve water and air quality"..... | 517 |
| Chrysler Corp.: | |
| Letter dated February 9, 1970, from Mr. Heinen, chief engineer, Emissions Control and Chemical Development, to Robert L. Harris, Jr., National Air Pollution Control Administration re assembly line emission data reports..... | 157 |
| Letter dated April 15, 1970, to Chairman Jarman, from Sidney Terry, vice president-engineering re suggested amendments to H.R. 15848..... | 815 |
| Commerce Department: | |
| Commerce Technical Advisory Board functions..... | 264 |
| Letter dated April 14, 1970, to Chairman Jarman from Myron Tribus re Commerce Technical Advisory Board panel to conduct a study on automotive fuels and air pollution..... | 266 |
| du Pont de Nemours, E. I. & Co., article entitled "Exhaust manifold thermal reactors—a solution to the automotive emissions problem"..... | 838 |
| Edison Electric Institute, statement..... | 877 |
| Engelhard Minerals & Chemical Corp., Richard C. Glogau, senior vice president, statement..... | 881 |
| Ethyl Corp., public health effects of lead antiknock compounds..... | 561 |
| Flood, Hon. Daniel J., a Representative in Congress from the State of Pennsylvania, letter dated March 11, 1970, to Chairman Jarman with attached article entitled "Our Automobiles Can Be Cleaner"..... | 886 |
| Ford Motor Co.: | |
| Attachment 1—Concept emission control package descriptions.. | 131 |
| Average employment (9 months ended Sept. 30, 1969)..... | 135 |
| Letter dated April 6, 1970, to Secretary Robert H. Finch, HEW, from Henry Ford, II, Chairman of the Board, re leaded gasoline..... | 789 |
| General Motors Corp.: | |
| Chronology of publications and events concerning the effects of leaded gasoline on emissions..... | 756 |
| Field performance of exhaust emission systems..... | 752 |
| Letter dated April 8, 1970, to Secretary Robert H. Finch, HEW, from E. N. Cole, president, re suggested changes in motor vehicle fuels..... | 758 |
| New engineering priorities for the seventies, remarks by Edward N. Cole, president, General Motors Corp., at the annual banquet of the Society of Automotive Engineers, Cobo Hall, Detroit, Mich., January 14, 1970..... | 760 |
| Supplemental statement of Dr. Paul F. Chenea, vice president, research laboratories..... | 107 |
| General Services Administration: | |
| Current emission v. future standards..... | 101 |
| Dual-fuel project—Test and control vehicles..... | 93 |
| Dual-fuel system schematic..... | 94 |
| Filters depicting clean burning properties of natural gas..... | 96 |
| Health, Education, and Welfare Department: | |
| Air monitoring stations..... | 75 |
| Air pollution control (budget estimate; appropriation; and obligations—fiscal years 1967-70)..... | 302 |
| Air pollution control program grants awarded, fiscal years 1965-70..... | 35 |
| Attachments to Dr. Steinfeld's December 8, 1969, statement: | |
| Figure 1—Flow diagram for action to control air pollution on a regional basis, under the Air Quality Act..... | 13 |
| Figure 2—Status of AQCR designation—December 6, 1969..... | 14 |
| Figure 3—Status of air quality control regions..... | 14, 15 |
| Figure 4—Air pollution control budgets for State, local, and regional agencies..... | 15 |
| Figure 5—Light duty vehicle (LDV) emissions..... | 16 |

| Additional material submitted for the record by—Continued | |
|--|---------|
| Health, Education, and Welfare Department—Continued | |
| | Page |
| Automobile steel scrap of low-residual copper..... | 383 |
| Car rental firms tests of hydrocarbon and carbon monoxide emissions..... | 60 |
| Carcinogenic hydrocarbons..... | 26 |
| Composition and analysis of composite municipal refuse (1966)..... | 380 |
| Contracts awarded to obtain information for designation of air quality control regions..... | 24 |
| Demonstration project—New Jersey motor vehicle emission inspection project..... | 84 |
| Direction under which the Council on Environmental Quality and the Federal agencies function..... | 368 |
| Excerpts from annual reports submitted to the Congress under section 306 of the Clean Air Act, as amended, re progress with the problem of motor vehicle pollution..... | 333 |
| Fiscal year 1972 and 1973 funding for air pollution control program..... | 220 |
| How HEW would spend \$30, \$45, and \$60 million during fiscal year 1971..... | 386 |
| Institutions receiving training grants..... | 69 |
| Instrumentation and analytical techniques..... | 79 |
| Interpretation of section 210 of the Clean Air Act re registration of fuel additives..... | 33 |
| Jet aircraft air pollution problems..... | 91 |
| Lead-free fuel availability—More stringent emission standards before 1975?..... | 210 |
| Letter dated April 14, 1970, to Chairman Jarman from Dr. Roger O. Egeberg, Assistant Secretary for Health and Scientific Affairs re clarification of intent of section 5 of H. R. 15848..... | 290 |
| Letter dated April 27, 1970, to Chairman Staggers from Creed C. Black, Assistant Secretary for Legislation, re exemption of fuel and auto manufacturers from the operation of the antitrust laws when called together by an agency of Government to cooperate in solving problems relating to air pollution..... | 320 |
| Letter dated April 28, 1970, to Chairman Staggers from Creed C. Black, Assistant Secretary for Legislation, re evaluation of DHEW health programs..... | 291 |
| Light duty vehicle emissions (in grams/vehicle mile)..... | 196 |
| Marine disposal of solid wastes—An interim summary..... | 377 |
| Motor vehicle research and development plan of the National Air Pollution Control Administration..... | 313 |
| Municipal solid wastes: physical characteristics data..... | 380 |
| National Air Pollution Control Administration active contracts..... | 214 |
| National Air Pollution Control Administration air quality control region information relating to standards for sulfur oxides and particulate matter—weekly summary: March 22–March 28, 1970..... | 234–237 |
| National Air Quality Criteria Advisory Committee meeting dates..... | 19 |
| Press release dated January 20, 1970, re Nation's airlines program of reducing smoke emissions from aircraft jet engines..... | 323 |
| Press release dated March 24, 1970, re Secretary Finch urging the Nation's petroleum companies to work toward production of a lead-free gasoline for motor vehicles..... | 206 |
| Program to gain comprehensive knowledge of the effects of air pollution on the public health..... | 77 |
| Rental car surveillance program, March 1988–November 1969—interim report of the Division of Motor Vehicle Pollution Control, Bureau of Abatement and Control, National Air Pollution Control Administration..... | 328 |
| Reported expected life for 34 cities' landfill operations..... | 389 |
| Requests of industry to supply information re air quality control..... | 85 |
| Résumé of air quality criteria for particulate matter..... | 28 |
| Résumé of air quality criteria for sulfur oxides..... | 28 |

Additional material submitted for the record by—Continued

Health, Education, and Welfare Department—Continued

| | Page |
|--|------|
| Review of accomplishments of abatement actions initiated under section 108 of the Clean Air Act, as amended..... | 223 |
| State air pollution control officials..... | 39 |
| Statement by Creed C. Black, Assistant Secretary for Legislative Affairs, presented at a joint hearing before the Subcommittee on Aviation of the Committee on Commerce and Subcommittee on Air and Water Pollution of the Committee on Public Works, U.S. Senate, February 4, 1970..... | 321 |
| Statement on H.R. 15847 by Hon. Robert H. Finch, Secretary.. | 284 |
| Statement on H.R. 15848 by Hon. Robert H. Finch, Secretary.. | 286 |
| States and territories with statutory authority to take emergency action to curtail air pollution emissions..... | 56 |
| Statutory language for testing automobiles coming off assembly lines..... | 55 |
| Technical and orientation courses conducted by the National Air Pollution Control Administration..... | 71 |
| Tests of prototype vehicles..... | 309 |
| Types of techniques used to comply with standards..... | 310 |
| Industrial Gas Cleaning Institute, Inc., Karel A. Weitz, president, statement..... | 878 |
| Interior Department: | |
| Acceptance of Bureau of Mines research on solid waste and air pollution by industrial firms and other organizations..... | 619 |
| Bureau of Mines environmental investigations..... | 613 |
| Bureau of Mines publications and presentations on fuels combustion as related to air pollution abatement, fiscal year 1967 to fiscal year 1970..... | 625 |
| Components of automobile exhaust emissions..... | 623 |
| Solid waste disposal authorization, budget request, appropriation, obligations, and expenditures, 1966-71..... | 612 |
| Statement on the National Petroleum Council..... | 242 |
| Total appropriation and solid waste expenditures, fiscal years 1967-71..... | 611 |
| Interstate and Foreign Commerce Committee: | |
| Excerpt from official certified transcript of hearings of California Air Resources Board—March 7, 1970..... | 631 |
| Fuel: A Factor in Internal Combustion Engine Emissions, an article by R. W. Hurn, Project Coordinator, U.S. Department of the Interior, Bureau of Mines, Petroleum Research Center, Bartlesville, Okla..... | 626 |
| Ivanhoe Junior Woman's Club, Geraldine M. Baader, chairman, conservation committee, letter dated March 28, 1970, to Chairman Staggers..... | 891 |
| Kleppe, Hon. Thomas S., a Representative in Congress from the State of North Dakota, letter dated February 16, 1970, to President Nixon re cleaner burning motor vehicle fuel combining gasoline with alcohol made from grain..... | 480 |
| Lead Industries Association, J. L. Kimberley, executive vice president, statement..... | 871 |
| Mayne, Hon. Wiley, a Representative in Congress from the State of Iowa, letter dated March 9, 1970, from Edward P. Cliff, Chief, Forest Service, Department of Agriculture, re reclamation of fiber for paper from the city dump in Madison, Wis..... | 604 |
| Missouri Oil Jobbers Association, John R. Hahn, executive director, letter dated March 30, 1970, to Congressman Richard H. Ichord, with forwarding letter..... | 889 |
| National Association of Secondary Material Industries: | |
| Background information about NASMI..... | 703 |
| NASMI publications..... | 702 |
| Perspective of the secondary materials industry..... | 700 |
| Secondary metal's significant statistical position..... | 700 |
| Studies of dislocation factors, No. II, the secondary material industries and environmental problems..... | 70 |

Additional material submitted for the record by—Continued

| | Page |
|---|------|
| National Coal Association: | |
| Chicago air yearly average sulfur dioxide..... | 646 |
| Modified SO ₂ system faces new tests..... | 667 |
| Statement of James R. Garvey, president, Bituminous Coal Research, Inc., before the Joint Committee on Atomic Energy, February 25, 1970..... | 650 |
| Statement of Joseph G. Stites, Jr., manager, Air Pollution Control Department, Monsanto Enviro-Chem Systems Inc., before the Joint Committee on Atomic Energy, February 25, 1970..... | 653 |
| Statement of Robert H. Quig, P.E., Engineer-Utility Operations, Chemical Construction Corp., before the Joint Committee on Atomic Energy, February 25, 1970..... | 655 |
| Statement of Stuart Watts, Wellman-Lord, Inc., for presentation to Joint Committee on Atomic Energy, February 25, 1970..... | 663 |
| National Coal Policy Conference, W. W. McClanahan, Jr., executive vice president, statement..... | 882 |
| National Oil Jobbers Council, William S. Jones, president, statement..... | 875 |
| New York City Council, Sanford D. Garelik, president, letter dated February 27, 1970, to Congressman Jacob H. Gilbert..... | 890 |
| Platten, Warren W., Osage, Minn., letter dated February 14, 1970, to Congressman Odin Langen with forwarding letter..... | 890 |
| Ryan, Hon. William F., a Representative in Congress from the State of New York, statement..... | 868 |
| Standard Oil Co. of Indiana, savings attributable to the use of unleaded gasoline compared with leaded gasoline..... | 256 |

ORGANIZATIONS REPRESENTED AT HEARINGS

Air Transport Association of America:

Flynn, Roger, director, domestic operations.
Humphreys, Robert R., assistant to the vice president, Federal affairs.
Seybold, Leo, vice president.

American Medical Association:

Barton, Frank W., director, Department of Environmental Health.
Chapman, Dr. John S., chairman, Council on Environmental and Public
Health.

Peterson, Harry N., attorney, Department of Legislation.

American Motors Corp.:

Adanson, John F., vice president, engineering and research.
Bernitt, Elmer W., vice president, safety and quality assurance.
Burke, Carl, assistant chief engineer, advance engineering and research.

American Petroleum Institute, Peter N. Gammelgard, senior vice president for public and environmental affairs.

Chamber of Commerce of the United States:

Coffey, John J., senior associate, natural resources and environmental
quality.
Richey, Herbert S., member of the board and chairman, Natural Resources
Committee.

Chrysler Corp.:

Heinen, C. M., chief engineer, emissions control and chemical development.
Terry, Sydney L., vice president of engineering.

Combustion Power Co., Inc.:

Dell, William C., vice president.
Smith, Dr. Richard, president.

Commerce Department:

Caccispaglia, Frank C., Jr., Executive Secretary, Commerce Technical
Advisory Board.
Tribus, Dr. Myron, Assistant Secretary for Science and Technology.

du Pont de Nemours, E. I., & Co.:

Diggs, Dr. Donald R., technical director, Petroleum Chemicals Division.
Welch, E. E., Environmental Quality Committee.

Ethyl Corp.:

Blanchard, Lawrence E., Jr., executive vice president.
Hesselberg, Howard E., coordinator of air conservation.
Hirschler, Daniel A., director of automotive research.

ORGANIZATIONS REPRESENTED AT HEARINGS—Continued

Ford Motor Co.:

Jensen, Donald A., director, automotive emissions office.
 MacNee, James, associate counsel, office of general counsel.
 Misch, Herbert L., vice president—engineering.
 Taylor, Ross E., assistant chief engineer in charge of advance engineering,
 Engine Division.

General Motors Corp.:

Bowditch, Dr. Fred W., director, emission control.
 Chenea, Dr. Paul F., vice president, research laboratories.
 Tuesday, Dr. Charles S., head, Fuels and Lubricants Department, Research
 Laboratories.

General Services Administration:

Foote, William, Acting Deputy Commissioner for Transportation and Motor
 Operations.
 O'Mahoney, Hon. Robert M., Commissioner, Transportation and Com-
 munications Service.

Health, Education, and Welfare Department:

Auerbach, Irwin L., Special Assistant for Legislative Affairs, National Air
 Pollution Control Administration, Environmental Health Service,¹ Public
 Health Service.
 Johnson, Charles C., Jr., Administrator, Environmental Health Service,¹
 Public Health Service.
 Middleton, Dr. John T., Commissioner, National Air Pollution Control
 Administration, Environmental Health Service,¹ Public Health Service.
 Saperstein, Sidney, Assistant General Counsel.
 Steinfeld, Dr. Jesse L., Acting Surgeon General, Public Health Service,
 Deputy Assistant Secretary for Health and Scientific Affairs.
 Vaughan, Richard, Director, Bureau of Solid Waste, Environmental Health
 Service.¹
 Veneman, Hon. John G., Under Secretary.

Interior Department:

Dole, Hon. Hollis M., Assistant Secretary.
 Hayes, Earl T., Acting Director, Bureau of Mines.
 Rampacek, Carl, Acting Assistant Director for Minerals Research, Bureau
 of Mines.
 Watkins, J. Wade, Director of Petroleum Research, Bureau of Mines.

Manufacturing Chemists Association:

Anthony, Myron V., chairman, Air Quality Committee.
 Johnson, Dr. Kenneth, staff engineer.

National Association of Secondary Material Industries:

Merrigan, Edward L., attorney.
 Mighdoll, M. J., executive vice president.

National Coal Association, Joseph W. Mullan, director, air pollution control.

National Petroleum Refiners Association:

Anderson, Thomas A., executive vice president, Quaker State Oil Refining
 Corp.
 Beadle, Buell W., vice president, research and development, Farmland
 Industries.
 Logan, Harry A., Jr., president, United Refining Co.
 McDuffie, Malcolm, president, Mohawk Petroleum Corp.
 O'Hara, Donald C., executive vice president, NPRA.
 Pruch, Heury, vice president, Kendall Refining Co.
 Voss, William C., vice president—administration, Northwestern Refining Co.

Standard Oil Co. of Indiana:

Gunness, Robert C., president.
 Mallatt, Russell C., coordinator for air and water conservation.
 Spear, W. W., Washington representative.
 White, Dr. Philip C., general manager of research.

Universal Oil Products Co.:

Gerhold, C. G., assistant to the president.
 Logan, John O., president.
 Thomas, W. H., Washington representative.

¹ Formerly Consumer Protection and Environmental Health Services.

AIR POLLUTION CONTROL AND SOLID WASTE RECYCLING

MONDAY, DECEMBER 8, 1969

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON PUBLIC HEALTH AND WELFARE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in room 2322, Rayburn House Office Building, Hon. John Jarman (chairman of the subcommittee) presiding.

Mr. JARMAN. The subcommittee will please be in order.

The hearings today are on H.R. 12934, introduced by Mr. Rogers of Florida, and H.R. 14960, introduced by Mr. Springer of Illinois—and similar bills providing a three-year extension of the authorizations for appropriations contained in section 104 and section 309 of the Clean Air Act.

This Act provides for research into problems involving air pollution, for training of personnel in this field; provides grants to States and local air pollution agencies to meet a portion of their costs of operation; provides authority for air pollution abatement proceedings brought by the United States; establishes a framework for State and local control of air pollution problems; and provides authority for the Secretary of Health, Education, and Welfare to prescribe emission standards for new motor vehicles.

All of these activities authorized under the Clean Air Act are financed with funds authorized to be appropriated by the two sections of law amended by these bills.

Existing authorizations expire June 30, 1970, so it is necessary for this legislation to be adopted prior to the end of this fiscal year in order to continue the authority for this program.

At this point in the record there will be placed the bills and the agency reports thereon.

(The texts of H.R. 12934, H.R. 14960, H.R. 15137, and 15192, and reports thereon follow:)

[H.R. 12934, H.R. 14960, H.R. 15137, and H.R. 15192, 91st Cong., 1st sess., introduced by Mr. Rogers of Florida on July 17, 1969; Mr. Springer on November 24, 1969; Mr. Jarman on December 8, 1969; and Mr. Miller of Ohio on December 10, 1969, are identical as follows:]

A BILL To amend the Clean Air Act to authorize appropriations to carry out such Act through fiscal year 1973

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 104(c) of the Clean Air Act (42 U.S.C. 1857b-1(c) is amended by striking out "and", and by striking out the period at the end thereof and inserting in lieu thereof", for the fiscal year ending June 30, 1971, \$25,000,000, for the fiscal year ending June 30, 1972, \$35,000,000, and for the fiscal year ending June 30, 1973, \$50,000,000."

SEC. 2. Section 309 of the Clean Air Act (42 U.S.C. 1857 (1) is amended (1) by striking out "and" immediately following "June 30, 1969", and (2) by inserting before the period at the end thereof the following: ", \$100,000,000 for the fiscal year ending June 30, 1971, \$125,000,000 for the fiscal year ending June 30, 1972, and \$150,000,000 for the fiscal year ending June 30, 1973".

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., April 13, 1970.

HON. HARLEY O. STAGGERS,
Chairman, Committee on Interstate and Foreign Commerce, House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your requests for reports on certain bills which would amend in various respects the Clean Air Act. These bills include: H.R. 640, H.R. 12934, H.R. 14960, H.R. 15137, H.R. 15335, H.R. 15491, and H.R. 15577.

On February 10, 1970, the President sent to the Congress his Message on Environmental Quality, which included his legislative recommendations with respect to problems of air pollution. The Secretary of Health, Education, and Welfare that same day transmitted to the Congress draft legislation, "The Clean Air Act Amendments of 1970," to carry out the President's recommendations.

The Administration's bill, which was introduced as H.R. 15848, is pending before your Committee. In our judgment it would accomplish more effectively the air quality objectives of the above-cited bills. Accordingly, we recommend that early and favorable consideration be given to H.R. 15848, in lieu of the above-cited bills.

Sincerely,

WILFRED H. ROMMEL,
Assistant Director for Legislative Reference.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
OFFICE OF THE SECRETARY,
Washington, D.C., December 22, 1969.

HON. HARLEY O. STAGGERS,
Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This is in answer to your requests for reports on H.R. 12934 and H.R. 14960, identical bills "To amend the Clean Air Act to authorize appropriations to carry out such Act through fiscal year 1973."

The views of the Department were expressed by Dr. Jesse L. Steinfeld, Acting Surgeon General of the Public Health Service and Deputy Assistant Secretary for Health and Scientific Affairs, before the Subcommittee on Public Health and Welfare of your Committee on December 8, 1969.

Sincerely,

ROBERT H. FINCH, Secretary.

Mr. JARMAN. Our first witness today will be our colleague from the State of West Virginia, the Honorable Robert H. Mollohan. Mr. Mollohan has a statement he would like to present to the committee.

**STATEMENT OF HON. ROBERT H. MOLLOHAN, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF WEST VIRGINIA**

Mr. MOLLOHAN. Mr. Chairman, I am pleased to have the opportunity to testify today.

In a recent newsletter, our colleague, Congressman Morris Udall of Arizona, reported that one of the Nation's largest volumes of production of aerial pollution. We produce more than 130 million tons of it each year, and that represents a larger tonnage output than the production of steel.

Every part of the country suffers some damage from this huge tonnage of aerial fallout, and West Virginia, too, suffers from several kinds of aerial pollution.

For instance, in the 1st Congressional District of West Virginia, we are plagued by air pollution generated by electric powerplants across the Ohio River from us. Every day these plants drop heavy clouds of fly-ash on communities like Moundsville, Vienna and New Cumberland. The damage to the small community of New Cumberland was so extensive that the town finally started proceedings which culminated in an air pollution conference authorized under the legislation you are presently considering today.

The conference made its report in August, and its recommendations were the strongest ever recommended by such a conference. In essence, the power company was advised to substantially reduce its plant's emissions of smoke and fly-ash or to close the plant.

Gentlemen, since then I have heard from citizens on both sides of the Ohio River that this company has taken no action, that it in fact intends to take no action. The Air Pollution Control Administration has responded to our inquiries that no further action can be taken until February of 1970.

At that time, as we know, a hearing may be held and more recommendations can be made, and if, after another six months, no action is taken, the Secretary of HEW is empowered to take the offending party into the Federal courts.

Gentlemen, the Air Pollution Control Administration reports to me that only one case has been taken to court and in that situation a consent decree was entered, which has not since been enforced because the Federal Judge was unwilling to close the offending plant.

For those of us across the river from the electric power plants in Ohio, it was rather discouraging to learn that the State of Ohio has no enforcement procedure to make effective the recommendations of the Air Pollution Conference held in our Congressional District. Even if Ohio had the statutes to enforce these regulations, it is doubtful that they would have pursued them vigorously against a political power like Ohio Edison for the benefit of West Virginia communities.

Gentlemen, given this situation, I suspect you would be reluctant, as I am, to give any assurances to my constituents that the present air pollution statutes offer a satisfactory remedy to their problems.

The powerplant in question is an old plant and the company could close it and shift production elsewhere, for it would be expensive to make the plant clean. And it is true that new electric powerplants, responding to pressures of local citizens, are planning much higher smokestacks. But this will merely serve to disperse the smoke and fly-ash over a wider area. Many companies are also planning to install precipitators and other anti-pollutant devices as well, and of course these devices will have the effect of reducing overall dust levels.

However, it is hard for me to envision how the present legislation can ever support a national effort of the size we require to effectively reclaim our aerial environment. The Air Pollution Control Administration has no effective or immediate power, but must rely on a lengthy and as yet untried court proceeding. The States have the power to control pollution only within the confines of their boundaries and are largely hamstrung by the political power of large industries even when they have the legal and bureaucratic machinery. The local communities have virtually no power to all to act.

As a result, the national air pollution policy and program of this country is cosmetic rather than substantive, an effort directed toward exposure rather than cure.

I have no panacea to offer, but I do think there are areas where we could vastly improve the workings of the Air Pollution Control Administration.

First, we should, in my judgment, give the Administration the power to act upon the recommendations of its conferences directly. Secondly, I think we should empower the participants of the air pollution conferences, that is, the local communities and the State regulatory agencies, to institute action in the courts to enforce the recommendations of the air pollution conferences so that if the Government, which is charged with the protection of the people, does not act, the people themselves may act.

I realize fully that these recommendations are no more than a partial answer to an overwhelming question. Furthermore, while these changes would move air policy in the right direction, this issue calls for a great deal more than regulation. It demands a new technology, and the \$50 million in the 1970 budget for air control research is only a beginning.

I think we would be sadly mistaken if we tried to pursue our goals for clean air solely through a regulatory approach. A new technology will be expensive, both in terms of developing a technology and implementing it. I, for one, am happy to see that the Congress is considering an accelerated depreciation allowance for anti-pollution programs for the business community.

The Nixon administration has given some evidence of its desire to wage a substantial attack on the entire problem of pollution through its Secretary for the Interior Walter Hickel. Secretary Hickel, as you probably saw, just this week called for the establishment of a cabinet level department to be known as the Department of Natural Resources and Environment, and I think this is a step in the right direction. I would hope both Houses of the Congress would also consolidate their jurisdiction for pollution legislation, so that a comprehensive attack on pollution could be made.

But, ultimately, the decision for all of us may involve changing our national purposes. We have based our economy upon the high volume of consumption by most of our citizens. The more goods consumed, the more jobs and profits available. This has, I suppose, been the main impetus for creating the kind of merchandise that wears out or becomes unfashionable quickly and is discarded, to make way for yet more merchandise.

This ethos is in large part responsible for our pollution, and it may, in the long run, pollute our values as well as our atmosphere. I hope future generations will be able to say of us that we confronted our problems and in solving them created a heritage of tangible and intangible worth for generations to follow.

I fear if we, who hold power, do not act expeditiously and wisely and forcefully, it may be said that our nation, seeking to build a material prosperity for all, created instead a wasteland.

Mr. JARMAN. Thank you, Mr. Mollohan, for sharing your thoughts with us today.

Mr. MOLLOHAN. Thank you, Mr. Chairman.

Mr. JARMAN. Our next witness today will be Dr. Jesse L. Steinfeld, Acting Surgeon General, Public Health Service, Deputy Assistant Secretary for Health and Scientific Affairs, and I would like to ask Dr. Steinfeld to introduce for the record his associates this morning.

STATEMENT OF DR. JESSE L. STEINFELD, ACTING SURGEON GENERAL, PUBLIC HEALTH SERVICE, DEPUTY ASSISTANT SECRETARY FOR HEALTH AND SCIENTIFIC AFFAIRS, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE; ACCOMPANIED BY CHARLES C. JOHNSON, JR., ADMINISTRATOR, CONSUMER PROTECTION AND ENVIRONMENTAL HEALTH SERVICE; AND DR. JOHN T. MIDDLETON, COMMISSIONER, NATIONAL AIR POLLUTION CONTROL ADMINISTRATION

Dr. STEINFELD. Thank you, Mr. Chairman.

On my left is Mr. C. C. Johnson, who is the Administrator of the Consumer Protection and Environmental Health Service, and on my right is Dr. John T. Middleton, Commissioner of the National Air Pollution Control Administration.

Mr. Chairman and members of the subcommittee, I am very pleased to have this opportunity to testify on H. R. 12934, which would provide for a three-year extension of the Clean Air Act. With the Nation's air pollution problem still serious and, indeed, still worsening in many respects, the need for continuation of the air pollution research and control activities authorized by the Clean Air Act is indisputable, and I therefore commend the subcommittee for starting its hearings on the bill at this time. We favor extension of the Act for three years. In our opinion, there also is a need for some modifications of the Act, as indicated by some problems I will discuss later.

Air pollution clearly is a major national problem. Either directly or indirectly, it impinges on the lives and business of nearly all inhabitants of these United States. The problem is most serious, of course, in our large cities. Three years ago at Thanksgiving time, for example, air pollution reached such high levels in the New York area that it was later found to have claimed the lives of 168 people and sickened many others. This year, within the past few months, the St. Louis and Chicago areas both have experienced episodes of unusually high levels of air pollution.

Even if such episodes were the only danger, there would be ample reason to intensify the Nation's attack on air pollution. But the fact is that ordinary levels of air pollution—the levels reached on many days of the year in many of the Nation's urban areas—also are a threat to our lives and our health and to the quality of our environment. Air pollution certainly would have to be high on any list of the modern problems that are threatening to strangle the Nation's cities.

Furthermore, the threat of air pollution extends even beyond the boundaries of our major cities. The air—whether polluted or not—flows from inner city to suburban areas and out into the countryside, from industrial to residential and scenic areas, and from one State to another. Moreover, there are many small communities that do not have to import their polluted air—they get it directly from sources

located within their own boundaries. Thus, air pollution affects communities, large and small, urban and rural, in all parts of the Nation.

In an age when the forces of science and technology have given man an unprecedented degree of control over the conditions of life, this problem surely must be considered a remnant of a more primitive era in the history of civilization. How else can we account for the odors and dirt that pervade the air or for the ugly shroud that so often hides some of the most awesome skylines in the world? Air pollution clearly is a gross anachronism.

But that's not all it is. Air pollution is a threat to public health and a drain on public and private pocketbooks. Even though some highly effective filtering systems are built into man's breathing apparatus, they will not protect us from all of the gases and fumes and dust and dirt that contaminate the air we inhale. Whether we like it or not, we must breathe the air as it comes to us. Its full impact on our health still is not known, but there is abundant scientific evidence that exposure to polluted air is associated with the occurrence and worsening of chronic respiratory diseases, such as emphysema, bronchitis, asthma, and even lung cancer. Some air pollutants may affect us in other ways, as well; carbon monoxide, for example, at the levels found in traffic on busy streets, may impair vision, response time, and cognitive functions, thus posing a genuine safety hazard.

In addition to its impact on public health, air pollution has a substantial impact on the economy. Through its effects on vegetation and materials, for example, air pollution causes economic losses to farmers, homeowners, and other groups and forces urban dwellers and businessmen to spend extra money to maintain their property. Totally, air pollution is costing the Nation several billion dollars a year in purely economic losses. How much it costs in terms of injury to human resources and esthetic values is unknown, but surely it is significant, perhaps the most significant part of its total impact.

The Nation's air pollution problem, which is already serious, is destined to grow and worsen unless our attack on it is pursued with increasing vigor. As we produce and use more electric power, more goods and services, and more motor vehicles, and as we produce and dispose of more refuse, there is an automatic increase in the Nation's potential for polluting the air. Whether that increased potential will turn into actual problems depends on what the Nation does right now. To devise and apply new technology for dealing with air pollution problems can take years, even a decade or more. Even where the needed techniques are known, adapting them to a particular situation and getting the necessary equipment designed, built, and installed may take years. In other words, if we are to have clean air tomorrow, we must take appropriate action today.

As a Nation, we took our first steps in the fight against air pollution in 1955, when the Department of Health, Education, and Welfare was given special authority to initiate a modest research program. Between that time and this, we have taken many more steps, so that now, under the Clean Air Act, as amended, the Department of Health, Education, and Welfare is authorized to carry on a broad national program involving research and development, training activities, assistance to State and local governments, and abatement and control efforts. This program usually is called the Federal air pollution program, but in reality

it is a national program, for it is an effort to mobilize the resources of all levels of government and the private sector in a joint attack on the problem of air pollution. I will not try, at this time, to present a detailed report on our progress since the enactment of the November 1967 amendments to the Act. In May 1968 and in January 1969, we submitted detailed reports to the Congress on our activities. Another in this series of reports currently is in preparation and will be submitted to the Congress early next year. I would like to take just a few minutes, however, to touch on some of the highlights of what has been accomplished.

First of all, the machinery for attacking air pollution on a regional basis has been set in motion. Thus far, we have designated air quality control regions in 20 urban areas. The map appended to my statement identifies those areas. In addition, it identifies 37 other areas in which we expect to designate air quality control regions during the next several months. When all 57 have been designated there will be at least a portion of an air quality control region in every State.

There are, of course, far more than just 57 areas where regional efforts to deal with air pollution are needed. Accordingly, we have already invited the Governors of all States to request designation of air quality control regions in any other areas where they feel that such action would be desirable. One need look at only a little information on population and urban-industrial concentrations to see that 300 or more air quality control regions might ultimately be designated just in urban communities. That would bring most of the Nation's population under the protective umbrella of the Clean Air Act, which would, of course, be desirable.

Even then, however, only a small fraction of our total land area would be covered. If major new sources of air pollution are to be prevented from arising outside urban areas, it may be necessary to extend across the entire Nation the air quality management system set up by the Clean Air Act. Such major sources, wherever they are located, will contribute to the total contamination of the atmosphere and thus have worldwide effects on the environment. In many instances, they will have adverse effects on plant and animal life and on the natural beauty of the countryside. Exactly how best to keep this from happening is a question we now have under active consideration.

Under the present provisions of the Clean Air Act, State governments are expected to adopt and implement air quality standards for air quality control regions. They are expected to take such steps with respect to each type of air pollutant for which the Department of Health, Education, and Welfare issues an air quality criteria document and a report on control techniques. Eleven months ago, we issued the first such documents. They pertained to sulfur oxides and particulate matter, two of the most important types of air pollutants. Now, in accordance with the timetable set forth in the Clean Air Act, air quality standards for these pollutants have begun to come in to the Department of Health, Education, and Welfare for review. Another appendix to my statement outlines the schedule for State adoption of sulfur oxides and particulate air quality standards.

As the schedule indicates, sulfur oxides and particulate standards for all or parts of several air quality control regions have been sub-

mitted on or before the dates they were due. Review of these standards is underway to determine whether they are consistent with the air quality criteria. In those cases in which air quality standards are now overdue, the delay is a result of technical-legal problems, and we have assurances from the States involved that they intend to resolve the problems as quickly as possible. In all instances, whether air quality standards are submitted on time or late, plans for implementation of the standards are due no more than 6 months after date on which the standards were due. In the months and years ahead, this process must be and will be repeated for many other types of air pollutants. Early next year, we expect to issue air quality criteria and reports on control techniques for carbon monoxide, hydrocarbons, and oxidants. A year later, we expect to issue similar sets of documents on nitrogen oxides, fluorides, and lead. And others will follow. In each instance, issuance of these documents will be the signal for States to begin setting air quality standards for the air quality control regions and then to develop plans for implementation of the standards. Thus, over the next several years, goals for reducing atmospheric levels of all pollutants injurious to public health and welfare will be established and concrete plans for reaching the goals will be worked out.

In the standard-setting schedule appended to my statement, you will notice a column showing when public hearings have been held or are scheduled to be held. In that column lies what is, perhaps, the most significant aspect of all that has taken place during the past 2 years. As you know, the Clean Air Act requires that States hold public hearings prior to the adoption of air quality standards for the air quality control regions. The intent of this requirement is to insure that the citizens who will be affected by the air quality standards will have an opportunity to express their views on what the standards ought to be.

It has been most encouraging to us to see that a great many individuals and organizations have taken advantage of the opportunities offered by such hearings. The quantity and quality of citizen participation have been unprecedented in the history of air pollution control. Public interest has been intense and well informed. At every hearing held thus far, people have served notice that they want air that is not just barely good enough to sustain human life, but is sufficiently clean to provide a margin of safety against the hazards of air pollution. As a result, several States have reconsidered their proposed standards, and some have taken steps to revise and improve the standards before submitting them for review by the Department of Health, Education, and Welfare.

There is, in the provisions of the Clean Air Act, a recognition that there are two broad classes of air pollution sources, stationary and mobile, which, ideally, are best attacked in differing ways. Insofar as stationary sources are concerned, they are considered to lie primarily within the jurisdiction of State and local governments, while it is the Federal Government that is primarily responsible for dealing with motor vehicles, the predominant mobile source of air pollution.

To encourage and help State and local government to assume their part of the responsibility, the Department of Health, Education, and Welfare furnishes them both technical and financial assistance. Financial assistance is provided in the form of grants to help State and local

agencies develop new air pollution control programs, establish programs already authorized by State or local law, improve existing programs, or maintain ongoing programs. Through awarding of such grants, which the recipients must match, in part, with their own funds, the Federal Government has been able to stimulate a marked expansion of State and local air pollution control activities. One of the charts appended to my statement shows the extent of this growth. This trend must continue, for there still are many areas affected by air pollution which are served either inadequately or not at all by air pollution control programs.

This means that Federal grant assistance must be continued. It also means that State and local agencies will need additional manpower, and, here again, they will need continued Federal help.

Nationally, stationary sources, such as steam-electric generating plants, manufacturing establishments, and incinerators, account for almost half of all man-made pollution. In any particular place, they may account for more or less than half. There can be no doubt, then, that clean air cannot be achieved solely through State and local efforts to deal with stationary sources. Mobile sources, principally motor vehicles, also must be attacked, and under the Clean Air Act, this is a responsibility of the Department of Health, Education, and Welfare insofar as new vehicles are concerned.

Title II of the Act authorizes us to establish and enforce national standards for the control of air pollution from new motor vehicles. Such national standards were first applied to 1968-model passenger cars and light trucks, the two groups of vehicles that account for most of the motor vehicle pollution problem.

The intended effect of these standards was to produce a reduction of about 42 percent in exhaust emissions of hydrocarbons from such new vehicles and about 60 percent in emissions of carbon monoxide. New and more stringent standards for passenger cars and light trucks are now in effect for 1970 models. A table attached to my statement shows that these new standards call for further reductions in emissions. In the 1971 model year, as the table shows, standards for evaporative emissions will take effect, thus requiring yet another reduction of hydrocarbon emissions. On January 1, 1970, standards for new heavy-duty vehicles, including standards to curtail diesel smoke emissions, also will take effect.

Naturally, the success of all air pollution control efforts, whether undertaken at the regional or national level, depends on the availability of practical and effective control techniques. For many types of air pollutants and many important sources, such techniques are available. But not for all. Perhaps the most important gaps are those relating to control of sulfur oxides pollution and motor vehicle pollution.

In the area of motor vehicle pollution control, application of the standards now in effect will, by the end of the 1970's bring, the national totals of carbon monoxide and hydrocarbon emissions down to levels approximating those that prevailed in the early 1950's. But if we were now to relax our efforts and make no further improvements in the standards, total emissions would begin to rise again, and this trend certainly would have a marked impact on air quality in all parts of the Nation. To prevent this from happening, our national standards must be and will be tightened in the years ahead. We are

now in the process of establishing motor vehicle emission reduction goals, both long-range goals and intermediate targets to be attained during the 1970's. To insure compliance with the tighter standards, low-pollution motor vehicles must be developed, either through modification of the conventional internal combustion engine and the fuel it uses or introduction of new propulsion systems.

In regard to sulfur oxides pollution, the situation is equally critical. The principal sources of sulfur oxides pollution are steam-electric generating plants, space heating systems, industrial boilers, and other fuel burning facilities. For some of these facilities, the only practical solution lies in the use of fuels which are either naturally low in sulfur or from which a portion of the sulfur has been removed. For the large sources, mainly steam-electric generating plants, a variety of techniques will be needed. In the immediate future, emphasis must be placed on the demonstration of techniques for keeping sulfur oxides out of the air, regardless of the sulfur content of the fuel being burned. Several such techniques have been developed and are awaiting full-scale demonstrations. If techniques such as these are not soon shown to be practical, there will be no widely acceptable way to prevent the continuing increase of sulfur oxides pollution.

Obviously, further research and development on the control of motor vehicle and sulfur oxides pollution are needed. These efforts cannot and should not be undertaken exclusively by the Federal Government. Even if larger appropriations and more manpower were available, the Federal Government should not be responsible for doing the entire job. Just as the Nation's industries contribute to these problems, so must they contribute to their solution. In many cases, industries have knowledge and resources that either cannot be duplicated or would be very expensive to duplicate.

The Department of Health, Education, and Welfare has been conducting and supporting research on the problems of motor vehicle and sulfur oxides pollution for several years, and we intend to intensify these efforts. Indeed, in section 104 of the Clean Air Act, the Congress placed special emphasis on the need to accelerate the search for practical solutions to the motor vehicle and sulfur oxides problems. This authority should continue to be an important element in our our fight against air pollution. Our research and development program under section 104 and other provisions of the act includes the direct activities of the National Air Pollution Control Administration plus an increasing effort to make the fullest possible use of the capabilities of other Federal departments and agencies and organizations in the private sector. We look to the private sector, in particular, to expand its own work in these areas and to participate in our program by sharing the cost of demonstrating promising new control techniques. It is encouraging to note that several private firms that have developed sulfur oxides control processes, together with a number of electric utility companies, are now indicating strong interest in such cost-sharing projects.

We hope to take advantage of this interest and to stimulate similar activity by other major segments of the Nation's business community, particularly those segments capable of contributing to the search for improved means of dealing with the motor vehicle pollution problem.

In addition to the activities I have discussed so far, many others are conducted under the Clean Air Act. Research on the health hazards and economic effects of air pollution is continuing, with emphasis on studies that will contribute to the development of air quality criteria. Support of college and university training programs, primarily at the graduate level, is continuing, along with the National Air Pollution Control Administration's short-course training program for State, local, and Federal personnel and other workers in the air pollution field.

The assistance we are receiving from advisory groups has been, and undoubtedly will continue to be, instrumental in our progress under the Clean Air Act. Their membership includes State and local officials, leaders of business and industry, engineers and scientists, and representatives of other groups interested in air pollution control. There is particularly broad representation of such groups on the President's Air Quality Advisory Board, established under section 110 of the Act, to advise both the Secretary of Health, Education, and Welfare, and the President.

Several technical advisory committees have been established to provide advice on implementation of specific provisions of the Act such as those relating to the development of air quality criteria and reports on control techniques.

Through the activities I have discussed, we are beginning to make inroads into the problem of air pollution. Nevertheless, the Nation is still a long way from solving the problem of air pollution. More money and more manpower are still needed, not only at the Federal level but also at State and local levels and in the private sector. A multitude of air pollution sources still is uncontrolled, and many new ones come into being every day. There are still many areas where industrial plants and other stationary sources can be built with only slight attention to the need for prevention of air pollution. There are still many technological problems to be solved before we will be adequately armed to attain and maintain high standards of air quality throughout the Nation. In short, there is much still to be done.

Extension of the Clean Air Act clearly is necessary. In addition, some modifications may be needed to enable us to cope with certain problems we have seen on the basis of our experience to date. At this time, I will just outline in general terms the nature of these problems.

The first one is in the area of motor vehicle pollution control. Our current program for determining whether new motor vehicles will comply with applicable national standards rests mainly upon testing of prototype vehicles in advance of actual production. Typically, the prototypes meet the standards, often by a substantial margin. On

the basis of the prototype testing, manufacturers are entitled to receive certificates which are valid for at least one year and which carry with them a presumption that production vehicles which in all material respects are of substantially the same construction as the prototypes will perform like the prototypes, insofar as air pollution control is concerned. Our experience suggests, however, that this is not entirely true, but rather that air pollution control systems installed in mass-produced vehicles often lose their effectiveness more rapidly than prototype systems do. Accordingly, there is a need to secure greater assurance that prototype capabilities are translated into production realities.

Another problem to be solved also concerns motor vehicle pollution control. The national standards established under the present provisions of the Clean Air Act can be and are applied to imported as well as American-made vehicles. Nevertheless, the present language of the law includes provisions that do permit importation of some motor vehicles that do not comply with the standards. Under these provisions, a significant number of cars not equipped to comply with applicable standards has been and can continue to be imported. Since foreign manufacturers make and sell vehicles equipped to comply with the national standards in effect in the United States, prohibiting the entry of cars that are not so equipped should not impose an undue hardship on anyone.

That completes my outline of the problems that may be among the subjects of proposals for modification of the Clean Air Act. As you know, the Department is in the process of completing a report on the need for national emission standards, in compliance with section 211(a) of the Act. If changes in the Act are needed as a result of the recommendations in the report, they will be submitted to the Congress.

Our progress under the Clean Air Act is being reinforced by notable steps toward improved coordination of Federal efforts in the area of air pollution research and control. The Department of Health, Education, and Welfare is the leader of the Federal Government's air pollution research and control activities, but it certainly is not the only segment of the Executive Branch that can or should contribute to the fight for clean air. A great many other departments and agencies have responsibilities and resources that are germane to the implementation of the Clean Air Act. Included among them are the Bureau of Mines and the Office of Coal Research of the Department of the Interior, the Department of Transportation, the Tennessee Valley Authority, the Environmental Science Services Administration of the Department of Commerce, and several others. In part, the air pollution research and development activities carried on by these departments and agencies have been and continue to be supported by funds transferred to them from the Department of Health, Education, and Welfare. Thus far, cooperation at the working level with the National Air Pollution Control Administration and understanding of its role as the leader of these activities have kept problems of overlap and duplication to a minimum. But there has long been a need for some concrete way of achieving high-level coordination to insure that Federal resources are used most effectively to enhance the fight against air pollution.

A means of achieving such coordination now exists in the form of the Environmental Quality Council created earlier this year by President Nixon. A standing Committee on Air Pollution has been established, with the Secretary of Health, Education, and Welfare as its chairman and with the Secretaries of the Interior, Housing and Urban Development, Commerce, and Transportation as members. A Committee on Automotive Air Pollution also has been formed. Very recently, Secretary Finch has established companion committees to deal with air pollution from stationary source fossil-fuel combustion and with abatement of air pollution from Federal facilities. Though the work of these groups is just getting underway, their activities can and should lead to greatly improved coordination of Federal activities in air pollution research and control and thus put the Federal Government in a much better position to exercise national leadership in solving the air pollution problem.

That leadership is vital. The American people want clean air. They have said so in the past, and they are saying it now more clearly than ever before. State and local officials are recognizing that air pollution is a problem they cannot ignore. The attitudes of business and industry are changing. A catalyst is needed to mold these forces into a unified attack on the problem of air pollution. Under the Clean Air Act, the Department of Health, Education, and Welfare can be that catalyst. I urge you, therefore, to authorize a continuation of activities under the act.

(The attachments to Dr. Steinfeld's statement follows:)

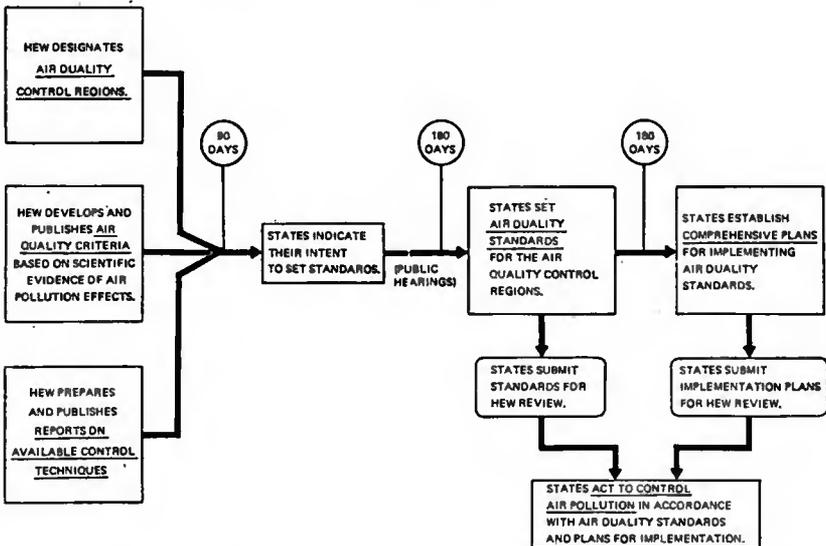


Figure 1 FLOW DIAGRAM FOR ACTION TO CONTROL AIR POLLUTION ON A REGIONAL BASIS, UNDER THE AIR QUALITY ACT

- INITIAL 57 REGIONS
 ● STUDY INITIATED
 ● CONSULTATION HELD
 ● REGION DESIGNATED



FIGURE 2. STATUS OF AQCR DESIGNATION - DECEMBER 6, 1969

FIGURE 3. STATUS OF AIR QUALITY CONTROL REGIONS

| REGION | Boundaries Proposed | Consultation | Designation | State | Letter of Intent | | Public Hearings Scheduled/Held | Standards | |
|------------------------|---------------------|--------------|-------------|-------------|------------------|----------|--------------------------------|-----------|----------|
| | | | | | Due | Dated | | Due | Submitt |
| Washington, D.C. | 7-31-68 | 8-22-68 | 10-1-68 | Virginia | 5-12-69 | 5-8-69 | 7-14-69 | 11-10-69 | 10-13-69 |
| | | | | Maryland | 5-12-69 | 5-12-69 | 10-1-69 | 11-10-69 | |
| | | | | D.C. | 5-12-69 | 5-12-69 | 10-24-69 | 11-10-69 | 11-7-69 |
| New York City | 8-30-68 | 9-30-68 | 11-20-68 | New York | 5-12-69 | 3-11-69 | 5-13, 14, 15-69 | 11-10-69 | 11-19-69 |
| | | | | New Jersey | 5-12-69 | 5-10-69 | 9-22-69 | 11-10-69 | 10-30-69 |
| | | | | Connecticut | 5-12-69 | 4-11-69 | 8-12, 19-69 | 11-10-69 | 11-7-69 |
| Chicago | 9-23-68 | 10-27-68 | 12-4-68 | Illinois | 5-12-69 | 5-9-69 | 8-5-69 | 11-10-69 | 11-3-69 |
| | | | | Indiana | 5-12-69 | 5-9-69 | 7-21, 9-26-69 | 11-10-69 | 11-10-69 |
| Philadelphia | 10-4-68 | 10-28-68 | 12-17-68 | Penn. | 5-12-69 | 3-12-69 | 9-10-69 | 11-10-69 | 11-3-69 |
| | | | | New Jersey | 5-12-69 | 5-10-69 | 9-22-69 | 11-10-69 | 10-30-69 |
| | | | | Delaware | 5-12-69 | 3-21-69 | 9-26-69 | 11-10-69 | 10-29-69 |
| Denver | 11-9-68 | 11-26-68 | 1-15-69 | Colorado | 5-12-69 | 5-7-69 | 10-15-69 | 11-10-69 | |
| Los Angeles | 11-28-68 | 12-10-69 | 1-23-69 | California | 5-12-69 | 5-7-69 | 9-17, 11-19-69 | 11-10-69 | |
| St. Louis | 12-21-68 | 1-14-69 | 4-11-69 | Missouri | 7-10-69 | 5-20-69 | 11-12-69 | 1-6-70 | |
| Boston | 12-20-68 | 1-17-69 | 4-12-69 | Illinois | 7-10-69 | 6-11-69 | 8-13-69 | 1-6-70 | 11-3-69 |
| | | | | Mass. | 7-11-69 | 5-23-69 | 11-27-69 | 1-7-70 | |
| Cincinnati | 1-10-69 | 1-27-69 | 5-2-69 | Ohio | 7-31-69 | 7-30-69 | 12-17-69 | 1-27-70 | |
| | | | | Indiana | 7-31-69 | 7-31-69 | 10-23-69 | 1-27-70 | |
| | | | | Kentucky | 7-31-69 | 5-7-69 | 12-2-69 | 1-27-70 | |
| San Francisco | 1-10-69 | 1-11-69 | 5-1-69 | California | 7-30-69 | 5-9-69 | 9-17, 11-12-69 | 1-20-70 | |
| Cleveland | 2-12-69 | 2-28-69 | 5-23-69 | Ohio | 9-21-69 | 8-21-69 | | 2-17-70 | |
| Pittsburgh | 2-12-69 | 2-27-69 | 5-1-69 | Penn. | 7-30-69 | 6-10-69 | 9-9-69 | 1-20-70 | 11-3-69 |
| Buffalo | 2-12-69 | 2-28-69 | 5-1-69 | New York | 7-30-69 | 5-13-69 | 8-19, 20-69 | 1-20-70 | |
| Kansas City | 3-20-69 | 4-11-69 | 7-19-69 | Missouri | 10-17-69 | 7-20-69 | 1-21-70 | 4-15-70 | |
| | | | | Kansas | 10-17-69 | 9-30-69 | | 4-15-70 | |
| Detroit | 10-10-69 | 11-3-69 | | Michigan | | | | | |
| Baltimore | 5-7-69 | 5-23-69 | 8-10-69 | Maryland | 11-14-69 | 10-10-69 | | 5-13-70 | |
| Hartford - Springfield | 4-16-69 | 4-29-69 | 10-3-69 | Conn. | 1-2-70 | 10-3-69 | | 6-30-70 | |
| | | | | Mass. | 1-2-70 | | | 6-30-70 | |

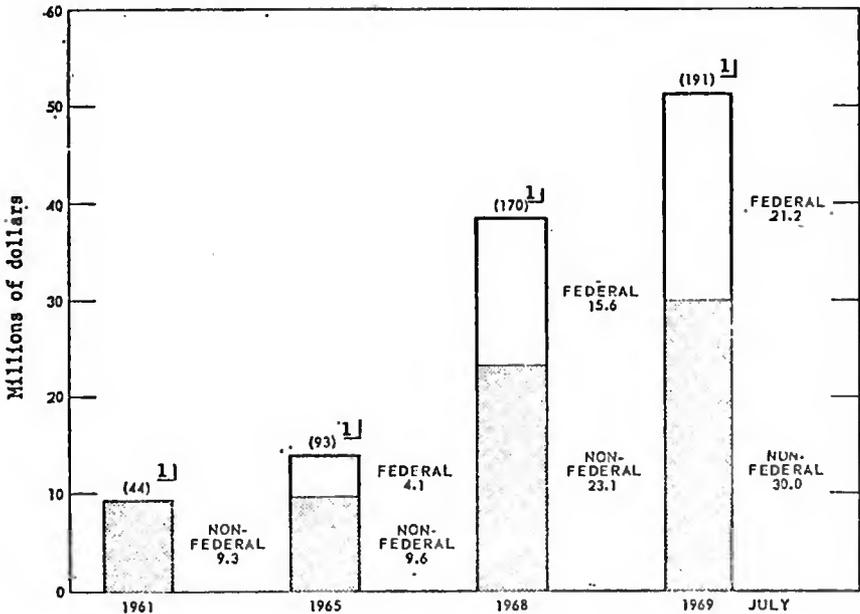
FIGURE 3 - continued

STATUS OF AIR QUALITY CONTROL REGIONS

| REGION | Boundaries Proposed | Consultation | Designation | State | Letter of Intent | | Public Hearings Scheduled/Held | Standards | |
|--------------|---------------------|--------------|-------------|--------------|------------------|----------|--------------------------------|-----------|-----------|
| | | | | | Due | Date | | Due | Submitted |
| Indianapolis | 5-23-69 | 6-10-69 | 9-18-69 | Indiana | 12-17-69 | 10-21-69 | | 6-15-70 | |
| Minn. - | | | | | | | | | |
| St. Paul | 5-7-69 | 5-21-69 | 8-16-69 | Minn. | 11-14-69 | 9-9-69 | | 5-13-70 | |
| Milwaukee | 7-3-69 | 7-21-69 | 9-18-69 | Wisconsin | 12-17-69 | 10-17-69 | | 6-15-70 | |
| Providence | 7-12-69 | 7-29-69 | | Rhode Island | 1-6-70 | | | 8-1-70 | |
| | | | 12-6-69 | Conn. | 3-6-70 | | | 4-1-70 | |
| Seattle - | | | | | | | | | |
| Tacoma | 7-23-69 | 8-5-69 | 10-27-69 | Wash. | 1-23-70 | | | 7-22-70 | |
| Louisville | 10-7-69 | 10-17-69 | | Kentucky | 3-6-70 | | | 9-1-70 | |
| | | | 12-6-69 | Indiana | 1-6-70 | | | 9-2-70 | |
| Evston | 10-8-69 | 10-16-69 | | Ohio | | | | | |
| Phoenix | 10-21-69 | 10-21-69 | | Arizona | | | 12-12-69 | | |
| Houston | 10-28-69 | 11-10-69 | | Texas | | | | | |
| Dallas - | | | | | | | | | |
| Ft. Worth | 10-29-69 | 11-12-69 | | Texas | | | | | |
| San Antonio | 10-30-69 | 11-14-69 | | Texas | | | | | |
| Birmingham | | | | Alabama | | | | | |
| Cleco | | | | | | | | | |
| Staubenville | 8-13-69 | 8-27-69 | | Ohio | 3-6-70 | | | 6-2-70 | |
| | | | 12-6-69 | West Va. | 3-6-70 | | | 9-2-70 | |
| Chattanooga | | | | | | | | | |

* On proposed sulfur oxides and particulate air quality standards.

Figure 4 Air pollution control budgets for State, local and regional Agencies.



1] Number of agencies

Figure 5: Light Duty Vehicles (LDV)¹ Emissions

| | 1963 Model | 1968 National | | 1970 National | | 1971 National | |
|-----------------|------------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|
| | Year Car (2,3) | Standards | Standards | Standards | Standards | Standards | Standards |
| | Grams per Vehicle Mile | Grams per Vehicle Mile | Percent Reduction (4) | Grams per Vehicle Mile | Percent Reduction (4) | Grams per Vehicle Mile | Percent Reduction (4) |
| Exhaust: | | | | | | | |
| Hydrocarbons | 5.7 | 3.3 | 42.2 | 2.2 | 61.4 | 2.2 | 61.4 |
| Carbon Monoxide | 87.2 | 34.0 | 61.0 | 23.0 | 73.6 | 23.0 | 73.6 |
| Crankcase: | | | | | | | |
| Hydrocarbons | 3.2 | 0 | 100.0 | 0 | 100.0 | 0 | 100.0 |
| Evaporation: | | | | | | | |
| Hydrocarbons | 2.8 | 2.8 | 0 | 2.8 | 0 | 0.5 | 82.1 |
| Totals: | | | | | | | |
| Hydrocarbons | 11.7 | 6.1 | 48.2 | 5.0 | 57.3 | 2.7 | 76.9 |
| Carbon Monoxide | 87.2 | 34.0 | 55.9 | 23.0 | 73.6 | 23.0 | 73.6 |

(1) Vehicles with a gross weight of 6000 pounds or less

(2) Tested according to Federal LDV test procedures

(3) At 2000 miles

(4) Percent reduction below 1963 emissions

Dr. STEINFELD. Thank you for patiently listening to this very long recitation. My colleagues and I would be pleased to answer any questions you may have.

Mr. JARMAN. Dr. Steinfeld, I think this is an excellent comprehensive report and we are encouraged by what the Department, Government at Federal and local levels, and industry are beginning to do in this tremendously important field.

We certainly look forward to reading in detail and studying the report that you will present to the Congress and make public early this next year.

May I ask for a comment on one or two questions, the first with reference to the specific bills before us.

Do you have any recommendations concerning the proper level of appropriation authorizations for the period covered by the bill?

Dr. STEINFELD. The administration, as you know, is currently reviewing the fiscal 1971 budget and so it perhaps would be inappropriate for me to comment specifically.

However, I believe that the appropriations recommended are in line with what we feel the nature of the job is and I think would permit us to continue to move ahead in this area.

Mr. JARMAN. Any specific recommendations that the Department could give us as the bill progresses would certainly be helpful.

Dr. STEINFELD. Just as soon as we can we would be delighted to. (The following statement was received for the record:)

The Department of Health, Education, and Welfare would prefer that the extension of the Clean Air Act authorize the appropriation of such sums as may be necessary for fiscal years 1971, 1972 and 1973 under both Sections 104(c) and 309. The DHEW budget request for fiscal year 1971 for all air pollution control activities is \$106,003,000.

Mr. JARMAN. What steps are taken within HEW to coordinate the activity of the solid waste disposal program with the air pollution research program?

Dr. STEINFELD. These are both under the leadership of Mr. Johnson, and the coordination is undertaken at his level. Perhaps you would like to amplify on that.

Mr. JOHNSON. I would be glad to, yes, sir. Mr. Chairman, we have recognized that there is a need to coordinate particularly our incinerator research activity in the solid waste area with the National Air Pollution Control Administration. The two commissioners have task forces that are now planning a five-year program in this area so they will move down the road in a coordinated fashion.

Mr. JARMAN. Would you outline generally for the subcommittee programs of the Department in training of air pollution personnel?

Dr. STEINFELD. I think this one probably can best be answered by Dr. Middleton.

Dr. MIDDLETON. I would be pleased to, Mr. Chairman.

The Department has a program of training grants, under which funds are awarded to institutions carrying on programs to train students in the principles and practice of air pollution control. We also have a program of fellowships, through which individuals are given awards for their advanced training. We also have a program in our own organization that trains personnel over short periods of time, increments of one week or more, in specific program areas. We have going through that system more than 2,000 people learning about various facets of the problem that they are particularly concerned with.

In our training grants activities, we are directing our attention to the development of two kinds of things: A consortium of institutions that collectively can provide more than any one institution, and, secondly, institutes, perhaps within an academic framework which will provide short-term training for specific purposes.

These institutes will allow us to train the much needed technician, the person who will be right out on the front line gathering the air samples, making measurements, collecting data, and making analysis.

So it is a spectrum of activity, from the training of technicians through the development of leadership personnel. We anticipate with the development of air pollution control programs throughout the country, that in the next five years we will probably need something like 8,000 people, whereas today we have not much more than 3,000.

Mr. JARMAN. Thank you very much.

Mr. ROGERS.

Mr. ROGERS. Thank you very much.

Dr. Steinfeld, your statement, I think, was good. I would like to get into a few more specifics perhaps with Mr. Johnson and Dr. Middleton.

Now, you have set, as I understand it, air quality criteria for sulfur oxides and for particulate matter.

Is that correct?

Dr. STEINFELD. Yes, sir. It is.

Mr. ROGERS. How about carbon monoxide? Have you set any criteria for carbon monoxide?

Dr. STEINFELD. The document should be ready in February 1970. However, we have already established national standards for control of carbon monoxide emissions from new automobiles. Those standards have been in effect for 2 years, but we have not issued an air quality criteria document on carbon monoxide.

Mr. ROGERS. What is holding that up?

As I understood it, your automobile exhaust problem is about 60 percent of the problem. Is it?

Dr. STEINFELD. It is the biggest part of the problem, yes.

Mr. ROGERS. Why are we waiting on setting those criteria when that is the major problem involved?

Dr. STEINFELD. We must complete our evaluation of the available data on effects of carbon monoxide. Just as soon as the evaluation of this information is completed and all of the material is put into proper form for publication, the document will be promptly published.

I can see no reason for waiting once the material is available.

Mr. ROGERS. What do we lack in knowledge here? You say in setting criteria we have the knowledge to set it for sulfur oxides. Don't we know how much we should set, what criteria should be set for with the automobile exhaust?

Dr. STEINFELD. I think in any of these one must compile all the existing information and review what are often conflicting reports to determine just what levels are associated with dangers to the population.

Mr. ROGERS. Who is doing this? Who is actually setting the criteria?

Dr. STEINFELD. We will, but you do want the specific individuals?

Mr. ROGERS. I want the specifics now. Who do you have working on it? How many people are working on it? What scientists are working on it? Do you have an outside group advising? How often are they meeting? Why isn't it done?

In other words, if we are going to have some urgency in meeting the problem, I think we have to set up our activity and I am not satisfied that we are doing this sufficiently.

Dr. MIDDLETON. Mr. Rogers, I share your impatience. I feel very strongly that the air quality criteria that deal with pollutants from mobile sources of pollution should be appropriately taken care of. And in referring to mobile sources, I mean not solely the motor vehicle.

Mr. ROGERS. Well, the airplane, too, is one.

Dr. MIDDLETON. Yes, sir. There also are other mobile sources that contribute to air pollution and they should not have any more relief than anyone else in this case. But to get back to your specific question, the nature of our activities in this area, the development of air quality criteria has a high priority in my organization.

It is something that simply must be done. The Clean Air Act, as amended in 1967, provided for the States to establish air quality standards based on the criteria; thus, at the State level, there is a dependence upon initiative at the Federal level.

I am sure you are aware of some of the difficulties in having people understand what is a fact and what may not be, insofar as data on effects of air pollutants are concerned, and to assist us in this area we have a National Advisory Committee on Air Quality Criteria that meets quite often.

Mr. ROGERS. How often?

Dr. MIDDLETON. I can give you for the record the number of meeting dates, but that would be an inconclusive way of measuring the total activity.

(The following information was received for the record:)

NATIONAL AIR QUALITY CRITERIA ADVISORY COMMITTEE MEETING DATES

- Feb. 12-13, 1968, A. Q. Criteria (pre-Adv. Com.) Washington, D.C.
 Feb. 22, 1968, Task Force on White Paper Chicago, Ill.
 Feb. 23, 1968, Task Force on Particulates Washington, D.C.
 March 8, 1968, Task Force on Sulfur Oxides Washington, D.C.
 April 9-10, 1968, A. Q. Criteria (Adv. Com.) Washington, D.C.
 April 29-30, 1968, SO_x Consultants (with SO_x Task Force representation)
 Washington, D.C.
 May 16-17, 1968, Task Force on Particulates Washington, D.C.
 May 20-21, 1968, A. Q. Criteria Adv. Com. Washington, D.C.
 May 27-28, 1968, SO_x Consultants (with SO_x Task Force representation)
 Washington, D.C.
 October 3, 1968, Task Forces Chairmen Riverside, California
 November 1, 1968, Task Force on Particulates Arlington, Virginia
 November 9, 1968, Task Force on Sulfur Oxides Arlington, Virginia
 November 16, 1968, Full Committee (on Particulates) Arlington, Virginia.
 November 23, 1968, Ad hoc Working Party on Economic Effects of Particulate
 Matter (Klarman/Stanley) Washington, D.C.
 Dec. 14, 1968, Full Committee (on Sulfur Oxides) Arlington, Virginia.
 January 24, 1969, Full Committee (on Particulates and Sulfur Oxides-Pre-
 liminary Statements) New York, New York.
 April 18, 1969, Full Committee (on Carbon Monoxide). Durham, North
 Carolina.
 June 20, 1969, Full Committee (on Photochemical Oxidants) Arlington, Virginia.
 August 22, 1969, Full Committee (on Carbon Monoxide and Photochemical
 Oxidants) Arlington, Virginia.
 November 7, 1969, Full Committee (on Nitrogen Oxides and Hydrocarbons)
 Arlington, Virginia.
 December 19, 1969, Full Committee (on Carbon Monoxide and Photochemical
 Oxidants) Arlington, Virginia.

Mr. ROGERS. I want to know who in your organization has this as their exclusive responsibility.

Dr. MIDDLETON. We have established a bureau with that exclusive responsibility. It is called the Bureau of Criteria and Standards.

Mr. ROGERS. Who heads that?

Dr. MIDDLETON. That is headed by a bureau director, Dr. Delbert S. Barth.

Mr. ROGERS. What background does he have.

Dr. MIDDLETON. He is a Ph. D. in biophysics. Within his organization he has a special office specifically to oversee the development of criteria. That office reports directly to him. It is charged with seeing that the whole machinery of collecting and analyzing data, producing draft reports, and scheduling meetings of the Advisory Committee and consultants is properly handled.

Within his bureau also, Mr. Rogers, is a Division of Health Effects Research. This is headed by Dr. Vaun Newill, who is an M.D. He has a very capable staff able to make analyses of the health effects as well as conduct research on health effects as well as get into the field, assessing whether the work we need to have done is being properly monitored and carried out.

Mr. ROGERS. How many in his office? You may have to furnish some of this for the record.

Dr. MIDDLETON. I will be pleased to furnish it for the record.

(The following information was received for the record:)

The Bureau of Criteria and Standards, as of January 1, 1970, had a total staff, including temporary and part-time, of 318, consisting of 184 professionals, 86 technicians, and 48 clerical personnel. It has three line divisions, a staff office, and the immediate office of the Bureau Director. The following is a brief breakdown of the staff and missions of the Bureau's components:

The Bureau Director's immediate staff consists of 7 professional and 3 clerical personnel. The Office of Criteria and Standards, which is a staff office in the Bureau, develops criteria and standards as required by law for the protection of the Nation's health and welfare in the areas of ambient air quality and pollutant and process emissions. Its staff consists of 14 professional and 3 clerical personnel.

The Division of Health Effects Research develops and conducts a comprehensive research program on the health effects of air pollution to provide intelligence upon which air quality criteria and standards can be based for the protection of human health and well-being. Its 150 man staff consists of 84 professionals, 46 technicians, and 20 clerical personnel.

The Division of Economic Effects Research develops and conducts a comprehensive research program on the effects of air pollution on vegetation, livestock, materials and structures; and on other socio-economic aspects of the problem in order to develop intelligence upon which criteria and standards may be based. Its 50 man staff consists of 31 professionals, 13 technicians and 6 clerical personnel.

The Division of Air Quality and Emission Data develops and maintains national programs for the surveillance of air quality, the collection, storage, and evaluation of air quality data, and the inventory of air pollutant emissions and the methods utilized for their control, and provides leadership and coordination, as necessary, for state and local surveillance activities. Its 91 man staff consists of 48 professionals, 27 technicians and 16 clerical personnel.

Mr. ROGERS. Could you give it to us generally?

Dr. MIDDLETON. Within the bureau there are some 300 people. The bulk of these people are concerned directly with the development of information related to development of criteria.

In addition, we have a Division of Economic Effects Research, which also contributes to criteria development. Criteria reflect not simply the effects of pollutants on man's health but upon his welfare, as well.

So, with the Division of Economic Effects Research, the Division of Health Effects Research, plus the special Office of Criteria and Standards within the Bureau, the Director of Criteria and Standards is equipped to develop these documents, see that they are properly compiled and suitably analyzed.

In this area, I should like to point out that, in order to get the best talent we can, we not only rely on suggestions from the National Air Quality Criteria Advisory Committee, but we get recommendations from a number of consultants and also ask that, under contract, people develop certain pieces of literature for us to be used in developing the final documents.

As for our budget in this area, last year, in the air quality criteria development activity, alone, we spent three-quarters of a million dollars, in the economic and health effects research areas, we spent a little over \$3.2 million out of our budget specifically oriented towards getting on with the task as rapidly and sensibly and most responsibly as possible.

Mr. ROGERS. Did you say three-quarters of a million for your air?

Dr. MIDDLETON. \$724,000, to be precise.

Mr. ROGERS. For Air Quality, and \$3.2 million for Economic Effects?

Dr. MIDDLETON. Economic and health effects research, which contributes to the development of air quality criteria and thus relates to the subject I have been discussing with you.

Mr. ROGERS. Health Research, too?

Dr. MIDDLETON. Yes, sir. And within this there is also the matter of compiling and evaluating emissions and air quality data, which obviously have to be a part of the air quality criteria documents. This involves another group of people in the same bureau, with a budget of \$2.39 million.

Dr. STEINFELD. Before we leave this, may I add something, Mr. Rogers?

On the last page of the statement which I made—I am sure the members of the subcommittee know about it but for the record—we have not waited for the publication of this document but have set standards for the control of exhaust emissions of carbon monoxide. With the current standards, there would be a 74-percent reduction from the 1963 model year, in terms of exhaust emissions of carbon monoxide. So we are not waiting to set standards, but the actual publication of the criteria document is, as you heard, not yet accomplished.

Mr. ROGERS. Why is this when you can set standards? I don't understand if you can establish standards why you can't establish the criteria.

Dr. MIDDLETON. Mr. Rogers, transportation sources account for 55 percent of the Nation's air pollution, on a tons per year basis, and most of that comes from motor vehicles. We have gotten to the point where we can reduce emissions from the motor vehicle, and by bringing about these reductions through the standards we have set, in about 1970 we would expect to have, as Dr. Steinfeld indicated earlier, reduced these emissions to about 1953 levels. After 1970, there would be an upswing.

It is toward preventing the upswing that we are working. We are looking for ways of no longer relying solely on the current technical feasibility of controlling motor vehicle pollution. We want to have standards set for air quality by the States so that they can say, "This is the goal we must have. These are the standards we are going to reach," and then emissions for the motor vehicles that are required can be set in tune with not only what is technically feasible but also what is necessary for the protection of health and welfare.

The emissions standards we now have are a good beginning for what is technically feasible. But they are not adequate for protection of public health. That is why the air quality criteria system is now being invoked, Mr. Rogers, to be sure that the States set air quality standards so that they bring together not only what is going on with the motor vehicle but also begin to work on the stationary sources of hydrocarbons and carbon monoxide. Thus, we can have a much stronger impact on getting the air quality we require.

Publication of the carbon monoxide criteria document will trigger State action to do something about the stationary sources that contribute additionally to the motor vehicle pollution problem.

Mr. ROGERS. Yes, but the motor vehicle is the major contributor on those particular emissions, is it not, so I wonder if it is wise to keep waiting so long? Shouldn't we move and improve it as we go? I think we are having a tendency to be hesitant to put out these quality criteria and I think we need to do that.

I notice an article in the paper today. The National Academy of Sciences—perhaps you read it too—is very concerned with this problem. They indicate that carbon monoxide levels above 10 parts per million

are creating real problems, and I notice, too, Dr. Steinfeld, that they also say it is a health hazard not only for emphysema and so forth, but for the heart.

Dr. STEINFELD. Yes, sir.

Mr. ROGERS. I notice you didn't mention that in your statement.

Dr. STEINFELD. Carbon monoxide has a very high affinity for hemoglobin, much higher than oxygen.

Mr. ROGERS. And brain damage and so forth?

Dr. STEINFELD. Well, it is the same as not being able to breathe oxygen, yes.

Mr. ROGERS. And so I am not sure that we are putting the proper emphasis on vehicle emissions. Now, let me ask you this: There have been designated about 20 regions that are operating?

Dr. STEINFELD. Air quality control regions, yes.

Mr. ROGERS. And you have 37 to come. Now, when will they be in existence?

Dr. STEINFELD. They are expected by the end of next summer.

Mr. ROGERS. Not until then? What is holding that up?

Dr. STEINFELD. I think, again, that Dr. Middleton can explain the details.

Dr. MIDDLETON. Nothing is holding it up. The people are behind it, and what may seem to you to be holding it up is the desirability of having public participation and of having clear understanding on the part of the cities and counties and States of what is needed by way of a boundary. This interaction at the various governmental levels must take place, and before boundaries are set there must be the public hearing process. Getting the involvement of the official agencies and the public and trying to have the regions be meaningful in the sense of using the best political, social, and legislative levels, and having public hearings and consultations, this simply takes time.

Mr. ROGERS. How long does it take to set up one of these regions?

Dr. MIDDLETON. The first took much longer than the last. The fact that we can get the 57 finished by the end of next summer, while we have 20 now, I think suggests that the time requirement is getting smaller and smaller.

Mr. ROGERS. Give me a typical case.

Dr. MIDDLETON. The biggest peice of the time is probably about a 2-month study to get together all the demographic data, the meteorological data, and emission source inventories, so that we have an understanding of the regional scope of air pollution in each area.

This is followed by publication and distribution of a report outlining the proposed boundaries, contact with the local air pollution control agencies and with city, county, and State governments, and a formal consultation with them, as required by the Clean Air Act. Naturally, it is necessary to allow all the interested parties time to examine our report before the meeting is convened and a sufficient period after the meeting has been convened to submit comments for the record. Then, there can be a decision on the part of the Secretary as to his satisfaction with what has taken place and the designation is made.

Mr. ROGERS. So what? Six months?

Dr. MIDDLETON. No, it does not take six months now. It takes more like three to four.

Mr. ROGERS. In three to four months you would establish it?

Dr. MIDDLETON. And I would hope this would be becoming smaller and smaller as we get the interest of local and State governments and their direct participation.

Now that the Governors have taken an interest in seeing that there are air quality control regions, and in your own State, the Governor has indicated his desire to have an additional air quality control region, this then allows the local governments, the counties, the State, to come to a realization of what they want and they will hasten the whole process.

Mr. ROGERS. Do you have to wait until the Governor requests it?

Dr. MIDDLETON. No, we do not.

Mr. ROGERS. As a matter of practice, do you?

Dr. MIDDLETON. We have identified, as Dr. Steinfeld said to you, 57 areas involving all 50 States, in which regions will be designated. We are now offering the States the opportunity of having additional ones, as they may wish them, so we can hasten the process.

Mr. ROGERS. How many have your people determined we really need in the country?

Dr. MIDDLETON. The actual number of people I would have to provide for the record.

Mr. ROGERS. No; I say how many Air Quality Regions have been determined by your people to be needed in the country to cover the population?

Dr. MIDDLETON. The first 57 regions will cover about 52 percent of the population. We think that 300 to 325 regions will cover more than 90 percent of the urban population but less than 20 percent of the Nation's land area.

Mr. ROGERS. Well, now, what is holding us up on getting those processed, the rest of them?

Dr. MIDDLETON. I don't think anything is—

Mr. ROGERS. All you have to do, isn't it, is designate that this will be a region?

Dr. MIDDLETON. After we have completed the 57, the format we have been using, with satisfactory results, is such that perhaps by changing it somewhat we can proceed with greater dispatch.

Mr. ROGERS. How many people are actually involved in doing this, in conducting the hearings and tying in and working on establishing your regions?

Dr. MIDDLETON. I have an assistant commissioner who has this specific responsibility, Assistant Commissioner for Regional Activities, Mr. Doyle Borchers, who has a staff in his office of seven people directly concerned with seeing that the development of the information is brought about.

They do not develop or bring all the information together but, rather, do this through some contracts and by asking interested groups and governments in the areas affected if they would provide the information.

We also use many of the people in the Bureau of Criteria and Standards who have the air quality information available. We also use, within the Bureau of Engineering and Physical Sciences, the people in meteorology.

Mr. ROGERS. Well, now, you say you use contracts?

Dr. MIDDLETON. Where we can get demographic data by purchasing it, we do.

Mr. ROGERS. How many contracts are outstanding?

Dr. MIDDLETON. We have one let at the present time.

Mr. ROGERS. Only one?

Dr. MIDDLETON. Yes.

Mr. ROGERS. Well, wouldn't this help speed it up if you got more?

Dr. MIDDLETON. If the nature of this contract and its productivity shows that this is a useful way to do the work, we shall extend it.

Mr. ROGERS. Let us have some details on that for the record, will you, who is doing it, the number of people involved, the cost of it, and the results from it?

Dr. MIDDLETON. We will attempt to do that.

(The following information was received for the record:)

CONTRACTS AWARDED TO OBTAIN INFORMATION FOR DESIGNATION OF AIR QUALITY CONTROL REGIONS

The National Air Pollution Control Administration has awarded two contracts for the purpose of obtaining information needed for designation of air quality control regions:

1. Contract No. CPA 70-11. For: A Study of Factors Relating to the Proposed Designation of Air Quality Control Regions. Contractor: Linton, Miels, and Coston, Inc., Washington, D.C. Contractor Personnel: 4.5. Estimated Cost: \$184,000.00.

Purpose of Contract: The contract is designed to provide to NAPCA at least 13 reports which will contain technical and professional evaluation of regions selected by NAPCA, with special emphasis on local and State organization and capability. These reports will assist NAPCA in preparing for consultations required under the Clean Air Act and for subsequent policy recommendations to the Secretary.

Time Period: One year

2. Contract No. CPA 70-2. For: Diffusion Model Studies to Assist Region Designations. Contractor: TRW Systems Group, Washington, D.C. Contractor Personnel: 1.25. Estimated Cost: \$63,400.00.

Purpose of Contract: The contractor receives from NAPCA information on emissions, meteorology, and other factors necessary to estimate air quality levels in areas being considered for designation as air quality control regions. The information is entered in a computer programmed to perform mathematical diffusion modeling. Air quality level calculations are made for sulfur oxides, carbon monoxide, and suspended particulates on an annual, summer, and winter basis. Results are provided on maps showing contour lines of equal pollutant concentrations. During FY 1970, approximately 20 different urban areas will be evaluated under the contract.

Time Period: One year

Mr. ROGERS. I have many more questions but I will not proceed and further delay.

Thank you, Mr. Chairman.

Mr. JARMAN. Dr. Carter.

Mr. CARTER. Thank you, Mr. Chairman.

I notice you state that 20 regions are already formed. I was happy to see that Louisville, Kentucky and Indiana were in one of those regions. Of course, I have been familiarized with that. Dr. I. W. Tucker of the University of Louisville has been quite active in developing this area.

I understand that he did a great deal of the work toward this.

However, the region hasn't really been organized and definitive. Work has not been done in these areas as yet. Is that true?

Dr. STEINFELD. Can we find it in here?

Dr. MIDDLETON. You can identify the areas and the States involved but I think Dr. Carter may be speaking to what is the activity at that point.

Mr. CARTER. What I meant to say was, are these 20 areas proceeding now to abate the pollution in their areas?

Dr. MIDDLETON. If I may respond, Dr. Carter, the designation of an air quality control region is the signal for the State to establish air quality standards consistent with the air quality criteria issued by the Department of Health, Education, and Welfare and to develop plans for implementation of the standards, under the Clean Air Act. It is not until 15 months after the designation of a region and/or publication of criteria that there is an obligation to have an action program.

However, as I think you know, in your area there are already air pollution control programs that do have an activity.

Mr. CARTER. Yes.

Dr. MIDDLETON. So you have various levels of implementation at this time.

Mr. CARTER. Well, let us say there have been very low levels of implementation as of yet although there has been some activity. Certainly we are anxious to see this get underway because we do consider it vital to the health of our country.

I think it is a pity that, so far as I know, nature has no way of ridding our air of carbon monoxide as it does have carbon dioxide.

It is true that nature does do that, is it not?

Dr. STEINFELD. As for carbon dioxide, it certainly does.

Mr. CARTER. I am also cognizant of the fact that respiratory diseases are caused by inhalation of these different substances.

Our distinguished colleague from Florida mentioned carbon monoxide pollution in the cities. I believe that it has been stated that 10 parts per million was the borderline. Above 10 parts per million would not be acceptable, is that true?

Dr. STEINFELD. You mean in terms of our air quality criteria?

Mr. CARTER. Yes, our quality criteria or in terms of keeping the concentration low enough so as to not adversely affect the health of the people.

Dr. STEINFELD. I think we will have a great deal of detailed information, Dr. Carter, in the document that will be published in February.

Mr. CARTER. It is rather interesting that in Chicago the air showed 12 parts per million of carbon monoxide. That does seem to be quite small at that.

Of course, we know further that air pollution does contribute to various respiratory diseases, as has been stated. In fact, I believe out at the National Institutes of Health you have produced lung cancer by inhalation of hydrocarbons, have you not, in experimental animals?

Dr. STEINFELD. I think there have been studies using both hydrocarbons and viral agents, but, as is true in many of these cases, wasn't reproduced by another group attempting to do the same thing.

Mr. CARTER. You did produce lung cancer. hydrocarbons, did you not?

Dr. STEINFELD. The study with combination of viral agents and hydrocarbons, did you not?

ings, by inhalation of a familiar involved a

Mr. CARTER. And what was the percentage of production of lung cancer in that case?

Dr. STEINFELD. I would have to supply it for the record.

Mr. CARTER. I believe it was almost 100 percent, quite a large percent.

Dr. STEINFELD. Could very well be.

Mr. CARTER. Strangely enough. What was the other agent that didn't produce this, if you would state that, please, sir.

Dr. STEINFELD. The other?

Mr. CARTER. That was used.

Dr. STEINFELD. It was an influenza virus, I believe in one series of experiments, but when the studies were reproduced it didn't come out the same way.

I would like to supply all the data for the record, because I don't remember the details.

(The following information was received for the record.)

CARCINOGENIC HYDROCARBONS

Kotin and Falk¹ produced an increased incidence of pulmonary tumors in mice by exposure to an atmosphere of ozonized gasoline. Kotin, *et al.*² produced similar tumors in tumor-resistant mice by the same method. Wisely, *et al.*³ successfully produced malignant tumors of mice by a regimen employing infection with three successive viruses and concurrent exposure to ozonized gasoline. They suggest that the tumors resulted from interaction of the virus infection and chemical carcinogens contained in the auto smog. A later attempt by Falk⁴ to reproduce this result was not successful. It must be pointed out however that all conditions of the first experiment were not duplicated, for instance, only one virus infection was employed and virus defined mice were used in the second experiment.

Findings of great importance to the public health aspect of air pollution have recently come to light, namely, the addition of seemingly inert particulates to hydrocarbon carcinogens resulting in the regular production of malignant tumors of the lung. Pylev⁵ produced lung cancer in rats by the intratracheal injection of DMBA incorporated with carbon particles. Saffiotti, *et al.*^{6,7} regularly produced tumors in hamsters mimicking those occurring in human beings by injecting a mixture of benzo(a)pyrene and hematite dust. Both of the latter substances are common constituents of polluted air. Findings suggest that the carcinogenic potential of polluted air is not solely derived from specific hydrocarbon carcinogens, but through complex interaction of the carcinogens with other pollutant material. It should be pointed out that experiments by Laskin⁸ indicate that the irritant air pollutant gas, sulfur dioxide, also potentiates the action of benzo(a)pyrene with the production of lung tumors in rats.

It would thus appear that airborne carcinogens in interaction with other agents, i.e., viruses, particles, and irritant gases are capable of inducing lung cancer in animals similar in type to those seen in man. There is a positive association between lung cancer in man and urban residence distinct from the effect of tobacco smoke. Carcinogens and materials capable of potentiating their effects occur in greater abundance in these areas.

While there is insufficient proof to positively incriminate polluted air as a producer of lung cancer, there is a strong suspicion that pollutants are playing a part in the production of this disease. These points can be clarified only by additional research.

REFERENCES

1. Kotin, P. and Falk, H.L.: II. Experimental Induction of Pulmonary Tumors in Strain-A Mice after their Exposure to Atmosphere of Ozonized Gasoline. *Cancer*, 9:910-, 1956.
2. Kotin, P., *et al.*: III. The Experimental Induction of Pulmonary Tumors and Changes in the Respiratory Epithelium in C56BL Mice Following their Exposure to an Atmosphere of Ozonized Gasoline. *Cancer*, 11:473-, 1958.

3. Wisely, D. W., *et al.*: The Production of Epidermoid Carcinomas in C57 Black Mice Following Exposure to Repeated Viral Infections and Carcinogenic Aerosols. *Proc. Amer. Assoc. Cancer Res.*, 3:278-, 1961.

4. Falk, H.L.: Chemical Definitions of Inhalation Hazards. *Proc. of Conference on Inhalation Carcinogenesis*, Gatlinburg, Tennessee, 1969.

5. Pylev, L. N.: Experimental Induction of Lung Cancer in Rats by Intratracheal Introduction of 9,10-dimethyl-1,2-benzanthracene. *Byull. Eksperim. Biol. i Med.*, 52:99-, 1961.

6. Saffiotti, U., *et al.*: Intratracheal Injections of Particulate Carcinogens into Hamster Lungs. *Proc. Amer. Assoc. Cancer Res.*, 4:59-, 1963.

7. Saffiotti, U., *et al.*: Bronchogenic Carcinoma Induction by Particulate Carcinogens. *Proc. Amer. Assoc. Cancer Res.*, 5:55-, 1964.

8. Laskin, S.: Carcinogenic Effects of SO₂ and Topical Approaches by Hydrocarbons. *Proc. of Conference on Inhalation Carcinogenesis*, Gatlinburg, Tennessee, 1969.

Mr. CARTER. You state that experimental animals have been exposed to another air pollutant which did not produce lung cancer. Specifically, what was the substance?

Dr. STEINFELD. I would have to supply all of that material for the record.

Mr. CARTER. Was it cigarette smoke, tobacco smoke?

Dr. STEINFELD. As I remember these were Paul Kotin's experiments some years ago.

Mr. CARTER. I believe tobacco smoke was the one which did not produce the cancer.

Further, on air pollution, the hydrocarbons in the air particularly are dangerous, as sulfur oxides. Not too long ago I talked with Dr. Rogan, who is Medical Director of the Coal Board in England, and he stated that pollution was a factor in causation of black lung disease, one of the final stages of it, the massive progressive infiltration, also inhalation of other pollutants produced a final stage of black lung disease.

According to the record, you have standards now or criteria developed for two substances. I believe carbon monoxide is one. What standard have you developed for sulfur oxide?

Dr. STEINFELD. I think Dr. Middleton can answer this better than I.

Dr. MIDDLETON. The criteria document speaks to the amounts and length of time that are associated with a particular effect. One finds different effects at different doses, and when Dr. Steinfeld said the States will establish air quality standards consistent with the criteria, he was saying that the States must establish standards that, as a minimum, would be prevent adverse health effects on man. What is actually happening is more than that; standards are being established not only to protect the health of man, but also to preserve the quality of the environment. This trend reflects the public interest in seeing to it that air quality is not just barely sufficient to enable man to survive but good enough to allow him to enjoy his environment.

Mr. CARTER. What is this level? How many parts per million would be acceptable of sulfur oxides?

Dr. MIDDLETON. In the résumé of the criteria document, we state what the minimum effect levels are, and this page could be presented for the record.

(The following information was received for the record:)

RÉSUMÉ OF AIR QUALITY CRITERIA FOR SULFUR OXIDES

In addition to health considerations, the economic and aesthetic benefits to be obtained from low ambient concentrations of sulfur oxides as related to visibility, soiling, corrosion, and other effects should be considered by organizations responsible for promulgating ambient air quality standards. Under the conditions prevailing in areas where the studies were conducted, adverse health effects were noted when 24-hour average levels of sulfur dioxide exceeded $300 \mu\text{g}/\text{m}^3$ (0.11 ppm) for 3 to 4 days. Adverse health effects were also noted when the annual mean level of sulfur dioxide exceeded $115 \mu\text{g}/\text{m}^3$ (0.04 ppm). Visibility reduction to about 5 miles was observed at $285 \mu\text{g}/\text{m}^3$ (0.10 ppm); adverse effects on materials were observed at an annual mean of $345 \mu\text{g}/\text{m}^3$ (0.12 ppm); and adverse effects on vegetation were observed at an annual mean of $85 \mu\text{g}/\text{m}^3$ (0.03 ppm). It is reasonable and prudent to conclude that, when promulgating ambient air quality standards, consideration should be given to requirements for margins of safety which would take into account long-term effects on health, vegetation, and materials occurring below the above levels.

Mr. CARTER. You don't have the parts per million of that?

Dr. MIDDLETON. Yes, we do.

Mr. CARTER. What would it be?

Dr. MIDDLETON. They should not exceed 0.11 parts per million (300 micrograms per cubic meter) for 24 hours one percent of the time. This would mean that an annual average should not be in excess of 0.04 ppm (115 micrograms per cubic meter). This is one set of numbers, for instance, that appears in the sulfur oxides criteria document.

Mr. CARTER. And particulate matter. Of course, I suppose you mean the dust in the area. What standards have been set for this?

Dr. MIDDLETON. The criteria, which are again, Dr. Carter, statements of effects noted, whereas standards have to be numbers that prevent those effects from happening, the particulate criteria document states, and again the resume could be supplied for the record, that a level of 80 micrograms per cubic meter has an impact, an adverse effect.

(The following information was received for the record:)

RÉSUMÉ OF AIR QUALITY CRITERIA FOR PARTICULATE MATTER

In addition to health considerations, the economic and aesthetic benefits to be obtained from low ambient concentrations of particulate matter as related to visibility, soiling, corrosion, and other effects should be considered by organizations responsible for promulgating ambient air quality standards. Under the conditions prevailing in areas where the studies were conducted, adverse health effects were noted when the annual mean level of particulate matter exceeded $80 \mu\text{g}/\text{m}^3$. Visibility reductions to about 5 miles was observed at $150 \mu\text{g}/\text{m}^3$, and adverse effects on materials were observed at an annual mean exceeding $60 \mu\text{g}/\text{m}^3$. It is reasonable and prudent to conclude that, when promulgating ambient air quality standards, consideration should be given to requirements for margins of safety which would take into account long-term effects on health and materials occurring below the above levels.

Mr. CARTER. Eighty micrograms per cubic meter. A microgram is what part of a gram? What part of a milligram?

Dr. MIDDLETON. Thousandth.

Mr. CARTER. A thousandth of a milligram?

Dr. MIDDLETON. I should point out here that whereas these seem to be small numbers, please remember that we are dealing with the total suspended particulate matter. One of the steps we shall have to be taking is to be concerned not merely with the total amount of

suspended matter but also with the size distribution and what the relative impact of those particle sizes is upon personal health. As the first step, however, the figure of 80 micrograms per cubic meter is a measure of the suspended particulate matter that has an adverse effect.

Mr. CARTER. And translated that would be 800ths of a milligram per cubic meter, I believe. Is that right?

Dr. MIDDLETON. Right.

Mr. CARTER. That is getting it down real well, I should think, if that can be approached. I notice that you state that we are permitting some foreign automobiles to come into this country which are not equipped as ours are at the present time.

Is that true?

Dr. STEINFELD. I think the law allows an individual who buys a car, if it is for his own use and he doesn't bring it in for resale to bring it into the country. Under the current law, this is permitted.

Mr. CARTER. I should like to see this law amended. I notice also that you state that when you check the prototypes of our manufacturers here they measure up very well but when you consider the cars indiscriminately, we might say, that prototype level is not maintained by our manufacturers.

Is that true?

Dr. STEINFELD. I think what is happening is that the average American doesn't care take of his car the way the manufacturer takes care of his prototype models, in tuning it, and changing oil, and so forth, but the deterioration factor for the models which we have checked for carbon monoxide and hydrocarbons is much greater for the average car than for the prototype models.

Mr. CARTER. In your paper you state that is a result of mass production. You didn't state it just that way now. You said that was the result of mass production and not of the way in which it has been used. At least you didn't mention that.

Dr. STEINFELD. I think all of these factors enter into what happens. It would be much better if the models held up just as well as the prototypes do.

Mr. CARTER. Certainly I think you have made an excellent presentation and I for one want to cooperate with you towards abatement of our air pollution and again with better solid waste disposal methods throughout our country, too, Mr. Johnson.

Mr. JOHNSON. Thank you, sir.

Mr. CARTER. Thank you, Mr. Chairman.

Mr. JARMAN. Mr. Preyer.

Mr. PREYER. Thank you, Mr. Chairman.

Dr. Steinfeld, I would like to just follow up on Dr. Carter's question about why mass-produced vehicles lose their effectiveness as far as pollution control systems is concerned.

I am not sure I understood your answer. Is the reason a technical reason? Is it the wilfulness or neglect of the automobile manufacturers? Or is it something that the individual does in tuning his car?

Dr. STEINFELD. It probably is a combination of all of these. There may be a quality control problem, in that the prototypes are carefully built and certainly carefully maintained. In addition to this problem, which could be solved by the manufacturers, I think what we do with the cars that are already on the road is another matter.

Many of us—I guess I should volunteer this—do not follow the outlines the manufacturers suggest in terms of all of the things that should be done.

Mr. PREYER. In other words, what I as an individual driver do to the car does affect the pollution control system of the car?

Dr. STEINFELD. It would be my understanding, yes.

Mr. PREYER. What do I do that affects it?

Dr. STEINFELD. I think you are out of my field, and I am not sure. Can you answer, Dr. Middleton?

Dr. MIDDLETON. It has been clearly shown that a well maintained car, and let us not worry about what "well maintained" is—let us take it as the maintenance which manufacturer of the car says should be done—will keep in better tune, better operation, and, therefore, one would expect the standard to be more easily met.

But the average driver, may I say that both of us are members of the average driver group, clientele, rarely follows the manufacturer's precise directions for maintenance of the motor vehicle, and it, perhaps, should be considered here that the quality control in production of the systems for air pollution control and abatement should be designed to accommodate what the average person does by way of maintaining his car rather than imposing some more extensive maintenance program.

So it is both quality control by the manufacturer and in-use handling on the part of the owner.

Mr. PREYER. Well, if I maintained my car exactly up to specifications would you have some rough guess as to what percentage of them would still have impaired air pollution control systems? In other words, what degree of the damage is being done by quality control or failure to have adequate quality control by the manufacturer?

Dr. MIDDLETON. This could be done only after we know what the quality of the car was upon leaving the production line and the dealer's shop, what that car looked like at that time, not its prototype. That would take care of the quality control system. We take the same cars and then see what the difference was in maintenance.

We do not have such data available and we do not now test production line cars. I am saying that I cannot be responsive to your question because we do not have that information.

Mr. CARTER. Will the gentleman yield on that?

Mr. PREYER. Yes.

Mr. CARTER. Certainly I think that is a mistake just to take the prototype cars from the industry. I think you should have the opportunity to check any car on the production line.

Thank you for yielding.

Mr. PREYER. Is that one of your suggestions for meeting this problem?

Dr. STEINFELD. This is something we have under serious consideration and have discussed in fairly great detail.

Mr. PREYER. Let me just ask one other question that Dr. Carter touched on. The second modification of the Clean Air Act which you mentioned dealt with the importation of foreign motor vehicles that don't comply with the standards.

I wonder what effect the pressure of publicity might have on forcing these cars to comply?

Do we know the names of these cars that are non-complying vehicles and, if so, is anything confidential about it that you shouldn't let the public know about?

Dr. STEINFELD. We know some of these. It costs more to produce a car that meets the American regulations than it does in many of the foreign countries and some people who are overseas may not buy cars made to the American specifications.

Mr. PREYER. Are these cars that are bought overseas that are brought back?

Dr. STEINFELD. Yes.

Mr. PREYER. So it is not just that some Volkswagen manufacturer, say, doesn't comply on any of his cars?

Dr. STEINFELD. Well, there may be dealers or groups who try to get around the law because these are less expensive cars but I think the law was designed to permit the individual who was overseas, whether he be a serviceman or living overseas for a while, to bring his own car back into the country as long as it was not brought in for resale.

However, there are a fair number of these, and the question is whether we should try to do something about this.

Mr. PREYER. I see.

So you can get at that problem regulating what happens to these cars that are bought overseas that don't comply with American standards?

Dr. STEINFELD. Yes. It seems to me we could insist that all cars meet the American standards.

Mr. PREYER. Thank you, Dr. Steinfeld.

Dr. STEINFELD. Thank you, Mr. Preyer.

Mr. JARMAN. Mr. Skubitz?

Mr. SKUBITZ. Mr. Chairman, I would like to reserve my time for the moment.

Mr. JARMAN. Mr. Hastings.

Mr. HASTINGS. One question, Dr. Steinfeld. From my experience in the Clean Water Act, and particularly in the case of my State of origin, I have observed that the States that are the most progressive in trying to meet the standards that are established are the ones who find themselves somewhat at odds with the industries located within the boundaries of their State, understandably so, of course.

Is there any way really that we can approach this problem so that it doesn't become a situation where the State tries to meet the responsibility and finds that in fact it stands in danger of having industries move from many of their areas to other States that aren't quite as insistent or don't move quite as quickly towards meeting these standards?

Dr. STEINFELD. The implication there, if I read your question right, is that if all States had the same relative standards in terms of water pollution and air pollution there would be no economic advantage for a manufacturing industry to leave one State, which happened to be progressive in this area, and go to another which was not.

This is clearly a problem. On the other hand, it might lead industry to move to places that were not heavily populated and perhaps we would have a better distribution of industry.

Mr. JOHNSON. I might add, Mr. Hastings, that is one of the reasons we are moving to designate 57 air quality control regions in which all 50 States would be represented.

Secondly, the Clean Air Act says that we must protect and enhance the quality of the air, which, in effect, espouses a no-degradation policy, and we would hope that the States, recognizing this, would not permit other industries to come into their States and deteriorate what is already good quality air.

Mr. HASTINGS. I understand the objectives of the legislation but I think the same objectives were apparent and inherent in the Clean Water Act and yet from personal experience I have seen where many of them successfully—I won't say who specifically—say that "If you insist on carrying through with the provisions of your State," which are very strict and I think in the public interest, "then we will have to take a step to perhaps move our operation to some State that isn't quite as strict," or, say, as enthusiastic.

I know it is a practical problem.

Mr. JOHNSON. I believe there are safeguards built into the act to help protect against this. The act calls for an implementation plan and the implementation plan has to say exactly how they are going to maintain the quality of the air and this implementation plan must be approved by the Secretary of HEW.

We are on guard against this kind of movement so that we can make sure that as new industries come in they do not come in at the expense of the quality of the air that does exist in those States.

Mr. HASTINGS. That is precisely what I was trying to get at and as long as you are aware and propose to continue to exercise your prerogative I have no further questions.

Dr. STEINFELD. I would just volunteer that we are preparing a report for the Congress on National Air Quality standards for stationary sources of air pollution, which I think would get at the question you have raised.

Mr. HASTINGS. Very good. Thank you.

Mr. JARMAN. Dr. Steinfeld, let me for the record get a response as to the attitude of the Department toward information necessary to be provided on fuel additives under the Clean Air Act.

Section 210 of the act provides for the registration of fuel additives.

Do you believe that that section authorizes the Department to require that a person seeking to register an additive furnish information to the Department beyond that specified in the law to be furnished before the Department will register the additive?

Dr. STEINFELD. This is an item that the General Counsel is currently reviewing and is going to provide us with an interpretation, which we will submit for the record.

Mr. JARMAN. There has been a good bit of concern expressed to us individually and to the committee over this question and, of course, the feeling on the part of industry that the information to be furnished to the Department should be consistent with what is set out in the law as required to be furnished. It would be helpful to us to have a statement of position on this.

Dr. STEINFELD. We will provide such a statement.

(The following information was received for the record:)

INTERPRETATION OF SECTION 210 OF THE CLEAN AIR ACT
RE REGISTRATION OF FUEL ADDITIVES

Section 210 of the Clean Air Act authorizes the Secretary to require manufacturers of fuels and fuel additives to submit information about the composition and "purpose in use" of fuel additives contained in designated fuels. Moreover, in the General Counsel's opinion, this section also authorizes the Secretary to require such manufacturers to submit any information which they may have developed or collected as to the composition of motor vehicle exhaust resulting from use of such additives or as to the health effects thereof. However, the General Counsel has concluded that it is doubtful that Section 210 authorizes the Secretary to require such manufacturers to conduct research or to gather any data as to the composition of exhaust or the health effects thereof, if such data was not in the possession of the manufacturers.

Mr. JARMAN. Mr. Rogers.

Mr. ROGERS. Thank you, Mr. Chairman. I want to see about your views on funding. I realize the budget has not been made up but I would like to know the thinking of the Department and I realize this this may not be what will come out or recommended.

Do you see the problem is such that we should increase funding dramatically or not?

Dr. STEINFELD. Well, words are hard to define. I would say that we agree with you and with the committee on the importance and on the urgency of the problem and on the fact that we must train more people and we must move faster, but in doing this we want to be sure that we marshal all of the available evidence.

Mr. ROGERS. I understand that. What I am trying to get at is this: Are the figures in the bill, the funding in the bill, sufficient to allow the Department to move as it should or is it insufficient?

Dr. STEINFELD. In my interpretation, it would be sufficient for us to move ahead aggressively, even more aggressively than we have. Because there is a tuning up period in any new program it takes longer to get started and less time as you move along.

Mr. ROGERS. Are there any major changes that should be brought about in the legislation?

Dr. STEINFELD. Major changes?

Mr. ROGERS. Yes, sir.

Dr. STEINFELD. I don't see any major ones, Mr. Rogers.

Mr. ROGERS. What basic changes do you think should be made in the law?

Dr. STEINFELD. We are going to submit a series of these. We have discussed some of the problems, and you know them well as we do. I think we are going to submit these in the very near future.

Mr. ROGERS. Well, what are some, for instance? What is your thinking on some?

Dr. STEINFELD. I have discussed a couple of the problems here—the imported automobiles, the fact that emissions standards—

Mr. ROGERS. Should apply to them as well.

Dr. STEINFELD (continuing). Should apply to them and should apply to production models as well as prototypes. The whole area of fuels is one we have not discussed, but certainly, in terms of both mobile and stationary sources of air pollution, the fuel that goes into the vehicle or the power plant is important, and we have not addressed ourselves to this in the law.

Mr. ROGERS. Do you think some changes would be recommended in that?

Dr. STEINFELD. It might be. I think these are other areas. I have just been identifying the problem areas that we have to look at.

Mr. ROGERS. I would think you would have to look at all of those and I would have hoped that your recommendations would be ready for this committee to consider and I think if you can get them to us quickly this would be helpful.

Now, let me ask you this: How many States have asked for Federal assistance in planning for standards?

Dr. STEINFELD. None.

Mr. ROGERS. None?

Dr. MIDDLETON. If I may, Mr. Rogers, just to be sure I am responding to the right question, you mean section 106, the interstate planning grant provision in the Clean Air Act? There has been none.

Mr. ROGERS. What about within the State?

Dr. MIDDLETON. We are not authorized to provide planning grants, *per se*, for intrastate air quality control regions. The legislation is limited solely to interstate areas.

Let me extend this comment just a bit. Air pollution control agencies can and do use their air pollution control program grant funds to aid in the planning of their organizational activities.

Mr. ROGERS. Yes.

Dr. MIDDLETON. I understood your question to be directed toward interstate planning in the air quality control regions.

In that case there has been none.

Mr. ROGERS. Are there any problems that are interstate in nature?

Dr. MIDDLETON. Yes, sir, a significant number of our first 57 are interstate air quality control regions where, usually, the most serious problems exist.

Mr. ROGERS. But they have asked for no help in that?

Dr. MIDDLETON. There has been no request under section 106 for funds to assist in planning in these areas.

Mr. JOHNSON. That doesn't mean that the States are not doing planning and are not using Federal funds to assist them in this area of activity.

Mr. ROGERS. I think we ought to have a rundown of this. Why would they use other funds to do this?

Mr. JOHNSON. Because we do support the States as they go about planning and conducting their air pollution control activities to the extent that we help them set up the mechanism for doing it. You, in effect, use, through an interstate kind of regional activity, many of the same people, and they control these through the understandings that they reach as to how these operations will be carried on.

Mr. ROGERS. I would like a rundown on that, on what is being done. How many States have been offered assistance by your Department?

Dr. STEINFELD. I believe all of them. There is a table which is upside down, the next to the last page of my statement (Fig. 4, p. 15.).

Mr. CARTER. Which shows the amount of Federal participation, doesn't it, and the State participation?

Dr. STEINFELD. Yes.

Mr. ROGERS. Yes, but it is not specific as to States, I don't believe. It just shows the non-Federal and Federal contribution.

Dr. STEINFELD. We will supply the details for the record. (The following information was received for the record:)

The following list shows the cumulative totals of air pollution control program grant funds made available to State, local, and regional air pollution control agencies from the time (Fiscal 1965) that such grants were authorized and funds appropriated. The list also shows the amount of each current grant. In many instances, local agencies which had been receiving grant funds separately have merged to form interjurisdictional programs; footnotes indicate where funds now are provided to the agencies resulting from such mergers. This list shows only the amounts of Federal funds awarded; it does not reflect expenditures of State and local funds.

AIR POLLUTION CONTROL PROGRAM GRANTS AWARDED: FISCAL YEARS 1965-70 (FEDERAL FUNDS)

| State and agency | Cumulative funding | Current funding | State and agency | Cumulative funding | Current funding |
|--|--------------------|-----------------|---|--------------------|-----------------|
| Alabama: | | | Connecticut: | | |
| Jefferson County | \$315,211 | (1) | Connecticut State | 666,322 | 199,794 |
| Huntsville | 60,776 | \$14,642 | Bridgeport | 106,625 | 40,000 |
| Alabama State | 85,000 | (1) | Middletown | 26,805 | (2) |
| Mobile County | 55,962 | (1) | Fairfield | 68,640 | 5,170 |
| Total | 516,949 | 14,642 | Stratford | 70,489 | 10,557 |
| Alaska: Tri-Borough Air Resources | | | New Haven | 187,793 | 46,000 |
| | 120,825 | 53,528 | Stamford | 117,813 | 39,695 |
| Arizona: | | | Greenwich | 52,812 | 11,200 |
| Maricopa County | 482,144 | 79,500 | Norwalk | 100,925 | 20,000 |
| Pima County | 179,915 | 52,500 | Milford | 40,778 | 17,278 |
| Arizona State | 444,600 | 181,978 | New Britain Health Department | 12,323 | (2) |
| Total | 1,106,659 | 313,978 | Meriden Health Department | 54,808 | 20,000 |
| Arkansas: Arkansas State | 224,574 | 48,934 | Total | 1,501,143 | 409,694 |
| California: | | | Delaware: Delaware State | | |
| Los Angeles County | 2,019,889 | 630,302 | | 674,420 | 248,670 |
| San Bernardino County | 229,710 | (2) | District of Columbia: District of Columbia | | |
| Bay Area APCD | 790,099 | 209,300 | | 321,344 | 213,382 |
| Monterey County | 90,174 | (2) | Florida: | | |
| California State | 1,509,768 | 793,641 | Dade County | 913,392 | 188,227 |
| Monterey and Santa Cruz County | 94,106 | 48,352 | Palm Beach County | 234,636 | 58,063 |
| County | 122,525 | 69,215 | Manatee County | 87,354 | (1) |
| Ventura County | 104,034 | 52,035 | Hillsborough County | 216,728 | 47,238 |
| Humboldt County | 88,000 | 50,000 | Florida State | 246,571 | 134,493 |
| Orange County | 144,000 | 144,000 | Total | 1,698,681 | 428,021 |
| Riverside County | 44,954 | 31,723 | Georgia: | | |
| Sacramento | 63,762 | 63,762 | Georgia State | 454,770 | 181,484 |
| San Diego | | | Fulton County | 359,468 | 111,150 |
| Total | 5,485,543 | 2,062,330 | Macon-Bibb County | 67,675 | 10,553 |
| Colorado: | | | Chatham County | 54,722 | 13,189 |
| City and county of Denver | 877,507 | 218,700 | Total | 936,635 | 316,379 |
| Tri-County Health Department | 311,383 | 65,280 | Hawaii: Hawaii State | | |
| Colorado State | 360,032 | 128,972 | | 73,042 | (2) |
| Jefferson County | 67,880 | 0 | Idaho: Idaho State | | |
| Pueblo City-County | 110,795 | 28,450 | | 111,270 | 46,288 |
| Boulder City-County | 22,848 | 7,866 | Illinois: | | |
| Colorado Springs | 21,209 | 38,528 | Chicago, Ill. | 4,261,300 | 1,105,050 |
| Weld County | 23,643 | 17,319 | Cook County | 469,218 | (1) |
| Mesa County | 33,136 | 11,894 | Illinois State | 446,388 | 286,000 |
| Total | 1,828,433 | 517,009 | Total | 5,176,906 | 1,391,050 |

See footnotes at end of table, p. 38.

AIR POLLUTION CONTROL PROGRAM GRANTS AWARDED: FISCAL YEARS 1965-70 (FEDERAL FUNDS)—Continued

| State and agency | Cumulative funding | Current funding | State and agency | Cumulative funding | Current funding |
|------------------------------------|--------------------|------------------|------------------------------------|--------------------|------------------|
| Indiana: | | | Mississippi: | | |
| Indiana State..... | 86,540 | 86,540 | Meridian..... | 18,200 | (?) |
| East Chicago..... | 122,320 | 22,620 | Mississippi State..... | 64,179 | 44,000 |
| Gary..... | 93,870 | 55,073 | Total..... | 82,379 | 44,000 |
| Evansville..... | 55,842 | 12,400 | Missouri: | | |
| Indianapolis..... | 273,171 | 103,100 | St. Louis County..... | 985,167 | 218,883 |
| Michigan City..... | 25,600 | 3,200 | St. Louis..... | 573,563 | 219,972 |
| Hammond..... | 133,000 | 30,000 | Missouri State..... | 488,956 | 165,232 |
| Vigo County..... | 79,840 | (*) | Greene County..... | 108,900 | 17,046 |
| South Bend..... | 49,035 | 27,400 | Kansas City..... | 300,250 | 93,704 |
| Lake County..... | 46,150 | 21,100 | Independence..... | 39,493 | 17,533 |
| Total..... | 965,368 | 361,433 | Total..... | 2,496,329 | 732,370 |
| Iowa: | | | Montana: | | |
| Cedar Rapids..... | 54,064 | (*) | Montana State..... | 196,907 | 64,622 |
| Des Moines..... | 85,431 | 32,931 | Missoula City-County..... | 51,306 | 27,342 |
| Linn County..... | 48,580 | 24,290 | Great Falls City-County..... | 12,525 | 12,525 |
| Black Hawk County..... | 58,695 | 58,695 | Billings..... | 23,400 | 23,400 |
| Total..... | 246,770 | 115,916 | Total..... | 284,138 | 127,889 |
| Kansas: | | | Nebraska: Lincoln-Lancaster | | |
| Kansas City-Wyandotte | | | County..... | 93,017 | 30,000 |
| County..... | 296,877 | 68,300 | Nevada: | | |
| Kansas State..... | 138,264 | 58,264 | Rena-Sperks-Washoe County..... | 193,204 | 44,652 |
| Total..... | 435,141 | 126,564 | Clark County District..... | 193,680 | 92,693 |
| Kentucky: | | | Nevada State..... | 19,508 | 19,508 |
| Kentucky State..... | 948,266 | 220,370 | Total..... | 406,392 | 156,858 |
| Jefferson County..... | 21,000 | (1) | New Hampshire: New | | |
| Louisville County..... | 179,992 | 95,955 | Hampshire State..... | 113,680 | 32,000 |
| Total..... | 1,149,258 | 316,325 | New Jersey: | | |
| Louisiana: | | | New Jersey State..... | 2,800,876 | 850,000 |
| Louisiana State..... | 397,068 | 120,000 | East Orange..... | 18,960 | (?) |
| Maine: Maine State..... | 90,000 | 18,000 | West Orange (suburban | | |
| Meryland: | | | Essex)..... | 149,679 | 58,869 |
| Prince Georges County..... | 155,570 | 89,993 | Elizabeth, N. J..... | 98,518 | 37,938 |
| Montgomery County..... | 260,000 | 140,000 | Total..... | 3,068,027 | 946,807 |
| Maryland State..... | 702,326 | 702,326 | New Mexico: | | |
| Anne Arundel County..... | 79,076 | 79,076 | New Mexico State..... | 131,776 | 30,000 |
| Baltimore County..... | 175,440 | 175,440 | Albuquerque, N. Mex..... | 233,683 | 47,786 |
| Allegheny County..... | 18,811 | 18,811 | Total..... | 365,459 | 77,786 |
| Baltimore City..... | 267,456 | 267,456 | New York: | | |
| Frederick County..... | 9,305 | 9,305 | New Rochelle..... | 230,090 | (?) |
| Total..... | 1,667,984 | 1,482,407 | Erie County..... | 920,118 | 210,500 |
| Massachusetts: | | | Broome County..... | 50,143 | (?) |
| Worcester..... | 133,407 | 21,500 | Dutchess County..... | 50,520 | (?) |
| Boston metropolitan area..... | 550,730 | 156,000 | Chemung County..... | 12,376 | (?) |
| Springfield metropolitan area..... | 207,000 | 63,000 | Nassau County..... | 587,850 | 155,000 |
| Fitchburg..... | 35,803 | 10,000 | Schenectady..... | 12,135 | (?) |
| Massachusetts State..... | 277,230 | 165,500 | Albany County..... | 21,200 | (?) |
| Total..... | 1,204,170 | 416,000 | Mount Vernon..... | 16,508 | (?) |
| Michigan: | | | Yonkers..... | 34,312 | (?) |
| Muskegon County..... | 76,743 | 9,696 | Columbia County..... | 11,969 | (?) |
| Wayne County..... | 2,662,252 | 1,107,795 | Niagara..... | 296,879 | 69,260 |
| Wyandotte..... | 31,525 | (?) | New York City..... | 2,274,173 | 814,000 |
| Detroit..... | 422,418 | (?) | New York State..... | 1,586,308 | 676,172 |
| Michigan State..... | 552,266 | 174,544 | Westchester County..... | 89,765 | 33,485 |
| Grand Rapids..... | 38,068 | 19,034 | Rensselaer County..... | 13,755 | (?) |
| City of Flint..... | 50,252 | 25,126 | Suffolk County Department | | |
| Total..... | 3,833,524 | 1,336,195 | ment of Health..... | 197,227 | 65,764 |
| Minnesota: | | | Ulster County Department of | | |
| St. Paul..... | 296,103 | 65,864 | Health..... | 26,310 | (?) |
| Minneapolis..... | 223,928 | 54,000 | Onondaga County Depart- | | |
| Minnesota State..... | 405,574 | 200,000 | ment of Health..... | 264,313 | 63,210 |
| St. Louis County..... | 87,178 | 28,545 | Rockland County Health | | |
| Olmstead County..... | 87,178 | 17,786 | Department..... | 57,041 | 37,041 |
| St. Cloud..... | 20,508 | 20,508 | Monroe County Health De- | | |
| Total..... | 1,068,863 | 386,703 | partment..... | 130,000 | 70,000 |
| | | | Total..... | 6,882,992 | 2,194,432 |

See footnotes at end of table, p. 38.

AIR POLLUTION CONTROL PROGRAM GRANTS AWARDED: FISCAL YEARS 1965-70 (FEDERAL FUNDS)—Continued

| State and agency | Cumulative funding | Current funding | State and agency | Cumulative funding | Current funding |
|--|--------------------|------------------|-----------------------------------|--------------------|------------------|
| North Carolina: | | | South Carolina: | | |
| Guilford County..... | 105,669 | 15,184 | Spartenburg..... | 45,383 | 8,350 |
| Durham County..... | 79,260 | 16,217 | South Carolina State..... | 300,670 | 115,664 |
| Buncombe County..... | 222,641 | 54,750 | Charleston County..... | 136,401 | 60,000 |
| Rowan County..... | 54,368 | 13,932 | Greenville County..... | 31,978 | 31,978 |
| New Hanover..... | 37,572 | (?) | Columbia..... | 8,365 | 8,365 |
| Gaston County..... | 84,078 | 16,200 | Total..... | 522,797 | 224,357 |
| Mecklenburg..... | 305,074 | 108,690 | South Dakota..... | | |
| Craven County..... | 71,071 | (?) | 0 (14) | | |
| Cleveland County..... | 101,739 | 33,180 | Tennessee: | | |
| State of North Carolina..... | 293,000 | 109,000 | Chattanooga..... | 45,799 | (?) |
| Catawba-Lincoln County..... | 71,542 | 35,771 | Tennessee State..... | 301,325 | 218,074 |
| Forsyth County..... | 112,224 | 56,112 | Nashville-Davidson County..... | 172,829 | 90,000 |
| Total..... | 1,538,238 | 459,036 | Memphis-Shelby County..... | 192,653 | 86,613 |
| North Dakota: North Dakota State..... | | | Knox County..... | 67,500 | 30,000 |
| 60,000 15,000 | | | Chattanooga-Hamilton County..... | 77,985 | 77,985 |
| Ohio: | | | Total..... | 858,091 | 502,672 |
| Lorain..... | 105,716 | 17,770 | Texas: | | |
| Akron..... | 462,865 | 67,000 | Texas State..... | 968,786 | 329,714 |
| Toledo..... | 285,624 | 72,591 | Oellas..... | 286,510 | 79,250 |
| Cleveland..... | 548,574 | 221,904 | Lubbock City-County..... | 67,566 | 16,344 |
| Canton..... | 181,430 | 39,998 | Houston..... | 786,021 | 287,916 |
| Steubenville..... | 70,000 | 13,000 | San Antonio..... | 327,461 | 111,557 |
| Portsmouth..... | 65,710 | 16,718 | Galveston County..... | 209,402 | 78,000 |
| Cincinnati..... | 87,660 | 36,100 | El Paso City-County..... | 67,156 | 33,532 |
| City of Ironton..... | 45,162 | 15,054 | Laredo-Webb County..... | 64,082 | 24,000 |
| Montgomery County-Dayton..... | 256,575 | 90,000 | Fort Worth..... | 139,215 | 60,823 |
| Ohio State..... | 200,000 | 100,000 | Jefferson County..... | 53,829 | 53,829 |
| Lake County..... | 60,000 | 30,000 | Pasadena..... | 23,000 | 23,000 |
| Total..... | 2,369,316 | 720,135 | Corpus Christi-Nueces County..... | 38,100 | 38,100 |
| Oklahoma: | | | Total..... | 3,031,128 | 1,136,065 |
| Oklahoma State..... | 86,000 | 52,112 | Utah: Utah State..... | 393,634 | 123,240 |
| Oklahoma City-County..... | 46,158 | (1) | Vermont: Vermont State..... | 42,512 | 21,256 |
| Tulsa City-County..... | 156,984 | 38,157 | Virginia: | | |
| Total..... | 289,142 | 90,269 | Roanoke..... | 1,823 | (14) |
| Oregon: | | | Roanoke County..... | 56,241 | 15,099 |
| Portland..... | 176,218 | 0 | Hopewell..... | 14,262 | (?) |
| Oregon State..... | 279,507 | 105,494 | Richmond..... | 65,598 | 25,000 |
| Lane County..... | 140,106 | 77,283 | Virginia State..... | 169,400 | 69,500 |
| Mid-Willamette Valley..... | 251,804 | 102,404 | Fairfax County..... | 121,379 | 70,167 |
| Portland Regional Air Pollution..... | 210,000 | (?) | Alexandria..... | 46,890 | 46,890 |
| Columbia-Willamette..... | 544,500 | 272,250 | Total..... | 475,593 | 226,656 |
| Total..... | 1,566,135 | 557,431 | Washington: | | |
| Pennsylvania: | | | Seattle-King County..... | 182,016 | (14) |
| Pennsylvania State..... | 1,603,194 | 669,222 | Clerk County..... | 50,418 | (?) |
| Lower Merionie..... | 1,560 | (15) | Puget Sound..... | 1,546,110 | 548,100 |
| Philadelphia..... | 1,644,981 | 597,143 | Thurston County..... | 27,778 | (16) |
| Allahehy County..... | 1,182,686 | 309,672 | Northwest APC Authority..... | 197,769 | 69,999 |
| York..... | 64,500 | 12,000 | Southwest APC Authority..... | 176,749 | 76,214 |
| Lehigh Valley..... | 56,550 | 12,600 | Spokane County..... | 55,739 | 23,103 |
| Total..... | 4,553,471 | 1,600,637 | Yekima County..... | 62,575 | 25,755 |
| Rhode Island: | | | Olympic..... | 152,226 | 69,111 |
| Providence..... | 14,106 | (14) | Weshington State..... | 340,000 | 340,000 |
| Rhode Island State..... | 381,187 | 114,239 | Total..... | 2,791,382 | 1,162,384 |
| Total..... | 395,293 | 114,239 | | | |

See footnotes at end of table, p. 38.

AIR POLLUTION CONTROL PROGRAM GRANTS AWARDED: FISCAL YEARS 1965-70 (FEDERAL FUNDS)—Continued

| State and agency | Cumulative funding | Current funding | State and agency | Cumulative funding | Current funding |
|--------------------------|--------------------|-----------------|----------------------------------|--------------------|-----------------|
| West Virginia: | | | Wyoming: Wyoming State..... | 40,535 | 16,000 |
| Wheeling..... | 36,430 | 13,392 | Guam..... | 0 | (?) |
| West Virginia State..... | 681,284 | 124,572 | Puerto Rico: Puerto Rico..... | 375,853 | 144,346 |
| Total..... | 717,714 | 137,964 | Virgin Islands: Virgin Islands.. | 56,048 | 30,000 |
| Wisconsin: | | | Grand total..... | 64,685,881 | 22,386,220 |
| Milwaukee County..... | 79,400 | (?) | | | |
| Wisconsin State..... | 101,085 | 50,000 | | | |
| Beloit..... | 11,600 | 4,800 | | | |
| Total..... | 192,085 | 54,800 | | | |

¹ Program did not meet requirements for Federal assistance.

² Agency did not apply for assistance.

³ Program combined with Monterey and Santa Cruz County.

⁴ Application is being reviewed.

⁵ Program combined with Linn County.

⁶ Program combined with Wayne County.

⁷ Program combined with West Orange.

⁸ State agency is funding this program.

⁹ Program combined with Columbia-Willamette.

¹⁰ Program combined with Lehigh Valley.

¹¹ State agency took over the functions of this program.

¹² State does not have an air pollution control program.

¹³ Program combined with Hamilton County.

¹⁴ Program combined with Roanoke County.

¹⁵ Program combined with Puget Sound.

¹⁶ Program combined with Olympic.

Mr. ROGERS. I would like to have that. I would like for the record, too, what State agency is responsible for implementing the act. Do we have a State agency in every State now to implement the act?

Dr. MIDDLETON. Mr. Rogers, each Governor has been asked to designate the responsible person in his State so far as his obligations to the Secretary of HEW for compliance with the Clean Air Act are concerned.

We do have that and do work through those people.

Mr. ROGERS. Have they done this in all States?

Dr. MIDDLETON. Each of the States that has an air quality control region or has an air pollution control program grant must have a designee, and we have a list of the Governors' designees who have responsibility for air pollution control matters.

If your question relates to another point, namely, is there a single State person who is going to be responsible for the abatement and control of air pollution in each air quality control region, this has not been designated in all States because that point in the mechanism has not been reached. But it will be necessary, as States adopt their standards and implementation plans, to spell out who will be responsible for the actual abatement and control activity.

That comes largely with the development of the implementation plans and their submittal for approval by the Secretary.

At that time, we will know who is specifically responsible, Mr. Rogers.

Mr. ROGERS. How many States have that setup now? In how many States do we know who is responsible for air pollution control in the State?

Dr. MIDDLETON. I can supply for the record a list of the States that have statewide air pollution control activities and the persons involved. I can recite a number of them right now.

(The following information was received for the record:)

STATE AIR POLLUTION CONTROL OFFICIALS

ALABAMA

Dr. Ira L. Myers, State Health Officer, Department of Public Health, State Office Building, Montgomery, Alabama

ALASKA

Dr. Donald K. Freedman, Director, Division of Health, Department of Health and Welfare, Pouch H, Juneau, Alaska

ARIZONA

Dr. Louis C. Kassoth, Commissioner of Health, Arizona State Department of Health, 4019 N. 33d Avenue, Phoenix, Arizona

ARKANSAS

Mr. S. Ladd Davies, Director, Arkansas Pollution Control Commission, 1100 Harrington Avenue, Little Rock, Arkansas

CALIFORNIA

Mr. John A. Maga, Executive Officer, California Air Resources Board, 1400 10th Street, Sacramento, California

COLORADO

Dr. Roy W. Cleere, Director of Public Health, Department of Public Health, 4210 E. 11th Avenue, Denver, Colorado

CONNECTICUT

Dr. Franklin M. Foote, Commissioner of Health, Connecticut State Department of Health, 79 Elm Street, Hartford, Connecticut

DELAWARE

Mr. Austin N. Heller, Executive Director, Delaware Water and Air Resources Commission, P.O. Box 916, Dover, Delaware

DISTRICT OF COLUMBIA

Dr. Raymond L. Standard, Director of Public Health, District of Columbia Department of Public Health, 1875 Connecticut Avenue, N.W., Washington, D.C.

FLORIDA

Mr. Vincent D. Patton, Director, Florida Air and Water Pollution Control Commission, Suite 400, 315 S. Calhoun Street, Tallahassee, Florida

GEORGIA

Dr. John H. Venable, Director, Georgia Department of Public Health, 47 Trinity Avenue, S.W., Atlanta, Georgia

HAWAII

Dr. Walter B. Quisenberry, Director of Health, Department of Health, P. O. Box 3378, Honolulu, Hawaii

IDAHO

Dr. T. O. Carver, Administrator of Health, Idaho Department of Health, 512 W. State, Boise, Idaho

ILLINOIS

Dr. Franklin O. Yoder, Director of Public Health, Illinois Department of Health, Springfield, Illinois

INDIANA

Dr. A. C. Offutt, Chairman, Indiana Air Pollution Control Board, 1330 W. Michigan Street, Indianapolis, Indiana

IOWA

Dr. Arnold M. Reeve, Commissioner of Public Health, Iowa State Department of Health, Lucas State Office Building, Des Moines, Iowa

KANSAS

Mr. Howard Seiger, Executive Secretary, Kansas Air Quality Conservation Commission, State Office Building, Topeka, Kansas

KENTUCKY

Mr. Ralph C. Pickard, Executive Secretary, Kentucky Air Pollution Control Commission, 275 E. Main Street, Frankfort, Kentucky

LOUISIANA

Dr. Andrew Hedmeg, Chairman, Louisiana Air Control Commission, P. O. Box 60630, New Orleans, Louisiana

MAINE

Dr. Dean Fisher, Commissioner, Department of Health and Welfare, Augusta, Maine

MARYLAND

Dr. Edward Davens, Commissioner of Health, Maryland State Department of Health, 2305 N. Charles, Baltimore, Maryland

MASSACHUSETTS

Dr. Alfred L. Frechette, Commissioner of Public Health, Massachusetts Department of Public Health, 600 Washington Street, Boston, Massachusetts

MICHIGAN

Dr. Maurice R. Reizen, Director of Public Health, Michigan Department of Public Health, 3500 N. Logan, Lansing, Michigan

MINNESOTA

Mr. John P. Badalich, Executive Director, Minnesota Pollution Control Agency, Health Building, University of Minnesota Campus, Minneapolis, Minnesota.

MISSISSIPPI

Mr. Robert S. Wright, Executive Secretary, Mississippi Air and Water Pollution Control Commission, 416 N. State Street, Jackson, Mississippi

MISSOURI

Mr. James H. Bogle, Chairman, Missouri Air Conservation Commission, 112 W. High Street, Jefferson City, Missouri

MONTANA

Dr. John S. Anderson, Executive Officer, State Department of Health, Cogswell Building, Helena, Montana

NEBRASKA

Director, State Department of Health, Lincoln, Nebraska

NEVADA

Dr. Robert L. Brown, Acting Director, Division of Health, Department of Health, Welfare and Rehabilitation, 790 Sutto Street, Reno, Nevada

NEW HAMPSHIRE

Mr. Forrest H. Bumford, Director, New Hampshire Air Pollution Control Agency, 61 S. Spring Street, Concord, New Hampshire

NEW JERSEY

Dr. James R. Cowan, Commissioner of Health, New Jersey State Department of Health P.O. Box 1540, Trenton, New Jersey

NEW MEXICO

James G. Jasper, Executive Director, Health and Social Services, Department, P.E.R.A. Building, Room 518, P. O. Box 2348, Santa Fee, New Mexico

NEW YORK

Dr. Hollis S. Ingraham, Commissioner of Health, New York State Department of Health, 41 State Street, Albany, New York

NORTH CAROLINA

Mr. George E. Pickett, Director, Department of Water and Air Resources, Box 9392, Raleigh, North Carolina

NORTH DAKOTA

Dr. James R. Amos, State Health Officer, North Dakota State Department of Health, State Capitol, Bismarek, North Dakota

OHIO

Dr. E. W. Arnold, Director of Health, Ohio Department of Health, 450 E. Town Street, Columbus, Ohio

OKLAHOMA

Dr. A. B. Colyar, Commissioner of Health, Oklahoma State Department of Health, 3400 N. Eastern Avenue, Oklahoma City, Oklahoma

OREGON

Dr. Edward Press, State Health Officer, Oregon State Board of Health, 1400 S. W. Fifth Avenue, Portland, Oregon

PENNSYLVANIA

Mr. Thomas W. Georges, Secretary of Health, Pennsylvania Department of Health, P. O. 90, Harrisburg, Pennsylvania

PUERTO RICO

Dr. Ernesto Colon Yordan, Secretary of Health, Department of Health, Stop 19, Santuree, Puerto Rico

RHODE ISLAND

Dr. Joseph E. Cannon, Director, Department of Health, Rhode Island State Department of Health, State Office Building, Providence, Rhode Island

SOUTH CAROLINA

Mr. W. T. Linton, Executive Director, South Carolina Pollution Control Authority, J. Marion Sims Building, Columbia, South Carolina

SOUTH DAKOTA

Mr. Clell Elwood, Director, State Planning Agency, Pierre, South Dakota

TENNESSEE

Dr. Eugene W. Fowinkle, Commissioner of Public Health, Tennessee Department of Public Health, 727 Cordell Hull Building, Nashville, Tennessee

TEXAS

Mr. Charles R. Barden, Executive Secretary, Texas Air Control Board, Austin, Texas

UTAH

Dr. Paul R. Ensign, Acting Director, Utah State Division of Health, 44 Medical Drive, Salt Lake City, Utah

VERMONT

Dr. Robert B. Aiken, Health Commissioner, Vermont State Department of Health, P.O. Box 607, 32 Spaulding Street, Barre, Vermont

VIRGIN ISLANDS

Dr. Eric L. O'Neal, Commissioner of Health, Virgin Islands Health Department, Box 1442, Charlotte Amalie, St. Thomas, Virgin Islands

VIRGINIA

Mr. Richard W. Arey, Executive Secretary, State Air Pollution Control Board, Room 902, Ninth Street Office Building, Richmond, Virginia

WASHINGTON

Dr. Wallace Lane, Chairman, Washington State Air Pollution Control Board, 1510 Smith Tower, Seattle, Washington

WEST VIRGINIA

Mr. Herbert E. Jones, Jr., Chairman, West Virginia Air Pollution Control Commission, 4108 MacCorkle Avenue S. E., Charleston, West Virginia

WISCONSIN

Mr. L. D. Voigt, Secretary, Department of Natural Resources, P.O. Box 450 Madison, Wisconsin

WYOMING

Dr. Lawrence J. Cohen, Director, Wyoming Department of Public Health, State Office Building, Cheyenne, Wyoming

Mr. ROGERS. How many of the States would you think have done this? What would be your estimate, and I realize you will furnish the facts.

Dr. MIDDLETON. I would rather give you a list for the record.

Mr. ROGERS. I understand that and I will accept that but what is your estimate now of how many States have this? Would it be 10? Twelve? Twenty?

Dr. MIDDLETON. I would say more likely a third do have State air pollution control designees and most of them are already listed in this Directory of Governmental Air Pollution Control Agencies.

Mr. ROGERS. What you are telling me is the States are not doing very much.

Dr. MIDDLETON. I am telling you the levels of air pollution control in this country are generally poor. There are some States that are outstanding in what they have done and there are some States that are outstanding in not doing anything about it.

Mr. ROGERS. I think we ought to know what the States are doing. It seems to me that maybe we are going to have to change this law to give some more authority and some more ability to the Federal department to do something.

We just can't keep waiting and waiting for some emphasis to be placed on these States where they are not doing it.

Now, what is the Department's thinking on this? Surely you must have looked at this problem.

Dr. STEINFELD. Well, we share your concern. Number one, ideally, there would be this cooperation, that the States and the citizens of the States are as concerned as we are about the quality of air they breathe.

Clearly, if within a reasonable period of time, and I don't know yet what a reasonable period is, if we could not achieve the goals we must, then we are going to have to seek other legislation and other authority.

Mr. ROGERS. Now, we started out with this new approach in what year? 1967?

Dr. MIDDLETON. November 1967.

Mr. ROGERS. And here we don't even have State agencies responsible in how many areas?

Dr. MIDDLETON. No, that is not quite correct, Mr. Rogers. Maybe I wasn't responding faithfully to the intention of your question.

I believe every State but South Dakota has a mechanism for a statewide air pollution control activity.

The degree of control, speaking to Dr. Carter's questions to where is air pollution actually being controlled, this is variable across the country.

What we are saying, and Dr. Steinfeld, I thought, had emphasized, is that the States are accepting their primary responsibility.

There are only two States that have failed to meet the very tight deadline on submitting their standards based on the criteria.

I think that is a very significant step forward on the part of the States.

Mr. ROGERS. Only two States have not met it?

Dr. MIDDLETON. All of those that have air quality control regions and are obliged to respond—

Mr. ROGERS. Which is how many?

Dr. MIDDLETON. I think the last count was 12 States had to have their standards in by early November. Only two have failed to comply.

Mr. ROGERS. You mean two out of 12 haven't even complied? Now, we have 50 States. You are telling me this is a great program because 12 have complied?

Dr. MIDDLETON. I am telling you I think it is excellent that the States have sent in standards that seem to be as good as they are. They are saying that they are willing to have a program. The real payoff now is: what kind of an implementation plan will they have, to assure that they attain those standards?

Mr. ROGERS. What about the rest of the States that are not within the 12?

Dr. MIDDLETON. The rest of the States, Mr. Rogers, as you can see from the appendix that Dr. Steinfeld gave you, will respond as their due date occurs. I am saying that the States are interested in responding to the standards-setting process and the publication of criteria. The designation of air quality control regions is the mechanism that is now bringing them forward in establishing standards and an implementation plan.

I expect that all of the States that will have air quality control regions, and by the end of the summer this will be all 50 States, will, within 15 months of that time, whenever their particular number comes up, have standards adopted and an implementation plan.

Mr. ROGERS. So you anticipate that 15 months from—well, it is about 2 years, I guess, is it?

Dr. MIDDLETON. About two years from now.

Mr. ROGERS. Every State will have an air pollution control mechanism.

Dr. MIDDLETON. They will necessarily respond to the requirement that they provide standards for the pollutants on which criteria are published and an implementation plan which states their emission reduction strategy and the way in which they are going to get the standards attained, over what period of time.

In the meantime, we will publish more criteria, and the States will continue with the standards development process, depending on the date on which they were designated for their air quality control region. So you have engaged at different times, different calendar dates, the States' activity across the country.

Mr. ROGERS. Is this an adequate schedule, do you feel, to meet the problem?

Dr. MIDDLETON. This is a schedule that we have developed with the manpower and resources that we have, and we think it is a truly meaningful approach in involving the public, in getting good standards and realistic implementation plans.

Mr. ROGERS. Is it sufficient?

Dr. MIDDLETON. I think, until we can show that it has not worked, that this is a sufficient plan, and I have no reason to think that what the Clean Air Act provides as a format is going to fail. I think it is going to succeed.

Mr. ROGERS. You think this is the best approach to use, the way we are moving?

Dr. MIDDLETON. I think that the establishment of standards based on air quality requirements, what you, I, and our society will tolerate, which will be protective of the health and welfare, is the best way to establish an air quality control program.

To establish an air quality control program on another basis would mean, that if there are groups of related industries with uniform control levels, that the quality of air in that region would be different than if there were a different complex of industries. It is to this point that Dr. Steinfeld said the report on national emission standards will speak.

But the concept in the Clean Air Act, which your bill proposes to extend, namely, that health and welfare should be factors in making decisions on air quality, I think is the correct way to go forward.

Mr. ROGERS. What I am saying is: is it correct to allow the setting of those standards to be done as it is? Is it too ponderous a way? What about enforcement, to see that they are complied with? Is this proposal provided for or should changes be made?

Dr. MIDDLETON. I, perhaps, share some of your misgivings on whether it will work uniformly well everywhere, but so far there is no evidence to say that it will not.

Mr. ROGERS. Well, there is no evidence to say that it will, either, is there?

Dr. MIDDLETON. Yes, there is evidence to say that it will work well.

Mr. ROGERS. Where?

Dr. MIDDLETON. Based on the standards that have come in and the fact that—

Mr. ROGERS. In enforcement?

Dr. MIDDLETON. The fact that there are implementation plans now being developed. There are workshops being held, one going on in North Carolina this week, another in Kansas City, Mo., in another week, and another one in San Francisco, Calif., where the air pollution control authorities are being brought together by the National Air Pollution Control Administration so they can understand how one builds an implementation plan that will be responsive to the standards adopted.

Mr. ROGERS. Well, I am not talking about planning. There is no present well-conceived operating enforcement plan really in this country, is there, except perhaps where in California you may have it, and maybe some in New York.

Dr. MIDDLETON. I was speaking only about the Clean Air Act and your bill, not about the level of State actions that are going on in various places. There are several States that have meaningful air pollution control programs today.

Mr. ROGERS. What are they?

Dr. MIDDLETON. New Jersey. New York. Pennsylvania is beginning to have one. California, while it seems to be in the forefront, is just now beginning to have a statewide program. Before that, it was strong in the counties.

Mr. ROGERS. And this has not been brought about by the Clean Air Act or your activity?

Dr. MIDDLETON. Those States that I enumerated had air pollution control activities going on at the time the amendments were made to the Clean Air Act in 1967.

Mr. ROGERS. Did they have standards?

Dr. MIDDLETON. Some of them did.

Mr. ROGERS. If they didn't how could they control things? You say they are controlled.

What do you mean, "some of them"?

Dr. MIDDLETON. They control various pollutants to various extents, differently in different places.

The Clean Air Act provides a basis for being assured that wherever people are, they will be entitled to a quality of air that protects them from adverse effects on health and welfare.

Mr. ROGERS. I understand that, but I am saying: what are these States doing, if they have a standard, it is already established, even before the Clean Air Act was passed, in what areas?

Dr. MIDDLETON. With very few exceptions, there have been very few States that have been able to get the air quality down to the standards they have adopted. The thrust of the Clean Air Act and the implementation plan is to assure that they do.

Mr. ROGERS. Well, this is what I am trying to get at. We are not doing it, and I don't want you to tell me that we are doing something if we are not doing it.

You tell me the States really are not doing it, and this is what the Clean Air Act is supposed to do.

Dr. MIDDLETON. Mr. Rogers, I was trying to speak clearly and apparently I am not, and I am sorry.

In the case of the implementation of the Clean Air Act and its most recent amendments, we have made a good beginning and everything looks right. We have not had the 15 months elapse in any one place to be sure that the implementation system is actually going to work. We think that it will.

On the other side, I was speaking to you about States, apart from the Clean Air Act, what their standards are and what their degree of achievement is. I am saying that is variable.

I am also trying to say that the Clean Air Act provides a way for the States to have meaningful standards and implementations across the country, not just spotty, where a State may elect to do something about it.

Mr. ROGERS. But only 12 States presently have it under the Clean Air Act.

Dr. MIDDLETON. That is true. That is a matter of timing. If you will refer to the appendix, you can see the next set of States that will have to become involved.

We have no indication that the States have failed to comply with the requirements of the Clean Air Act. Only two States have asked for an exception and a delay.

Mr. ROGERS. I see Los Angeles under Status of Air Quality Control Region hasn't even submitted its standards. Is that true?

Dr. MIDDLETON. They have asked the Secretary for a delay.

Mr. ROGERS. What is California doing? Here I thought they were way ahead and now they are getting a delay in setting their standards.

Dr. MIDDLETON. They are asking for a delay so they can take care of some technical details in the submission of their standards to the Secretary.

Mr. ROGERS. If these standards have been set by States and other areas, why is it so difficult for us to set standards?

Dr. MIDDLETON. I think the reason that the States are responding as well as they have, and the fact that the standards—

Mr. ROGERS. I don't agree with you "as well as they have." I don't think they are responding at all.

Dr. MIDDLETON. I think that the public understanding that they want to be protected from the adverse effects of air pollution is driving the standards down in the States to levels that are better than could be achieved through some other mechanism.

Public involvement in making public decisions, meaningful activity in a forum, which is the public hearing, is a good way to have a participatory democratic system in arriving at good standards.

Mr. ROGERS. Yes, but when?

Dr. MIDDLETON. Within 15 months of when they are obliged to, under the requirements of the Clean Air Act.

Mr. ROGERS. You are telling me then, in 15 months we will have an effective, enforceable program in those 12 States?

Dr. MIDDLETON. That is what I am trying to tell you.

Mr. ROGERS. You really believe that?

Dr. MIDDLETON. I really believe that. If you wish to phrase it that directly, I am obliged to say that every evidence we have from the States so far involved is that they have every intention of doing what the Clean Air Act expects them to do; but to say that they will at this time, Mr. Rogers, is something that I can only express confidence in.

Mr. ROGERS. I understand. Now, you mean they will actually begin enforcing air quality standards?

Dr. MIDDLETON. When the Secretary finally approves the standards and the implementation plan, that is the date zero for the beginning of the implementation plan. They start to work, if they have not already done so, and many States have already done something.

Mr. ROGERS. I am talking about enforcement now.

Dr. MIDDLETON. Enforcement begins when the implementation plan is accepted.

Mr. ROGERS. What does this require, enforcement, as far as fuel additives?

Dr. MIDDLETON. In the case of fuel additives, this would be a Federal registration program.

Mr. ROGERS. Be what?

Dr. MIDDLETON. This is a part of the Federal activity, not a part of the State activity.

Mr. ROGERS. Then they won't be doing anything about fuel additives, is that right?

Dr. STEINFELD. Mr. Johnson wants to add something.

Mr. JOHNSON. Mr. Rogers, I think we are both saying a little bit of the same thing and both going a little bit divergent.

Many States, even right now, are enforcing air quality control standards. There are those that they have developed on the basis of such criteria or such leeway as they want to make. New York State has air quality control standards. New Jersey has them.

The difference is that, now, under the Clean Air Act we have a different basis for setting these, and some of these will be modified and some of them may be the same.

We are talking about point source emission standards. As they begin to analyze and see just what quality of air they will have to have under the criteria, they may have to alter some of these point source emission standards so that they come about according to their analysis and evaluation with the quality of air that the criteria call for.

So Dr. Middleton has been trying to say that we are not really starting from scratch, but that we are bringing a little more uniform order out of the way in which we have been doing business. As we progress along this line, we are going to have a stronger air quality enforcement agency in these 12 regions that have been designated, simply because they will have decided, in terms of criteria that have been developed, what quality of air that they want, meeting the requirement of the Federal Government, the Secretary of HEW.

I think that this does give us a tool, an administrative process that we have never had before, and I don't think that we have had an opportunity yet to see whether it will or will not work, but we have every confidence, particularly with the cooperation and the coordination that we have been getting so far, that we have a good tool to work with.

Mr. ROGERS. Then you are telling me the States can't do anything until you develop fuel additive standards, criteria?

Mr. JOHNSON. We have mixed fuel additives now and the overall question of air quality control regions and criteria. Right now, we have criteria for sulfur oxides and criteria for particulate matter. When we start talking about fuel additives, we are in another area of concern.

Mr. ROGERS. Which you haven't decided yet.

Mr. JOHNSON. Which is a Federal-level responsibility that has to do with mobile sources of pollution, which at this point in time is still being considered from a—

Mr. ROGERS. Yes, you have not acted, so the States in that degree must wait until the Federal Government acts.

Mr. JOHNSON. Ordinarily, the States have not handled the mobile pollution source, because the Clean Air Act reserves this authority and responsibility to the Federal Government.

Mr. CARTER. Mr. Chairman, if the distinguished gentleman will yield on that—

Mr. ROGERS. Yes.

Mr. CARTER. I believe the fuel additive that we talk about mostly is tetraethyl lead, and I believe that at the present time you are working on a level or standard for that.

Mr. JOHNSON. That is correct.

Mr. CARTER. And that you will announce it sometime in the near future.

Mr. JOHNSON. That is correct. I think we have a little difficulty in separating standards from criteria.

Mr. CARTER. Yes.

Mr. JOHNSON. And, basically, at the Federal level, we develop and promulgate criteria. Standard-setting is generally the responsibility of the State and local authorities. We are doing a study on lead in the environment, a great deal of which comes from the automobile, but there are many other sources of lead.

One of the reasons why the Consumer Protection and Environmental Health Service was created was to make certain that we didn't have blinders on when dealing with a pollutant. We have lead in our water, we have lead in our food, we have lead in occupational exposures, and we get lead from automobiles, and so when we concern ourselves with lead, we have to look at the totality of the impact that it has on the environment, and it will greatly influence the kind of position that we take with respect to the automobile.

Mr. CARTER. So far as additives are concerned, that is a little bit different from what you mentioned.

Mr. JOHNSON. That is right.

Mr. CARTER. We might add that we have a lot of concern about lead in wallpaper, and paint, and so on.

Mr. JOHNSON. That is correct.

Mr. ROGERS. What is the expertise of the States in their air control program, the personnel involved?

Mr. JOHNSON. I believe there are about 3,000 people involved, throughout the country, at the State and local levels.

We think this, perhaps, is only about 25 percent of what we will need over the next 5 years. We are still considering this. We have good manpower training programs. We have need for a big spread, from technicians to Ph.D.'s, and we will be making a report to the Congress on manpower needs.

Mr. ROGERS. Someone advised me in the State of Ohio it is reported they only have one person with proper expertise working on air pollution. Are you aware of that, Dr. Middleton?

Dr. MIDDLETON. All too well aware of that.

Mr. ROGERS. Is that generally true?

Dr. MIDDLETON. Fortunately not.

Mr. ROGERS. Where are the worst areas?

Dr. MIDDLETON. The numbers of personnel varies, of course, depending on whether you are referring to a State agency or a local agency.

In the State of Ohio, there is a low level of personnel participation, According to this publication for 1969, in Ohio there are a chief engineer and engineer-in-charge, Mr. Eagle and Mr. Wunderle, plus seven additional people. Since the State of Ohio will have more of the first 57 air quality control regions in it than any other State in the Nation, there will be difficult times unless there are more people involved in this activity.

Mr. ROGERS. I think if you could give us a run-down on the capability of the States, we would be interested in that.

(For the information requested see p. 102.)

Mr. ROGERS. Let me ask you this, Dr. Steinfeld.

You say auto prototypes may prove out, but then from the production line of the automobile you find this doesn't necessarily hold up.

Dr. STEINFELD. We don't have the actual production models tested. In a program initiated and still conducted with our support, California has tested privately owned cars. Projections based on these tests indicate that the rate of emission of hydrocarbons is approximately 15 percent higher than that of the prototypes at 50,000 miles and carbon monoxide 20 to 25 percent.

Mr. ROGERS. Let me ask you this. When you get the prototype, you issue a certificate of acceptability, is it? Would that be correct?

Dr. MIDDLETON. Certificate of compliance.

Mr. ROGERS. Of compliance.

Do you ever revoke those certificates of compliance?

Dr. STEINFELD. Have we?

Mr. ROGERS. When you find out it has not held up in the production?

Dr. STEINFELD. Is the question, "Have we ever revoked one?" or "Would we consider revoking?"

Mr. ROGERS. Have you ever revoked one?

Dr. STEINFELD. The answer is "no, we have not."

Mr. ROGERS. Do you have such authority?

Dr. MIDDLETON. The question of revoking may not be pertinent, because it is whether or not one issues a certificate, since this concerns new vehicles.

Mr. ROGERS. Yes, but you are issuing it on a prototype. You issue it—and this is the question I am asking—then they produce. You don't check production, but suppose you did check it and you found it didn't meet the standard that they said they were maintaining on your prototype.

Would you in that instance revoke their certificate of compliance?

Dr. STEINFELD. You have hit an area that we see as needing not only study but some action, and I think with the appropriate action, we will have that authority and will do so.

Mr. ROGERS. Do you have at present authority to do that?

Dr. STEINFELD. I don't know that we do. This is another matter we have to take up with the General Counsel.

Mr. ROGERS. The committee wants to know some of these, and we expect you to come here and let us know. I realize you have a lot of decisions to make and we want to work with you and try to be helpful. But we can't get answers always postponed. We need to know.

We are going to start writing the law and I wish you would check with your general counsel over lunch, because I understand from the Chairman we are going to reconvene; and let's get some answers to these things. The committee needs them.

I want to know that, and if you have the authority to do it and what authority you need, if you do need authority, to actually get from the production line cars for testing.

Do you need additional authority from the law or do you have present authority?

Dr. STEINFELD. Well, this is one of the proposals we have under consideration.

Mr. ROGERS. No, I am asking: Does the present law give you authority? I know you may not have done it yet.

Dr. STEINFELD. I will check with the General Counsel as soon as we break.

Mr. ROGERS. All right. We should like to know that.

Those two points I would personally like to know.

Also, any suggestions in funding.

What about research? Are you still doing your budget of about 3.4 percent on the automobile emission problem, or has there been any change there?

Dr. STEINFELD. We are reviewing the budget in terms of the automobile emission problem. My personal feeling is that the dollars expended and the effort in that direction are going to increase in the next year, not only through the Federal initiative but in private industry, as well.

We see this as an area that must be emphasized, and it needs greater attention.

Mr. ROGERS. Because we went into this in June of this year in the extension of section 104.

Dr. MIDDLETON. Extension of section 104?

Mr. ROGERS. Yes. That was done earlier. We passed that to give you all the authority. Yet, on a 60 percent rate, we only spend \$3.2 million for research.

Dr. STEINFELD. That is not right.

Mr. ROGERS. It isn't right and we have to have a change, but we keep talking about it and I don't see any reflection of a change yet. I hope you will let us know about that.

Dr. STEINFELD. It will come.

Mr. ROGERS. I notice a report saying that 11 Chicagoans, nine of them infants, died of tracheal bronchitis in a 7-day period after sulfur dioxide pollution in the city rose to critical levels from November 14 to November 20 of this year. Evidently sulfur dioxide pollutants in Chicago rose above 25 parts a million.

Do Chicago and Illinois have a great State program of air pollution control, Dr. Middleton?

Dr. MIDDLETON. The State of Illinois has submitted standards that are most gratifying. The city of Chicago has had an air pollution control activity for some years. It is well-conceived, well-planned, and they are at that difficult point that you keep enunciating so well and I am so pleased to hear, of really getting down to the guts of the issue—are they going to turn something off or not at a critical time? This is what Chicago is faced with today. The plan that is conceived to deal with such situations is very often a voluntary compliance plan.

In this event, it may not have worked as well as it should, so the implementation plan that has to come in from Illinois will have to have provisions for action to be undertaken at various established levels, and if the National Air Pollution Control Administration finds that appropriate action is not taken, then we will see that the appropriate action is taken, both under the emergency provisions of section 108(k) of the Clean Air Act or section 108(e), which relates to development of the implementation of the plan.

So we do have a mechanism by which the Clean Air Act, as amended, can be invoked in the State of Illinois.

Mr. ROGERS. But presently it is on a voluntary basis.

Dr. MIDDLETON. Presently it is within the plan established by the city of Chicago, which, at various levels, asks for certain actions to take place.

Mr. ROGERS. Is this generally true in the 12 States where you have your plan, a voluntary action plan?

Dr. MIDDLETON. Every State that submits an implementation plan must have a plan for action to deal with emergency situations. In some States, they now have such an action plan. The State of New York, for instance, has. The State of New Jersey has an episode plan whereby certain things must take place.

Other States do not.

Mr. ROGERS. It is a compulsory plan?

Dr. MIDDLETON. No.

Mr. ROGERS. Well, now, that doesn't get the answer I want.

I want to know if it is compulsory or voluntary. There is a great deal of difference.

Dr. MIDDLETON. I am saying that under the Clean Air Act, the implementation plan must include such a plan of action.

Mr. ROGERS. That is not quite my question. I am saying: Do they have now a compulsory plan?

Dr. MIDDLETON. In some places, they may. In some places, they do.

Mr. ROGERS. They may. Do they?—is my question.

Could you let us know this afternoon those that do and those that don't, of the 12 States that you say have their plan?

In other words, I think we don't want to get into so many mechanics here that we are not getting to the problem. If we need to do something on this and bring some compulsory provisions, we may have to do it and I don't want to get in the position of saying, "Well, yes, and we may, and we are going to do it," but then I find out that we are not doing it.

We need to move.

Dr. MIDDLETON. Mr. Rogers, the fact that the Nation's air pollution problem is as bad as it is substantiates your point that there has not been much air pollution control. What we are trying to do with the Clean Air Act is see that there is.

Mr. ROGERS. That is why we are holding these hearings, to find out why we are not, and what we ought to do on this side to help you do the job.

So I need to get from you, and this committee needs to get from you, what really needs to be done. We are not trying to be critical of you. I think you are doing a good job with what facilities you have. I don't think you have enough, and we are trying to be helpful, but you must tell us not what someone is going to do or paint a rosy picture.

I want you to give us the rough picture, so we will know how to help you the best we can in this legislation.

Thank you very much, Mr. Chairman.

Mr. JARMAN. Let the Chair announce that the committee is requesting the continuance of hearings at two o'clock this afternoon, even though the House is in session, so the subcommittee will stand in recess until two o'clock.

Mr. CARTER. Mr. Chairman, just one point.

Dr. Steinfeld, how long have you been Acting Surgeon General, if you please, sir?

Dr. STEINFELD. About three weeks, I think.

Mr. CARTER. We are requiring a lot of you, it seems, and it reminds me of a youngster who spent his first day in school. He evidently came from a broken home, and the language he had been used to hearing hadn't been too good. His teacher asked him, "Son, do you know your ABC's?"

He said, "Well, hell, no, I have not been here five minutes."

So really, we couldn't expect you to know all of these things, could we?

Mr. ROGERS. If the gentleman would yield?

Mr. CARTER. Yes, sir.

Mr. ROGERS. Of course I understand Dr. Steinfeld's position, and I would not expect him to know, and that is why he has with him Dr. Middleton and Mr. Johnson, who have been here a number of years and are quite familiar with the program.

I would not expect the Doctor to have all the answers, but I think he has done very well.

Dr. STEINFELD. Thank you.

Mr. JARMAN. The presentation has been excellent this morning, and we will continue the hearing at two o'clock this afternoon.

(Whereupon, at 12:08 p.m. the subcommittee recessed, to reconvene at 2 p.m., the same day.)

AFTER RECESS

(The subcommittee reconvened at 2 p.m., Hon. Paul G. Rogers presiding.)

Mr. ROGERS. The subcommittee will come to order, please. I think we will go ahead and continue. The other members of the committee are coming in shortly.

I think first of all we might as well get your responses to the question we asked you to check for us.

Dr. STEINFELD. I think one of the questions related to whether or not we have authority to do anything about the automobiles that are produced on the production line, if they do not perform as well as the prototypes.

In talking with the people in the General Counsel's office, I find that there is clear cut disagreement as to whether or not we have that authority.

I think it is very clear that we need additional regulatory authority which will be more explicit, so that there will be no question.

Mr. ROGERS. Would you submit the necessary language to the committee of what you think would give you sufficient authority?

Dr. STEINFELD. We will do that. (See statement for the record on p. 55 this hearing.)

Mr. ROGERS. We will also check that out.

Authority in other words, to make spot checks from the production line, so you can see if they are meeting the standards supposedly set by the prototype.

Dr. STEINFELD. I think there are a number of things, including whether the manufacturer or government makes the checks and what deviation would be permitted.

Mr. ROGERS. I would presume you would want the authority to make your own checks. I think you may want them to set up a system of checking but I would think you would want the authority to spot check.

Right then at that point, let me ask you this: In the prototype that is submitted, do they always meet the standard?

Dr. MIDDLETON. We have never had any prototype fail.

Mr. ROGERS. You have never had a failure from a prototype as far as the standards on the emissions are concerned?

Dr. MIDDLETON. They may have failed somewhere in the system, but by the time they are required to finish their durability test of 50,000 miles, there has never been one turned down.

They have always complied.

Mr. ROGERS. I am not sure. You mean they might not meet it at first, but they must have a fifty thousand mile—

Dr. MIDDLETON. Yes, the certificate of conformity, Mr. Rogers, is based on a number of things. A number of hurdles have to be jumped over successfully.

One of them is a first test at 4,000 miles. The last one is a test of the durability of the system. If, in the interim between 4,000 and 50,000 miles it does not pass one test, the system may be further refined or maintenance done such that the automobile that is finally supplied does pass.

So, the prototypes have been successful. There is a need for a change in the manner of testing, a change that probably would mean some failures, and these failures would be based on a more stringent test procedure.

Mr. ROGERS. Is this test made by you or the company?

Dr. MIDDLETON. The durability test is performed by the company in our behalf and the data supplied for us to check out.

Mr. ROGERS. Do you supervise such tests?

Dr. MIDDLETON. We do not supervise the actual durability tests, but the test data are given to us, and we make some tests in our own laboratory.

When we get a car that is said to pass, we validate this and we find that they do pass.

Mr. ROGERS. So you have no question, as far as you are concerned that the prototypes are meeting the standards you have set?

Dr. MIDDLETON. Yes, sir.

Mr. ROGERS. Although you don't know if the production line actually meets those same standards, because you have not tested those. Is that right?

Dr. MIDDLETON. We do not know that because we don't test production line cars, yes, sir.

Mr. ROGERS. Do any of the companies test those cars, or do you know?

Dr. MIDDLETON. I do know that in the Los Angeles area General Motors at least has a plan where by they do check some of their own cars on the production line or slightly after wards.

Mr. ROGERS. Is this information given to you?

Dr. MIDDLETON. I do not have this information, no.

Mr. ROGERS. Have you requested this?

Dr. MIDDLETON. I have not requested it for validation purposes, no.

Mr. ROGERS. Is there any reason why you should not ask the companies to do this on their own and let you have their findings?

Dr. MIDDLETON. No. In owner fleets, we know what is happening. But we don't have data on cars off the production line, though we could ask for that.

Mr. ROGERS. Why not? Wouldn't it be helpful?

Dr. MIDDLETON. I am sure it is available to us.

Mr. ROGERS. I would think you would want to ask for it to see if it is meeting the standard.

Dr. MIDDLETON. We would like not only to have the information, but also have that a part of our compliance and conformity actions.

Mr. ROGERS. Can you do that under present authority, simply by an administrative change?

Dr. MIDDLETON. It could be contested. We think it would be better to make it explicit.

Mr. ROGERS. In the law?

Dr. MIDDLETON. Yes.

Mr. ROGERS. You will let us have the suggested language?

Dr. MIDDLETON. Yes.

(The following information was received for the record:)

STATUTORY LANGUAGE FOR TESTING AUTOMOBILES COMING OFF
ASSEMBLY LINES

Statutory language providing for testing of automobiles coming off assembly lines was requested for inclusion on pages 53 and 54 of the hearing. Section 3 of H.R. 15848, which is attached, would authorize such testing. H.R. 15848 reflects the proposals made by the President in his February message to the Congress on environmental problems.

TESTING OF MOTOR VEHICLES AND ENGINES

SEC. 3. (a) Subsection (a) of section 206 of such Act (42 U.S.C. 1857f-5) is amended by striking out in the first sentence thereof "Upon application of the manufacturer, the" and inserting in lieu thereof "The"; by striking out "such manufacturer" and inserting in lieu thereof "the manufacturer"; and by inserting after "not less than one year" in the second sentence thereof "(except as provided under subsection (c))".

(b) Subsection (b) of such section is amended by inserting before the period at the end of the sentence " , except as provided in subsection (c)".

(c) Such section 206 is further amended by adding after subsection (b) the following new subsections:

"(c)(1) In order to determine whether new motor vehicles or new motor vehicle engines being manufactured by a manufacturer are in fact constructed in all material respects substantially the same as the test vehicle or engine, the Secretary is authorized to test such vehicles or engines. Such tests may be conducted by the Secretary directly or, in accordance with conditions specified by the Secretary, by the manufacturer.

"(2) If, based on such tests conducted on a representative sample of such vehicles or engines, the Secretary determines that such vehicles or engines do not conform with the regulations in effect on the date the certificate of conformity was issued, he may revoke such certificate and so notify the manufacturer. Such revocation shall apply in the case of any new motor vehicles or new motor vehicle engines manufactured after the date of such notification and until such time as the Secretary finds that vehicles and engines being manufactured by the manufacturer do conform to such regulations.

"(d) For purposes of enforcement of this section, officers or employees duly designated by the Secretary, upon presenting appropriate credentials and a written notice to the manufacturer, are authorized (A) to enter, at reasonable times, any factory, or other business or establishment, for the purpose of conducting tests of vehicles or engines coming off the production line, or (B) to inspect, at reasonable times, records, files, papers, processes, controls, and facilities used by such manufacturer in conducting tests under regulations of the Secretary. A separate notice shall be given for each such inspection, but a notice shall not be required for each entry made during the period covered by the inspection. Each such inspection shall be commenced and completed with reasonable promptness."

(d) The heading of such section 206 is amended to read:

"COMPLIANCE TESTING AND CERTIFICATION".

(e) Paragraph (1) of subsection (a) of section 203 of such Act (42 U.S.C. 1857f-2) is amended by striking out "it is in conformity with" and inserting in lieu thereof "such manufacture is covered by a certificate of conformity issued (and in effect) under".

(f) The amendments made by this section shall apply in the case of motor vehicles and motor vehicle engines manufactured after the month in which this Act is enacted.

Mr. ROGERS. You were going to check another matter for me, too.

Dr. MIDDLETON. It is the question of whether the States are actually able to abate and control air pollution to prevent episodes. In case there is any misunderstanding about the urgency to do something about air pollution I must say that your interests match my own.

This country is far past the point where there should be any question about controlling air pollution. The question I believe you were raising was what compulsory action States can take to do something about air pollution in an episodic event?

I do find that, as suggested, the State of New Jersey, Los Angeles County, and the City of New York do have compulsory programs under which in the event of episodes, there are defined the various levels at which certain actions will take place.

The State of Pennsylvania has something that is similar to this, in which the industries indicate what their plans of action are to the Governor, and then apparently there is some later option as to whether they shall be, in fact, implemented.

So it is variable among these four States. So far as I know, that is the extent, at this time, within existing State control programs of any compulsory plan for this sort of an activity.

Mr. ROGERS. So it really is not very much nationwide.

Dr. MIDDLETON. Nationwide. One State "maybe," and the rest "no."

(The following information was received for the record:)

STATES AND TERRITORIES WITH STATUTORY AUTHORITY TO TAKE EMERGENCY ACTION TO CURTAIL AIR POLLUTION EMISSIONS

Thirty-eight States and Puerto Rico and the Virgin Islands have basic statutory authority to take emergency action to curtail air pollutant emissions when adverse meteorological conditions are producing or threatening to produce an episode of severe air pollution. Thus far, the only States that actually have developed emergency plans under which action to curtail pollutant emissions is compulsory are New Jersey and Pennsylvania. Among local air pollution control agencies, those serving New York City and Los Angeles County also have emergency action plans that involve compulsory cutbacks of pollutant emissions. Emergency plans providing only for voluntary action have been developed by the States of Illinois and New York, the City of Chicago, and the St. Louis Metropolitan area. The following is a brief description of these plans:

1. *New Jersey's* emergency action plan provides for identification of alert levels, control of emissions during each alert stage, and penalties for violations. Any person responsible for a major source of pollution must have standby plans that define specific actions to be taken at each alert level. These standby plans must be designed to reduce or eliminate emissions of contaminants into the atmosphere. The types of actions to be identified in the standby plans may be thought of as substantial pollution reduction at the first alert stage; maximum reduction at the second stage; and elimination of pollution at the emergency (third) stage. Violators are subject to penalties of up to \$100,000 and or 10 years in jail or both.

2. *Pennsylvania's* emergency episode plan is applicable to the urban areas of the State. It provides for the identification of four alert levels and control of emissions when such levels are reached. Air pollution sources located within the areas covered by the plan are required to submit an abatement plan to control their emissions during episode conditions. After a plan has been reviewed by the State, it becomes the official action plan.

3. *Los Angeles County's* plan provides for the declaration of alert levels and mandatory control of emissions during any alert stage. The plan also provides for periodic updating of abatement measures to be taken during emergencies.

4. *New York City's* plan calls for the identification of alert levels and abatement provisions during each alert stage. City departments are the first sources scheduled to reduce emissions. If the air pollution reaches the emergency alert level, the Mayor has authority to limit both public and private emission sources, including a ban on all but the most essential motor vehicle traffic.

5. *New York State's* voluntary emergency action plan provides for identification of air pollution alert levels and issuance, through the news media, of requests to take appropriate abatement action during alerts.

6. *The State of Illinois'* plan provides for identification of three alert levels, which are determined by specified criteria in combination with the Weather Bureau's issuance of a high air pollution potential advisory. Once an alert level has been reached, voluntary abatement actions are recommended.

7. *The City of Chicago's* emergency action plan provides for identification of three alert levels, which are identical to those of the State. When the first level is reached, electric utilities are requested to switch to low sulfur fuels or shift operations to non-urban stations. Municipal incinerators are requested to limit operations. During the second level, additional pollution sources are requested to curtail emissions. Abatement action during the third level consists of requesting further reduction in emissions.

8. *The St. Louis* area plan was developed for use in the St. Louis interstate metropolitan area. It provides for coordinated governmental activity, identification of alert levels, increased air monitoring, and voluntary air pollution abatement measures.

Mr. ROGERS. Which I think is indicative of the approach to the problem, because if we don't have any compulsion, I am afraid there is not going to be much done. Wouldn't you agree?

Dr. MIDDLETON. I agree. As I indicated in my testimony this morning, the implementation plans that will be required under the 1967 amendments will have to include some such plan, wherever there is an air quality control region.

Mr. ROGERS. Under the Clean Air Act, are you given the authority to go in and account, if State authorities do not, or the regional air authority does not?

Dr. MIDDLETON. Yes, we can act in several ways. In the event a Governor indicates that the State does not intend to adopt standards, then the Department may, through the procedure prescribed by the Clean Air Act, establish those standards.

In the event that standards and an implementation plan are adopted, and the implementation plan is not executed, in the interstate areas, the Secretary may act.

In the case of an intrastate situation, the Secretary can only act to carry out the implementation if the State asks for assistance.

Mr. ROGERS. Should you have more authority to act, do you feel?

Dr. MIDDLETON. It would appear that there may be a problem in intrastate areas, if States adopt standards and an implementation plan and then do not act on them, do not do anything. Unless the State asks the Federal Government to do something, then there is no recourse for the Federal Government.

Mr. ROGERS. Probably the State is not going to ask, if they have not acted themselves.

Dr. MIDDLETON. That is one of two options.

Mr. ROGERS. I think it is pretty obvious what the conclusion is there. So to be effective, I think you should have then as the last resort the right to go in to help clean up the air if it is necessary. Don't you agree?

Dr. MIDDLETON. I agree that the intent of the Clean Air Act is to have the States assume the responsibility. In the event of their failure, there should be recourse for the Federal Government to assist.

Mr. ROGERS. What do you think of that, Dr. Steinfeld?

Dr. STEINFELD. I agree, certainly.

Mr. ROGERS. I was thinking there was one other matter you were going to check. It was revocation of certificates.

Dr. STEINFELD. Counsel feels that we have authority to revoke certificates, but since they are optional certificates of compliance, we feel, as I said in the first part of the discussion, that more explicit regulatory authority is needed to take care of the problem.

Mr. ROGERS. You get reports you say from fleet owners? You got some reports.

Dr. MIDDLETON. The reports we have are from a contract we entered into with a car rental agency to obtain information for us. They provided cars, we developed the information.

Mr. ROGERS. What did that show?

Dr. MIDDLETON. It showed that there is a considerable degree of failure in a variety of makes and models.

Mr. ROGERS. How large is the failure?

Dr. MIDDLETON. It is fairly significant.

Mr. ROGERS. Would you let us know?

Dr. MIDDLETON. Yes, I could let you know. This is the information that Dr. Steinfeld referred to earlier. It is on a relatively small basis and we don't have it developed to the point where we can derive deterioration factors for hydrocarbons and carbon monoxide, but by just scanning the list, some information could be provided.

There are a number of failures by car companies and engine sizes. There is a difference in makes and models. But I would like to point out that this information is from fairly new cars and represents the rental car agencies, their renters' handling of the cars.

Mr. ROGERS. Who actually made the tests on these?

Dr. MIDDLETON. We made the tests on cars supplied to us by the rental agency. They have shown that, with one exception, all of those we have tested have failed either the hydrocarbon or carbon monoxide standard. But the data are such that I can't give you a percent default.

Mr. ROGERS. Give us the specifics there, if you could point out some.

Dr. MIDDLETON. I would be pleased to supply that. Would you like to have it now?

Mr. ROGERS. Yes, I think it might be interesting to the committee.

Dr. MIDDLETON. In the case of a Ford that is described as having a 289 cubic inch engine two barrel carburetor, 8.7 compression ratio, we tested 45 cars, and 18 of them failed both hydrocarbon and carbon monoxide emission regulations.

Mr. ROGERS. How badly?

Dr. MIDDLETON. The data are not presented in a way that I could give you the percent. I could derive that and supply it.

Mr. ROGERS. Can't you tell us what it is supposed to be and what it showed up to be without going into percentages? In other words is a certain standard, so many parts?

Dr. MIDDLETON. Grams per vehicle mile. Out of the 45 vehicles, 18 of those vehicles failed to pass—they failed to meet the standards.

Mr. ROGERS. You may not have measured what they failed in effect, but just simply it was over what it was supposed to be.

Dr. MIDDLETON. Of the 45, 18 percent failed hydrocarbon and carbon monoxide and 65 percent of them failed either.

Mr. ROGERS. 64 percent of the 45?

Dr. MIDDLETON. Yes. If you move to another kind of car, for instance, the Chevrolet, 307 cubic inch, 44 percent of the vehicles out of 34 tested failed to meet both hydrocarbon and carbon monoxide levels.

Mr. ROGERS. 34 out of how many?

Dr. MIDDLETON. 34 percent out of 45 cars failed to meet the tests, or another way of looking at it, 73 percent, almost three-quarters of that 34, failed to pass either hydrocarbon or carbon monoxide and if you take, as an example, a Chrysler product, 318 cubic inch with a two barrel carburetor, 9.2 compression ratio, we tested 48 cars, 4 percent of the cars failed to pass both the hydrocarbon and carbon monoxide and, 19 percent of the 48 cars failed either one, hydrocarbon or carbon monoxide.

Mr. ROGERS. On the Ford was that 18 failed or 18 percent?

Dr. MIDDLETON. I am sorry. I said before it was the number 18. It is 18 percent, to get the record straight.

Mr. ROGERS. 18 percent failed.

Mr. CARTER. Failed on one, combination 64 percent.

Dr. MIDDLETON. 64 percent of the 45 cars failed to pass either the carbon monoxide or hydrocarbon.

Mr. CARTER. General Motors, 44 percent failed in one classification and 73 percent failed both, failed either or both.

Dr. STEINFELD. Failed either one or the other.

Dr. MIDDLETON. There are other examples. A Ford, that is a 390 cubic inch, with a double carburetor 9.5 compression ratio, 6 percent of 115 cars failed to pass both hydrocarbon and carbon monoxide, whereas 25 percent of 115 cars failed to pass either carbon monoxide or hydrocarbons. So it varied by makes and models, engine sizes, and compression ratios.

Mr. ROGERS. When you find this failure, what do you do?

Dr. MIDDLETON. Record the evidence and make it available for discussion such as this and publication.

Mr. ROGERS. But you don't revoke any certificate?

Dr. MIDDLETON. For the reasons that have been advanced.

Mr. ROGERS. Are the companies advised of these findings and called in to see what they are going to do about it?

Dr. MIDDLETON. This is a matter of public record. The information is available. There is no question that the information is not withheld.

Mr. ROGERS. I understand that. What I am saying is does your agency specifically contact the companies and tell them of these findings, that you are disturbed about it and that they ought to check in and correct it?

Dr. MIDDLETON. Through our Division of Motor Vehicle Pollution Control in Ann Arbor this is made known, and in my discussions with the representatives of the motor vehicle industry I personally make it known to them.

Mr. ROGERS. I would like to know the responses of the various companies.

Dr. MIDDLETON. I would be glad to let you know the response. I think the evidence that Dr. Steinfeld gave you earlier indicated that there has been a general improvement, although there is still not full compliance. I think he tried to point that out this morning.

(The following material was received for the record:)

CAR RENTAL FIRMS TESTS OF HYDROCARBON AND CARBON MONOXIDE EMISSIONS

The National Air Pollution Control Administration's tests of cars owned by car-rental firms have indicated that hydrocarbon and carbon monoxide emissions levels rise more rapidly with increasing mileage than is the case with prototype models used for certification. Representatives of automobile manufacturers have been advised of these findings on various occasions. A formal communication to the companies whose cars have been involved in the testing program was sent on December 15, 1969, by Commissioner John T. Middleton. A copy of this communication is attached. Also attached are copies of responses received thus far.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,
Arlington, Va., December 15, 1969.

Mr. CHARLES M. HEINEN,
Chief Engineer, Emission Control and Chemical Development,
Chrysler Corp., Highland Park, Mich.

DEAR CHARLIE: During the course of hearings dealing with the extension of the Clean Air Act at which time the Department of Health, Education, and Welfare made its presentation on December 8, specific information on emissions from cars in owners' use was furnished. In order to be assured that you are fully aware of that information, I enclose the following two items:

Table 2. California Air Resources Board—Emission Factors and Deterioration Factors (Composite Start)

Table 3. NAPCA Testing of Rental Agency Cars in Detroit and Los Angeles Areas

The data presented in Table 2 is derived from more than 4,000 vehicles, while the data in Table 3 is derived from a much smaller population. While the data in Table 2 shows a general trend of improvement in deterioration factors for 1966 and 1967 models, that for 1968 is less clear and in any event shows the failure of vehicles to remain within the standards used as a basis for issuing the certificate of conformity. As more information is evolved a critical evaluation of the information presented in Table 3 can be made. The results so far are certainly unsatisfactory and clearly dictate a significant change is required in the manner in which durability testing is scheduled and the employment of a deterioration factor.

I would appreciate your sending me data which you have that bears on this matter. Considerable attention will be given to this subject, all of which should lead to correction of the excess emissions and assurance that vehicles certified remain within the standards for their expected lifetime.

Sincerely yours,

(S) John T. Middleton
JOHN T. MIDDLETON,
Commissioner.

Enclosures

Identical letter to the following:

Mr. Donald A. Jensen
Executive Engineer
Vehicle Emissions and Regulations
Ford Motor Company
The American Road
Dearborn, Mich.
Mr. John F. Adamson
American Motors Corporation
14250 Plymouth Road
Detroit, Mich.
Dr. Fred Bowditch
Engineering Department
General Motors Corporation
Warren, Mich.

THE FORD MOTOR CO.

Dearborn, Mich., December 30, 1969.

Dr. JOHN T. MIDDLETON, *Commissioner,*
Department of Health, Education, and Welfare,
Arlington, Va.

DEAR DR. MIDDLETON: Thank you for your letter of December 15, 1969, which included two tables which appear to show deterioration of exhaust emission control systems. You indicate "the results so far are certainly unsatisfactory and clearly dictate a significant change is required . . ." We respectfully disagree with that conclusion and urge you to reconsider.

In response to your request for data bearing on this matter, I am enclosing with this letter Figure 7 from a report on "Exhaust Emissions from Privately Owned 1966-1969 California Automobiles. A Statistical Evaluation of Surveillance Data" dated November 7, 1969. (California Air Resources Laboratory)

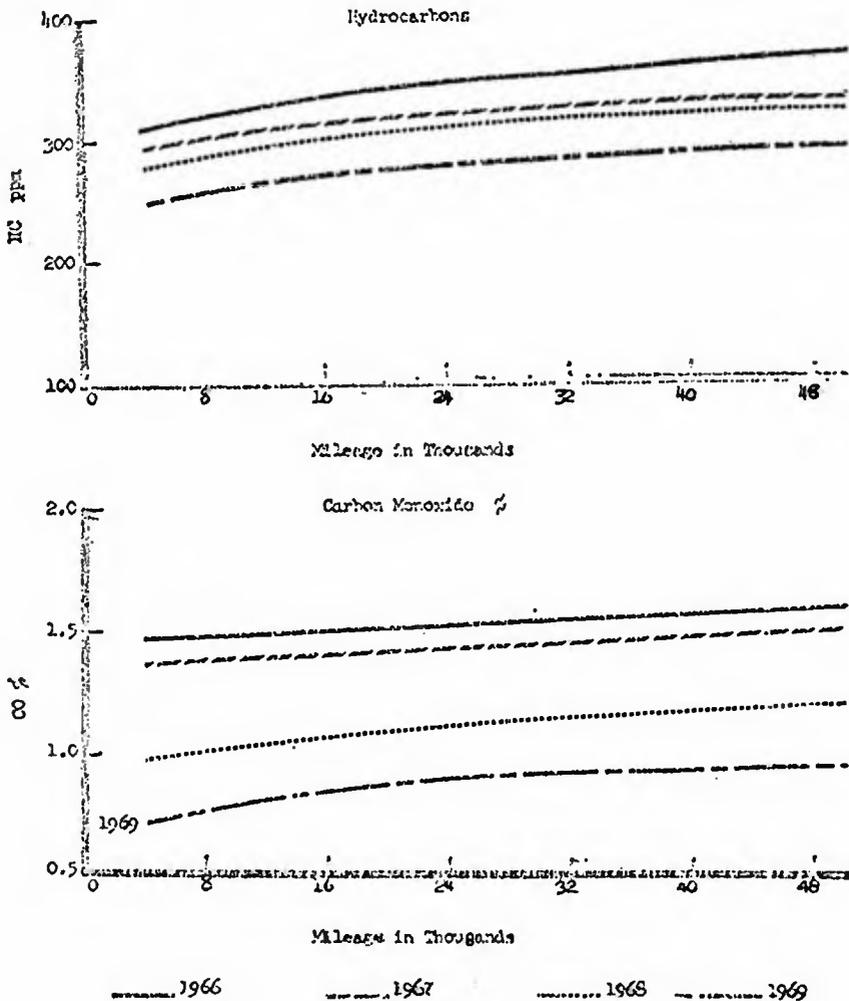
This data reflects very clearly the significant and, to us, most satisfactory results of our internal voluntary efforts to obtain greater durability in our emission control systems. Through stringent quality control measures at our component manufacturing plants and at our assembly plants; through such installations as plastic idle limiters and through increased education of the service personnel at our dealerships, we have achieved a year-by-year improvement. We hope that before making any "significant" changes, you carefully evaluate all reliable data that is available on this subject. Without commenting at this time on the validity of the two tables enclosed with your letter, we ask you to take special note of the fact that the California data was based on a large random sample of vehicles in the field and that the 1969 Ford cars are within exhaust emission standards when data is extrapolated to 50,000 miles. This achievement is gratifying and encourages us to continue our internal program to make our control systems more durable.

Since we jointly are concerned with "real pollution in the field", a discussion relative to this subject of deterioration of emission levels in the field would seem most appropriate. We would welcome an opportunity to meet with you or your representative for such a discussion at your convenience.

Very truly yours,

D. A. JENSEN,
Director, Automotive Emissions Office.

Figure 3. Exhaust Emissions in Millions
 1966-69 Ford Motor Automobiles
 Data Corrected to Reflect California Population.
 All Tests Hot Start



GENERAL MOTORS ENGINEERING STAFF,
 GENERAL MOTORS TECHNICAL CENTER,
 Warren, Mich., January 13, 1970.

Dr. JOHN T. MIDDLETON, Commissioner,
 National Air Pollution Control Administration,
 Department of Health, Education, and Welfare, Arlington, Va.

DEAR DR. MIDDLETON: The best field emission performance data we have available is some taken from the Los Angeles car population. These data have been summarized in detail in the attached SAE paper. Problems of accumulating complete federal emission test data of this type are difficult, requiring considerable effort to assure compatible data, and we therefore do not accumulate this information on a continuing basis, but rather on a project basis. The "as received"

emission levels shown in the attached paper for the controlled and uncontrolled vehicles, are the values used in our prognostications of past and future atmospheric levels of automotive-related pollutants.

It is this information which is used as the basis for the GM statements that the hydrocarbon emissions from the total car population in the Los Angeles basin area will reach 1940 levels by about the year 1975, and will remain below that level through the 1980's in spite of the ever increasing car population. It is also from this information that we have made the statement that our 1970 California vehicles and 1971 models nationwide, have 80 percent lower hydrocarbon and 63 percent lower carbon monoxide levels than did our 1960 models. It is for these reasons that we believe that the present field performance is adequate to assure desired atmospheric levels of automotive-related pollutants for at least the next ten years.

The original intended purpose of the attached SAE paper was to point out the importance of proper vehicle adjustment on emission levels. As indicated in the paper, it appears quite likely that had all the vehicles in the NAPCA test fleet been adjusted to manufacturers' specifications, the emission results would have been significantly altered.

The fact that certification test data and field test data are not expected to be alike, has been discussed with you and your staff on numerous occasions, and as recently as two months ago. This matter was formally brought to the attention of HEW in the February 9, 1968 AMA letter to the then Secretary of HEW, the Honorable John Gardner. A copy of the pertinent portion of this communication is attached. The industry requested at the time of this letter, that HEW take formal notice of the fact that certification and field emission data would not to be expected to be similar. The reasons for these anticipated discrepancies are spelled out in detail in the referenced letter attached.

Should you wish amplification of any of this information, please let me know and I will be glad to provide you with the information.

Very truly yours,

FRED W. BOWDITCH,
Director, Emission Control.

AMERICAN MOTORS CORP.,
Detroit, Mich., January 14, 1970.

Dr. JOHN T. MIDDLETON,
Commissioner, Consumer Protection and Environmental Health Service, Public Health Service, Department of Health, Education, and Welfare, Arlington, Va.

DEAR DR. MIDDLETON: We have reviewed your letter of December 15, 1969 and the general subject of vehicle certification. I would like to take this opportunity to comment on the information contained in the subject letter.

The Emission Factors and Deterioration Factors developed by the California Air Resources Board do raise substantial question when viewed against our targets for performance of our cars in the field. Although American Motors' vehicles were not included in the California Air Resources Board data on Table 2, we do wish to comment on this information. We raise the question, "Do these California data include the latest input of data recently released which would include more high mileage cars and reduce the extent of extrapolation to 50,000 miles—a problem which has plagued us from the onset of the field surveillance program?"

Certain authorities have suggested, and we tend to concur, that the California car population is somewhat unique with regard to maintenance frequency. Since the area's higher-than-average ambient temperatures does not force the maintenance required by the majority of the balance of the country, which is colder from a geographical standpoint, the maintenance is not equivalent to the nation-wide average. We are convinced that maintenance is a factor in performance of vehicles in the field and that assured routine maintenance would result in lower emissions and come closer to correlation with the performance of our certification fleets.

To pursue this point of deterioration further, the fleet of industry cars supplied to the Willow Run Surveillance program should serve some useful purpose. As I recall, the program plan called for approximately 38 cars beginning with 1968 and 1969 models. In the case of American Motors, three (3) vehicles have been involved as follows:

- 1968 Ambassador with 343 C.I.D. engine/automatic transmission.
- 1969 Ambassador with 232 C.I.D. engine/automatic transmission.
- 1969 Rambler with 199 C.I.D. engine/automatic transmission.

Data on these three cars indicate that two of the vehicles remain substantially under the standard and one is somewhat higher than average, however, the average is still within the standard.

The data summarizing the testing of rental agency cars in Detroit and Los Angeles were very encouraging. The emission levels recorded for the 36 vehicles with our 290 engine relate very closely to our 1968-69 certification data. As a further compliment to the data, the American Motors deterioration factors for 1968-69 were 1.12 for hydrocarbon and 1.0 for carbon monoxide. Since the factors were generated on public roads without the benefit of controlled traffic density and traffic velocity, we consistently generated hydrocarbon deterioration factors higher than our large domestic competitors.

In a more detailed review of rental car data, I note a column identified as "% vehicles failing applicable standards." I presume this identification is merely a means of studying the general distribution of the vehicles relative to the standard. As a means of determining compliance with the certification procedure, it is inconsistent with the "fleet averaging concept" employed in the applicable regulation. However, setting aside its validity as an indicator of the performance of our vehicles in the field relative to the standard, American Motors takes encouragement from the performance of our vehicles as compared to our competitors as indicated by these data.

Setting statistical arguments aside and being candid, we are not satisfied with the performance of our vehicles in the field and are making every effort to accomplish improvements. Since the introduction of controls in California in 1966, and nation-wide in 1968, we have gained considerable experience in vehicle emission system design requirements for successful performance in the field. We have installed substantial quality control facilities in production to assure that vehicles off the production line are representative of the vehicle as certified. We believe our current production vehicles are a substantial improvement over those produced in the 1966 thru 1968 model years.

We regret that we cannot supply surveillance data on cars in the hands of the customer of the type you requested. The data we have accumulated, aside from that required for certification, is of a development nature. In addition, we have gathered emission data on endurance vehicles run for the purpose of evaluating other components of the car. Although the mileage involved is substantial, the driving speeds and patterns are such that they do not bear direct correlation to emission in average customer driving.

Yours truly,

AMERICAN MOTORS CORPORATION,
J. F. ADAMSON,
Vice-President, Engineering and Research.

Mr. ROGERS. But if you have additional authority, you feel that you could get to this problem in a better way?

Dr. MIDDLETON. I do.

Mr. ROGERS. Mr. Kyros?

Mr. KYROS. I have no questions.

Mr. ROGERS. Mr. Nelsen.

Mr. NELSEN. Dealing with automobile emissions, you can have two new automobiles with identical engines and everything the same, and one may cause some problem and another might not.

So much depends on the mechanical adjustment such as the automatic choke. An older engine may have the rings worn so there is crankcase emission which is not all necessarily the fault of the manufacturer. Sometimes it is simply a matter of adjustment. Having run tractors and automobiles all my life, it is very obvious to me that this adjustment may be improper on many different things on a machine.

You could never manufacture something that would be completely perfect because wear on a machine will cause situations that may develop requiring mechanical adjustment. Even an automatic choke may stick. You may have seen the situation in traffic where a brand new automobile will have black smoke pouring out of it.

The choke works on a heat control unit that regulates the carburetor. Isn't this true?

Dr. MIDDLETON. Yes, as Dr. Steinfeld said earlier this is truly a mixture of quality control, the fuel used in the vehicle, and how the vehicle is maintained.

Mr. NELSEN. Have you found any way to stop these busses from blowing that black smoke into my car when I drive to work? They are about the worst offenders.

Dr. MIDDLETON. You will be happy to know, I trust, Mr. Nelsen, that beginning January 1, 1970, which is quite soon, all new diesel engines will necessarily comply with a smoke emission standard. When you say smoke emission, it sounds permissive, but we are saying that they can't smoke except for small amounts for very short periods of time. The serious problem is what do you do with the used diesel vehicle or the used gasoline-fueled vehicle?

We are developing and will publish a manual which deals with the maintenance of the diesel engine. We will make this available so that those who operate fleets of diesels who do not know how to keep them cleaner than they are have an opportunity to do this.

In addition, we propose, as we have said earlier, to have an instruction period for the Federal departments and agencies so that the diesels operated by the Federal Government can be exemplary in this regard.

There will be clear cut operational procedures, nature of the fuel, and soon, to begin a strong attack on the foul emissions that come from diesel buses, which certainly should not be emitted at all.

Mr. NELSEN. Thank you.

Mr. ROGERS. Mr. Preyer.

Mr. PREYER. I had just one question of Dr. Middleton. We have been discussing the reasons why the production line cars do not match the performance of the prototype. Is another reason related to the fact that it is mechanically possible to remove the air pollution control equipment from a car? Is that possible?

Dr. MIDDLETON. It is becoming more and more difficult to remove any part of the system that controls air pollution, because the motor vehicle industry is seriously bent upon having air pollution control an integral part of the engine system. So there are not odds and ends of hardware attached that can be removed, with the notable exception of the crankcase ventilation system which is usually piping, and it can be disturbed.

For this reason, many States have their own laws which stipulate that it is unlawful to disconnect such equipment to so do and in some States, of licensing is dependent upon an annual certification that the air pollution control equipment is, in fact, in place and operative.

Mr. PREYER. I assume this equipment does use up gas to operate it and therefore it would be tempting to try to dismantle it in some way. But I take it from what you say that this is not a major problem, that either through state criminal laws or licensing laws, and through the development of the equipment, which is making it more organically related to the car, that this is not a formidable problem.

Dr. MIDDLETON. It is not a formidable problem. The State of California first saw the possible need of inspection before licensing because they felt it might be a formidable problem.

They have made surveys. They have discovered that this is inconsequential. There are some, but not many, people who do disconnect things. I think they would begin to understand that disconnecting is not necessarily a fail safe operation.

This interferes with the proper operation of the motor vehicle itself.

Mr. PREYER. Thank you.

Mr. ROGERS. Dr. Carter.

Mr. CARTER. You mentioned Fords and Chevrolets and Plymouths and Chrysler products, I believe. I would like to get down to the foreign cars. Of course you brought up the one exception in which a man could purchase a foreign car and perhaps bring it into the United States without having this proper equipment.

But we know we have fairly large scale, for instance sales of the Volkswagen in this country. Do you have any records on those cars?

Dr. MIDDLETON. We don't have surveillance records of the emissions after such cars have been sold and are in use.

Mr. CARTER. Do you have any taken before the car is sold?

Dr. MIDDLETON. Yes. We do know that the Volkswagens submitted for a certificate of conformity do, in fact, pass. They do meet the United States standards for emissions.

Mr. CARTER. They have no failures that you know of?

Dr. MIDDLETON. They have not had any failures.

Mr. CARTER. What about the Mercedes?

Dr. MIDDLETON. The foreign motor vehicle manufacturers have met the same requirements that domestic manufacturers have.

Mr. CARTER. I was interested just a little bit ago in what I believe my distinguished colleague from Florida mentioned, that there are problems in which we do have clouds of pollution hanging over some cities, which could well cause an increased incidence of acute pulmonary trouble.

I believe you stated that you could go in in cases like that to assist that area, is that right?

Dr. MIDDLETON. Yes, Dr. Carter. That is right. What we were talking about was a situation that might come up in an air quality control region. In the event the State had adopted air quality standards for the region, standards approved by the Secretary and had an implementation plan, which would provide for emission reductions the real guts of an air pollution control program, and then the State agency designated to implement that plan failed to do so, carry it out, have any action, then, under section 108, we could undertake to see that the plan is properly implemented.

Mr. CARTER. What would you do in case a pile of pollution was hanging over the city of New York and was causing an increased number of deaths, just as one did a few years ago and as one did in London a few years ago. What would be your method of attack?

Dr. MIDDLETON. Our method of attack is to be sure that there is an action program long before any survey shows that people are dying. What we need, and what is required as part of implementation plans for air quality control regions is a course of action that the States are pledged to take in the event that an episode of high air pollution seems likely to occur.

Mr. CARTER. Preventive action?

Dr. MIDDLETON. When air pollution rises to certain pre-determined levels, then a series of emission control actions would be instituted. If the State, responsible agency, fails to institute those, we can see that they are instituted.

In the event—that and we predict that through our high air pollution potential prediction system, by which forecasts are sent out daily shortly after noon, that there is the potential for occurrence of an episode—then areas designated in that forecast are alerted to the fact that there may be an episode and they should be prepared to doing something about it.

Let's make an assumption to get this example to work. We are talking about sulfur oxides levels. Assume that the sulfur dioxide level reaches 0.1 parts per million and is expected, within 24 hours, to reach 0.4 parts per million.

At that point, we would invoke Section 108(k) of the Clean Air Act, under which the Secretary of Health, Education, and Welfare, can ask the Attorney General of the United States to bring suit to enjoin air polluting activities.

This would take place only if there were no action on the part of the responsible State agency. State and local agencies, being closer to the scene of such a problem, are in a better position to deal with it, and under the Clean Air Act, we can expect States to take the necessary action. The alternative is for the Federal Government to see that action is taken out on behalf of the State.

Mr. CARTER. Have you gone over this emission chart with anyone? Has anyone asked you concerning that? It is attached to your paper.

Mr. STEINFELD. Yes, figure 5?

Mr. CARTER. Yes.

Dr. MIDDLETON. Dr. Steinfeld made some comments on that this morning.

Mr. CARTER. I notice that carbon monoxide emissions, by 1970, will be reduced to 23 grams per mile. Is that right?

Dr. MIDDLETON. That is right.

Mr. CARTER. In '71, you don't envision any further reduction?

Dr. MIDDLETON. That is right.

Mr. CARTER. Do you think that that is at such level, evidently, that it won't be consequential, then?

Dr. MIDDLETON. That is not a correct deduction. Following the publication of air quality criteria reflecting the current knowledge of the effects of carbon monoxide, we would expect the air quality standards adopted by the States to require, since the motor vehicle is the principal source of this pollutant, that there be further reductions of emissions from the motor vehicle, and this being a Federal responsibility, we look forward to having more stringent standards for carbon monoxide in the future.

Mr. CARTER. Actually, total pollution would depend more on the number of cars than really the amount emitted, would it not? The more cars you have, the more pollution you have, in other words?

Dr. MIDDLETON. Even with the standards that have been in effect in California since the 1966 model year on, about 40 percent of the days in the Los Angeles area, a carbon monoxide level of ten parts per million for a number of hours that was, is exceeded.

This is the clearest way I can tell you that the 23.0 grams per vehicle mile limitation on carbon monoxide emissions is an inadequate emission reduction.

It needs to be much more stringent.

Mr. CARTER. Even with the much more stringent standards and the number of cars increased, we would still have the same amount of pollution.

Dr. MIDDLETON. Dr. Carter, if you had the same living patterns, the same kinds of transportation systems, you would have a serious problem. But if you change the average rate of speed with which cars move, you can reduce the amount of pollution, to some extent.

But then if you increase the number of cars, you also begin to increase the amount of pollution they actually put out. So we really need to be concerned not only with bringing about motor vehicle pollution control through attention to the emissions from vehicles; we also need to be concerned, as Dr. Steinfeld said earlier, with the properties of the fuel, as well as, more basically, the nature of the transportation system.

Mr. CARTER. I certainly agree. Perhaps more electrically powered transportation or something of that nature might help. Is that right?

Dr. MIDDLETON. This depends very greatly on whether an electric generating plant is the principal battery charging basis. One then has to consider whether the battery system, though clean in its own right, is contributing to the amounts of sulphur oxides, particulate matter, and nitrogen oxides that are being emitted by the powerplant.

Mr. CARTER. You are referring to hydrogen electric powerplant, I would think then?

Dr. MIDDLETON. It would be nice to think that hydroelectricity could be available everywhere, but I think we have to understand that we depend very greatly on coal and oil for this.

Mr. CARTER. That is quite true.

Dr. MIDDLETON. That is why we have been trying to place emphasis on solving the sulphur oxides problem, on demonstrating practical control techniques, so that we can have an assured use of coal and oil in this country without the pollution.

So, if we couple clean powerplants with electric cars, then, possibly, electric cars would be useful. But if we plan on having a transportation system with electric cars and forget how the electricity gets generated, then we don't have a worthwhile system.

Mr. CARTER. Thank you, Mr. Chairman.

Mr. ROGERS. Let me ask you about your training program. What amount of your budget is devoted for training purposes then?

Dr. MIDDLETON. Our manpower development program, as we call this effort, includes of training grants in fiscal year 1969 in the amount of \$2,691,000.

Mr. ROGERS. These go to institutions?

Dr. MIDDLETON. These are grants to academic institutions.

Mr. ROGERS. How many benefit from that 2 million?

Dr. MIDDLETON. About 30 institutions.

Mr. ROGERS. Would you let us have for the record those institutions?

Dr. MIDDLETON. Yes.

(The following information was received for the record:)

INSTITUTIONS RECEIVING TRAINING GRANTS

In Fiscal 1969, National Air Pollution Control Administration training grants were awarded to 38 academic institutions and one State health department. Institutions that received support were as follows:

| | |
|--------------------------------------|---|
| University of California | Northwestern University |
| University of Chicago | Ohio State University |
| California State Polytechnic College | Oregon State University |
| University of Cincinnati | Pennsylvania State University |
| Cooper Union | University of Pittsburgh |
| Drexel Institute of Technology | Portland State College |
| University of Florida | Purdue University |
| Harvard University | Santa Fe Junior College |
| Johns Hopkins University | University of Southern California |
| University of Illinois | Temple University |
| University of Indiana | University of Texas at Austin |
| University of Iowa | Texas A. & M. University |
| University of Kentucky | University of Utah |
| University of Maryland | Vanderbilt University |
| University of Massachusetts | University of Washington |
| University of Michigan | University of West Virginia |
| Michigan State University | University of Wisconsin |
| University of Minnesota | Yale University |
| New York University | California State Department of Public Health (technical seminars) |
| North Carolina State University | |

Mr. ROGERS. How many students are involved in this work in those thirty institutions?

Dr. MIDDLETON. I would be pleased to supply that for the record. (The following statement was received for the record:)

Totally, 621 students have been or are being trained at the 38 institutions supported by fiscal 1969 training grant awards. Of this total, 370 received support (e.g., stipend, dependency allowance, tuition, etc.) from the National Air Pollution Control Administration.

Mr. ROGERS. Have you any estimate at all?

Dr. MIDDLETON. I would rather supply it for the record. It is several hundred. I am not sure what the number really is.

(The following statement was received for the record:)

In fiscal 1969, a total of 621 students was enrolled in college and university training programs supported by the National Air Pollution Control Administration.

Mr. ROGERS. What type of training is this?

Dr. MIDDLETON. This includes mainly graduate training in areas relating to air pollution control, but it also includes some undergraduate, and post graduate activity.

Mr. ROGERS. We would like to know how many in each program?

Dr. MIDDLETON. I would be pleased to supply that.

(The following statement was received for the record:)

Of the 621 students enrolled in training programs supported by the National Air Pollution Control Administration in fiscal 1969, more than half were graduate students. Specifically, there were 285 undergraduates, 315 graduate students, and 21 post graduates.

Dr. MIDDLETON. We have in our fellowship program \$468,000 for disbursements of funds for graduate, post-graduate training.

Mr. ROGERS. How many are involved in that program?

Dr. MIDDLETON. I will be glad to supply that for the record as well; it is close to a hundred.

(The following statement was received for the record:)

In fiscal 1968, fellowship awards amounted to \$468,000. These funds supported 77 students.

Dr. MIDDLETON. Most of these programs cost in the neighborhood of about \$6,000 to \$7,000 per person.

Mr. ROGERS. You underwrite them for how long?

Dr. MIDDLETON. A fellowship applicant applies on the basis of having a degree in mind, with the institution he will attend having approved his plan. He can be supported so long as he meets the institution's academic requirements and is meeting the plan that he originally supplied. So the period of support then, depends upon whether he is seeking a master's degree or a Ph. D. degree or some professional degree.

Mr. ROGERS. What is the longest period of time you would support?

Dr. MIDDLETON. Normally the longest period of time would be for a Ph. D., and, typically, a full time student, at a good institution, with good teaching, should be able to finish this in three years.

Mr. ROGERS. So that would be the longest fellowship, a three year fellowship, is that right?

Dr. MIDDLETON. There may be unusual situations in which the period of support would be extended, for example, where the candidate who was an engineer and wanted to go into some related medical studies. That may take longer. Typically, however, it is less than three years.

Mr. ROGERS. We would like to be advised of how many and the length of time generally, and if there are any over your 3-year period.

Dr. MIDDLETON. That could be supplied for the record.

(The following statement was received for the record:)

In the fiscal 1963-69 period, fellowship awards were made to 167 students, of whom 14 were supported for more than three years. Among these 14, the average period of support was $3\frac{1}{2}$ years. In ten cases, the students were doctoral degree candidates who required more than three years to complete their work. In four cases, extra time was spent in post-doctorate studies. Generally, however, the average period of fellowship support is two years.

Mr. ROGERS. Do you have funds for supporting families of a full time student?

Dr. MIDDLETON. Yes, the amount of payment to the student is also dependent upon whether he has a family. There are fixed fees for the size of the family.

Mr. ROGERS. I would like to know the largest grant as well as the smallest in the fellowship program.

Dr. MIDDLETON. I would be glad to supply that for the record.

(The following statement was received for the record:)

In fiscal 1969, the largest single fellowship award was \$13,000 (tuition, \$2,500; stipend, \$8,000; dependents, \$2,500), while the smallest was \$5,500 (tuition, \$2,500; stipend, \$3,000).

Dr. MIDDLETON. The other element of our manpower development program budgeted at \$1.5 million, is the short term training program we spoke about earlier this morning.

Mr. ROGERS. You do that in Cincinnati?

Dr. MIDDLETON. We do much of that in our Technical Center in the Research Triangle Park in North Carolina, but we also conduct these

courses in various other places around the country. We work out with the States and local agencies to ascertain their interests in training activities and try to arrange our States, curriculum accordingly.

Mr. ROGERS. Let us know what programs have been run last year, the length of those programs and the number of people trained.

Dr. MIDDLETON. I would be pleased to supply that. I would ask perhaps your indulgence to supply it not for just the last year, because last year, in the process of moving people from Ohio to North Carolina, there were some upsets in our program activity.

Mr. ROGERS. Let us have the year before and last year so we can see what has been done. We will appreciate that very much.

Dr. MIDDLETON. We will include all the information.

(The following information was received for the record:)

TECHNICAL AND ORIENTATION COURSES CONDUCTED BY NATIONAL AIR POLLUTION CONTROL ADMINISTRATION

The National Air Pollution Control Administration conducts a variety of technical courses for its own personnel, employees of other Federal agencies, State and local personnel, employees of private organizations, and university faculty members and students. Courses offered cover virtually all aspects of air pollution control, including air quality management, field studies and enforcement, process evaluation and control, and air sampling and analysis. Courses are conducted either at the National Air Pollution Control Administration's Technical Center in North Carolina or at other places around the country. Table 1 shows the number of course presentations and enrollment for the Fiscal 1958-1969 period. Table 2 provides a breakdown of enrollees by type of organization in which they were employed.

TABLE I.—NATIONAL AIR POLLUTION CONTROL ADMINISTRATION, SUMMARY OF TECHNICAL COURSE PRESENTATIONS AND ENROLLMENT, FISCAL YEARS 1958-69

| Fiscal year | Resident | | | Field | | | Total | | |
|-------------|-----------------------------|-------------------------|-----------------|-------------------------|-----------------|--------------------|-------------------------|-----------------|--------------------|
| | Number of technical courses | Number of presentations | Number of weeks | Number of presentations | Number of weeks | Number of trainees | Number of presentations | Number of weeks | Number of trainees |
| 1958 | 7 | 7 | 9.6 | 136 | 2 | 42 | 7 | 9.6 | 136 |
| 1959 | 8 | 8 | 12.0 | 153 | 1 | 20 | 10 | 15.0 | 195 |
| 1960 | 8 | 8 | 13.0 | 200 | 3 | 52 | 16 | 18.0 | 236 |
| 1961 | 9 | 12 | 17.0 | 194 | 3 | 88 | 15 | 20.6 | 283 |
| 1962 | 12 | 15 | 18.0 | 295 | 6 | 116 | 21 | 23.0 | 408 |
| 1963 | 17 | 15 | 18.2 | 375 | 10 | 198 | 24 | 23.6 | 463 |
| 1964 | 17 | 14 | 23.2 | 445 | 11 | 34.4 | 31 | 34.4 | 485 |
| 1965 | 18 | 20 | 23.9 | 532 | 17 | 523 | 37 | 40.8 | 1,073 |
| 1966 | 24 | 20 | 27.7 | 598 | 19 | 565 | 45 | 46.4 | 1,373 |
| 1967 | 26 | 16 | 19.0 | 629 | 19 | 574 | 45 | 46.4 | 1,373 |
| 1968 | 42 | 39 | 35.2 | 1,170 | 23 | 805 | 42 | 47.8 | 1,264 |
| 1969 | 65 | 39 | 39.2 | 1,170 | 26 | 959 | 65 | 52.0 | 2,129 |
| Total..... | 253 | 202 | 232.4 | 4,663 | 121 | 3,932 | 323 | 338.2 | 8,595 |

TABLE 2.—NATIONAL AIR POLLUTION CONTROL ADMINISTRATION—PERCENTAGE DISTRIBUTION OF STUDENTS BY EMPLOYERS

| Fiscal year | Total | DHEW | Other Federal | State | Local | Industry and consultants | University | | Others |
|-------------|-------|------|---------------|-------|-------|--------------------------|------------|----------|--------|
| | | | | | | | Faculty | Students | |
| 1958 | 100 | 5.1 | 13.2 | 28.0 | 4.4 | 33.8 | 10.3 | 0 | 5.2 |
| 1959 | 100 | 8.4 | 17.7 | 22.3 | 16.9 | 24.6 | 3.8 | 0 | 6.3 |
| 1960 | 100 | 19.4 | 18.7 | 18.7 | 12.0 | 23.4 | 6 | 0 | 7.2 |
| 1961 | 100 | 25.6 | 9.7 | 22.0 | 8.8 | 15.9 | 3.5 | 0 | 14.5 |
| 1962 | 100 | 20.0 | 5.7 | 22.6 | 10.6 | 10.6 | 3.4 | 0 | 27.1 |
| 1963 | 100 | 28.4 | 12.7 | 21.2 | 14.7 | 13.7 | 1.9 | .3 | 7.1 |
| 1964 | 100 | 22.9 | 13.9 | 22.7 | 17.0 | 15.4 | 3.1 | .8 | 4.2 |
| 1965 | 100 | 12.5 | 11.7 | 19.0 | 30.3 | 15.2 | 3.2 | 2.5 | 5.6 |
| 1966 | 100 | 6.9 | 10.1 | 20.6 | 42.6 | 12.8 | 2.1 | 2.3 | 2.3 |
| 1967 | 100 | 9.6 | 12.5 | 19.7 | 34.4 | 15.3 | 2.2 | 2.9 | 3.4 |
| 1968 | 100 | 9.3 | 10.2 | 26.0 | 36.1 | 11.1 | 2.8 | 1.6 | 2.8 |
| 1969 | 100 | 13.2 | 6.3 | 27.7 | 31.4 | 12.7 | 1.5 | 1.2 | 5.9 |

In addition to technical courses for air pollution control personnel, the National Air Pollution Control Administration conducts orientation courses for interested citizens and civic leaders. Such courses are designed primarily to develop improved public understanding of air pollution and its prevention and control. Table 3 shows numbers of orientation course presentations and enrollment during the Fiscal 1958–1969 period.

TABLE 3.—NATIONAL AIR POLLUTION CONTROL ADMINISTRATION, SUMMARY OF ORIENTATION COURSE PRESENTATIONS AND ENROLLMENT

| Fiscal year | Number of presentations | Number of weeks | Number of trainees |
|-------------|-------------------------|-----------------|--------------------|
| 1958 | 6 | 3.0 | 742 |
| 1959 | 1 | .4 | 83 |
| 1960 | 3 | 1.2 | 269 |
| 1961 | 5 | 2.0 | 588 |
| 1962 | 4 | 1.0 | 721 |
| 1963 | 2 | .4 | 226 |
| 1964 | 9 | 2.2 | 502 |
| 1965 | 7 | 1.4 | 383 |
| 1966 | 20 | 4.4 | 1,010 |
| 1967 | 15 | 4.4 | 897 |
| 1968 | 12 | 1.2 | 148 |
| 1969 | 1 | .2 | 22 |
| Total | 85 | 21.8 | 5,591 |

Mr. ROGERS. Someone said that we have spent some \$10 million to \$20 million over the past 4 or 5 years to train technicians, engineers and control officials but only about one-third of those are still in programs of a public nature. Would that be true?

Dr. MIDDLETON. I seriously doubt that. But we have figures that I will supply to you.

Mr. ROGERS. I think we would like to know how many of them are staying in the fields once they have been trained?

(The following information was received for the record:)

From Fiscal 1963 through Fiscal 1968, a total of 511 students was supported by training grants and fellowship awards from the National Air Pollution Control Administration. Of this total, 332 are engaged in activities related to air pollution control; 185 (56 percent) are in public service (government and education) and 147 (44 percent) are employed in the private sector. Of the 179 not engaged in air pollution activities, 64 percent are continuing their education and some are serving in the armed forces.

As for personnel who have been enrolled in one or more of the technical courses offered by the National Air Pollution Control Administration in Fiscal 1968-69 (as shown in Table 1 above), it is estimated that 75 percent of those who were employed by Federal, State, and local agencies at the time of their attendance at the courses still are in public programs. For the period prior to Fiscal 1968, the estimated public program retention rate is over 60 percent.

Mr. ROGERS. Is there any requirement if they take your training, fellowship or any kind of assistance, that they stay in public health in this area?

Dr. MIDDLETON. In these programs, there is no such requirement, no condition that they remain in the air pollution field. But the nature of the person's commitment, the fact that he has a plan, and a process or steps, and accepts it, and it has been shown that very few leave the air pollution field.

They may change their work place.

Mr. ROGERS. I understand they may be going to private industry. But I wonder how many stay in the public area?

Dr. MIDDLETON. We can supply that. (See statement on p 73, this hearing.)

Mr. ROGERS. What about monitoring?

What is our problem there, in monitoring what the air pollution levels are? Is there any problem with this?

Do we have the technique, do we have the instrumentation and trained personnel to monitor air pollution?

Mr. JOHNSON. As in all other areas, we certainly don't have all of the monitoring stations or all of the people to operate them that we would like to have.

Mr. ROGERS. What do we have?

Mr. JOHNSON. I believe we have in the Federal system maybe 200 stations, and we would anticipate we would need about 2,000 of these across the country.

Mr. ROGERS. Would you let us know the number of personnel that would require?

Mr. JOHNSON. I want to verify my figures. I pick these out of the air sometimes.

John, I believe we have about two hundred Federal monitoring stations in air pollution across the country now?

Dr. MIDDLETON. We have about 300 stations that do a number of kinds of tests. Most of them are operated by State and local agencies, for which we established Federal protocols. The information that is gathered is put into a central data storage and retrieval system so that it can be usefully employed.

Mr. ROGERS. Do you find those personnel?

Dr. MIDDLETON. Yes, on a matching fund basis with the State and local governments through control program grants.

Mr. ROGERS. How many more monitoring units do we need, stations?

Dr. MIDDLETON. We have a need for a considerable extension.

Mr. ROGERS. Do you need 2000 approximately?

Dr. MIDDLETON. We are looking towards about doubling what we have, and instead of having as too often we have in certain cities, just one downtown station with one monitoring, extending that so we really know what is happening in the entire urban area, not just in the central core city.

So there is a real need for extending the size of the program.

We are hopeful that States' plans for implementation of air quality standards in the air quality control regions include provisions for adequate monitoring; indeed, we expect the States and local agencies to do more monitoring than they have done in the past.

Mr. ROGERS. How many do we really need to get at the air control problem to know what is happening in the country?

Dr. MIDDLETON. We need something like 800 or 1,000 stations.

Mr. ROGERS. Do you think that would be sufficient?

Dr. MIDDLETON. That would be a much more adequate beginning.

Mr. ROGERS. I understand that. I want to know what we need, not what is more knowledgeable or closer. What do we need, 100, 1,000, 2,000, 3,000? I realize it is an estimate.

Dr. MIDDLETON. We ought to have about 1,000 stations, and they ought to be monitoring more pollutants than they presently are. Along with that we should begin to have some environmental indices that not only tell us what the chemical compounds may be in the air, but also provide some estimates of environmental changes.

Mr. ROGERS. Is this in the works or do you need more authority or do you need more money and personnel or all?

Dr. MIDDLETON. The development of environmental indices is a matter we have been talking about. The resources and personnel that we have will not allow us to begin this at the present time.

Mr. ROGERS. If you had the money and the personnel, could you accomplish this?

Is the state of the art such that you can't?

Dr. MIDDLETON. The state of the art is such that we could start this.

Mr. ROGERS. Would you let us know what you need to start this?

Dr. MIDDLETON. I would be pleased to do that, Mr. Rogers.

Mr. ROGERS. In personnel and in monies and where you would like to see these established.

Dr. MIDDLETON. Yes.

Mr. ROGERS. Also, we would like to know the number of personnel that are required to bring us up to a proper monitoring effort, and the amount of money to support that from the Federal share, if you would let us have that for the record.

(The following information was received for the record:)

AIR MONITORING STATIONS

To determine the extent of people's exposure to air pollution and to assess the impact of air pollution control measures, it is necessary to have a continuum of data on air pollutant emissions and air quality. Gathering and evaluating these data are tasks that require a joint Federal-State-local effort. Accordingly, NAPCA is engaged not only in operating its own air monitoring network but also in supporting State and local monitoring activities.

Air monitoring networks must measure and document progress toward meeting ambient air quality standards in all parts of the Nation and must provide data that will help control officials predict the impact of decisions on air pollution control measures. A comprehensive nationwide air monitoring network would consist of 10,000 air monitoring stations. NAPCA would operate approximately 1,000, with State and local agencies operating 9,000. Of the NAPCA stations, between 150 and 200 would provide continuous monitoring of air quality. NAPCA also would provide laboratory support for analyzing samples from State and local stations for those pollutants (for example, trace metals, asbestos, pesticides,

aeroallergens) that require highly complex, difficult to standardize, laboratory procedures. In addition, NAPCA would have to provide additional financial support to the States (which would be included in control program grants under section 105 of the Clean Air Act).

In Fiscal 1970, resources available for air monitoring and analysis will be about 50 positions and \$2.1 million. In the absence of normal budgetary constraints (e.g., limitations on total funds available, competition among programs for available resources), resource levels for these activities could usefully be increased to a level of 180 positions and \$7.0 million in Fiscal 1973 and maintained at those levels for some years thereafter. States could use additional financial support of approximately \$7.5 million in Fiscal 1973 for air monitoring. It should be noted that these estimates do not represent a commitment by the Department to seek appropriations for, or to fund, this program at the above level.

With the expansion of air sampling stations, the data could be related to the environment by diffusion modeling, and environmental indices could be developed. To develop meaningful environmental indices, the interactions of the various pollutants in the atmosphere and their effect on the ecosystem must be known. Air monitoring, alone, will not allow the development of meaningful indices; ecological studies, basic studies of interactions of pollutants, and development of new environmental measuring techniques also are required.

Mr. ROGERS. Where else do you need personnel? Are you short in training, research or what? This is a direct question, now, and I am not trying to put you on the spot. But we want to know.

Dr. MIDDLETON. One of our critical needs at this time, Mr. Rogers, is that while we have the beginnings of a control program, we still are dependent upon having an adequate research and development program to provide needed control techniques and to broaden the base of useful sound, uncontroversible information on the health and welfare effects of air pollution.

Our health research programs are sufficient to allow us to develop, may I say, the first generation, of air quality criteria documents. They are inadequate to permit us to go on to what we might really need.

Mr. ROGERS. What we will need?

Dr. MIDDLETON. What we will need are to identify what gaps need to be filled and then to fill them. We have not had an opportunity to assess, as yet, the interaction of pollutants, except, to some extent, the interaction of sulfur oxides and particulate matter. Yet, we know that air pollution is everything in the air, not just these discrete entities.

Health effects research activities across the Nation and around the world have not probed very deeply into the interactions of these pollutants.

Mr. ROGERS. Let us know what personnel and what money to cover that personnel and what equipment would be necessary.

Would you furnish that for the record?

Dr. MIDDLETON. Yes.

Mr. ROGERS. I think it would be well to give us a summary of the importance of this type of research and its activity on the program, what it means in terms of health to the nation.

Dr. MIDDLETON. I think you can understand, Mr. Rogers, that in the health and welfare research area, one cannot normally expect the private sector to respond to the extent the Nation Air Pollution Control Administration requires. In the demonstration of control techniques for the abatement of pollutants from industrial sources, there is a significant private sector involvement which can participate in the activities our agency requires.

(The following information was received for the record:)

**PROGRAM TO GAIN COMPREHENSIVE KNOWLEDGE OF THE EFFECTS
OF AIR POLLUTION ON THE PUBLIC HEALTH**

Comprehensive knowledge of the effects of air pollution on the public health is essential to the establishment of meaningful air quality goals. The National Air Pollution Control Administration is stimulating and supporting the development of such knowledge through a diversified program which includes: (1) studies in its own laboratories, (2) contracts to both private research corporations and nonprofit institutions, (3) interagency transfers supporting research in other Federal agencies, and (4) research grants to nonprofit institutions.

The need for air quality criteria places a critical demand on biomedical research. The stock of information acquired during the last decade on the effects of air pollution on human health is impressive. However, this accumulation of knowledge has not obviated the need for additional studies of man both in his natural environment and under controlled conditions. Earlier studies were designed to demonstrate simply the presence or absence of air pollution effects on health, and emphasis was placed on those chronic respiratory diseases caused by a small number of pollutants. Research tended to focus on those effects which were easiest to measure, often at the expense of the more delicate and less detectable changes. The investigation of respiratory function, for example, probably was overemphasized in comparison to other physiological and biochemical parameters.

The current orientation of health effects research is to measure the more subtle changes and to study selected population groups (for example, children), and it is certain that the emphasis will shift increasingly to long-term studies of the exposure to low concentrations of many different pollutants. Accordingly, research must be undertaken into the effects of accumulation and storage in the body of pollutants which may present continuous or intermittent dangers to health. For example, can changes due to low-level exposure, where they do occur, be correlated with chronic respiratory diseases? Industrial exposures may provide a clue for potentially hazardous substances, but one cannot extrapolate results from the industrial setting because, among other factors, the population groups in industry differ selectively from the total population, and the exposure situation is not the same as the long-term, low-level exposures encountered outside. To date, most studies of the effects of pollutants on health have been carried out under industrial or laboratory conditions. These must be supplemented by intensive studies under the real-world conditions of community air pollution. The harmful role of asbestos, for example, in the industrial environment may be quite different from its role in the ambient atmosphere, where many other pollutants are also present.

In the area of epidemiology, NAPCA has initiated a major new effort to observe and measure, on a continuing basis, the health of the Nation's population in relation to air pollution exposure. For this purpose, a health effects surveillance network is being set up. Currently, the network is in operation in Birmingham, Alabama, and Charlotte and Greensboro, North Carolina. Before the end of Fiscal 1970, operations are scheduled to begin in three midwestern cities; selection of the cities has not been made, as yet. Additional cities will be added to the network in future years. The network will cover not just cities with chronically high levels of air pollution but also cities with intermediate and low levels; this will permit comparison of the state of persons' health in relation to varying degrees of exposure to air pollution. Initially, cities are being selected on the basis of relative levels of particulate matter and sulfur dioxide. Subsequent cities will represent various geographic areas, as well as different climatological conditions, and will also be selected on the basis of relative levels of photochemical oxidants, trace metals, hydrocarbons, and other significant pollutants. Within each area, monitoring will be conducted in various sections of both the central city and suburbs. This monitoring will consist of regular measurements of the levels of air pollutants plus continuous observation of fluctuations in selected health characteristics.

Understandably, public health activity has focused on a few pollutants—those that are commonly known—but the atmosphere contains a large number of other substances, some quite exotic. Since much of the desired knowledge about the health effects of these agents, singly or in combination, is not now available, it becomes apparent that there is a tremendous job to be performed. Another aspect of this task that helps to suggest its magnitude is that, in many instances, *a priori* reasoning does not indicate what specific health effect might be produced or in

which organ system it will occur. Such health effects can be related to increases in body burden, physiological changes, structural damages, or alterations of behavior or psychomotor functions.

In such cases, the task of documenting the effects of pollutants breaks down into two parts. The first is the identification of specific air pollutant effects in man or animal, and the second is the quantification of these effects in relation to ambient air levels. The first step in the National Air Pollution Control Administration's approach to the task is the preparation of a summary of what is known about the effects of a pollutant. Such a document identifies areas in which knowledge is missing and suggests research needs. The second step is to design studies which will gather those missing pieces of information. Priorities for studies are determined by how critical the desired information is for the preparation of the air quality criteria documents.

Even in those cases where sufficient data exist for preparation of air quality criteria documents, research must continue. After publication of an air quality criteria document for a specific pollutant, work is continued to obtain additional information about the effects of mixtures of the specific pollutant with other pollutants and to determine if the lowest levels of exposure that cause important health effects have been ascertained.

The National Air Pollution Control Administration's Division of Health Effects Research is organized into three branches. The Ecological Research Branch is responsible for community studies of health effects of air pollution, including the development and operation of a Health Effects Surveillance Network. The Medical Research Branch is responsible for human laboratory studies, including the development and testing of new techniques for use in field studies. The Biological Research Branch is responsible for conducting laboratory studies on animals. Such studies are necessary to identify effects of both short-term and long-term exposure to pollutants, singly and in combination, prior to any consideration of human studies.

In Fiscal 1970, resources available to the Division of Health Effects Research will be about \$5 million and 125 positions. In the absence of normal budgetary constraints (for example, limitations on total funds available, competition among programs for available resources), resource levels for research on the health effects of air pollution could usefully be increased to a level of 220 positions and \$9.1 million in Fiscal 1973 and maintained at those levels for some years thereafter. It should be noted that this estimate does not represent a commitment by the Department to seek appropriations for, or to fund, this program at the above levels.

Mr. ROGERS. Do we have the necessary instruments to measure air pollution?

Dr. MIDDLETON. No, we do not.

Mr. ROGERS. What work is being done there?

Dr. MIDDLETON. Our own organization and a number of commercial concerns are developing a variety of instruments. We have a very significant activity in testing the various kinds of measurement systems, in cooperation with the Inter-society Committee, and, a number of other professional organizations.

Mr. ROGERS. What do we need to do to get the necessary instrumentation?

Dr. MIDDLETON. We need more and more to move away from the old gas bubblers and liquid systems into some finite, physical chemical methods, mostly those methods that are operated by mechanical devices and are not dependent upon correction by men.

Mr. ROGERS. Do we have the technique or knowledge to develop these now?

Dr. MIDDLETON. Air pollution measurement and monitoring systems are in their infancy in this country. They need to be greatly improved.

Mr. ROGERS. What amount of your budget is devoted to research on instrumentation?

Dr. MIDDLETON. An altogether too small an amount of budget.

Mr. ROGERS. Approximately?

Dr. MIDDLETON. I would have to break that out from information that I do not have with me here. I can supply that.

Mr. ROGERS. Would it be more than a million?

Dr. MIDDLETON. Yes. About one million or one million and a quarter.

Mr. ROGERS. If you will let us have that figure and also what you think is necessary to bring this up to a proper program and the number of personnel involved and any costs involved.

Dr. MIDDLETON. Yes.

Mr. ROGERS. With a statement of importance.

(The following information was received for the record:)

INSTRUMENTATION AND ANALYTICAL TECHNIQUES

Currently available air pollution instrumentation and analytical techniques are not adequate to meet current and anticipated future needs in air monitoring, source testing, measurement of meteorological parameters, and laboratory research. This problem is accentuated by increases in the number of pollutants coming under surveillance and the expanding activity of air pollution control agencies.

The development of new instrumentation is critical to the continued progress of air pollution control and to evaluation of that progress. More accurate, reliable, compact, and less costly instrumentation is needed for air monitoring. Enhanced capabilities are needed: Long-path instruments are needed to determine air quality and meteorological variations in space as well as time; remote optical measuring equipment is needed to facilitate measurement of source emissions. New instruments will be needed to permit implementation of future motor vehicle emission regulations. Standardization of instrument techniques also is urgently required.

Most instruments in use for air quality monitoring were developed between 10 and 15 years ago and are limited largely to four of the most common types of air pollutants. NAPCA intends publishing air quality criteria to cover, in total, more than 25 pollutants over the next five years. Also, these instruments lack accuracy, sufficient sensitivity to reflect progress in controlling air pollution, or the specificity needed to satisfy air quality criteria requirements. In addition, many of these older instruments have calibration and maintenance problems associated with their use. Remote instrumentation is not available to measure stack emissions of particulate matter or nitric oxide, and available instruments are not completely adequate for measuring sulfur dioxide. No equipment is available for continuous field measurements of specific particulate substances, such as lead, sulfate, nitrate, polynuclear aromatic hydrocarbons, and aeroallergens. Miniaturized pollutant dosage instruments are not available for health effects surveillance activities.

In the past, it was hoped that the instrument industry would expend its own funds to provide new air pollution instrumentation. Though a few industrial air pollution instrument projects are carried out, past and present projections indicate too small a market potential to justify extensive use of private funds for research and development. It is clear that instruments needed in air pollution will not be provided without an adequate level of Federal funding.

An increased expenditure of Federal funds will be needed to conduct and support the necessary research and development in all areas of significant technological need. An adequate level of funding would permit exploration of two or three approaches, in many cases, to insure appropriate probability of success and to provide a range of instrumentation for use in various situations. In addition, an adequate program would include expanded efforts to take advantage of spin-off from instrumentation programs of other Federal agencies, particularly the Department of Defense and the National Aeronautics and Space Administration.

In Fiscal 1970, resources planned for NAPCA's instrumentation development, evaluation, and closely related activities total some \$3 million and 25 positions. Many of these staff members are in NAPCA's Division of Chemistry and Physics, which conducts most instrument projects and is responsible for coordination of all instrumentation activities in NAPCA. About half of these staff members are in-

volved in developing new instruments for air quality monitoring; the progress made in this area within the last two years is the result of a combined effort by this NAPCA group and contractors. Future success in instrumentation research requires that NAPCA staff engage actively in the main aspects of experimental activity. Experimentally oriented staff members also are well equipped to select the best proposals from contractors, provide capable project officers, and insure progress across project lines. In the absence of normal budgetary constraints (e.g., limitations on total funds available, competition among programs for available resources), resource levels for instrumentation research and development could usefully be increased to a level of 47 positions and \$6 million in Fiscal 1973 and maintained at those levels for some years thereafter. It should be noted that this estimate does not represent a commitment by the Department to seek appropriations for, or to fund, this program at the above levels.

Mr. ROGERS. It seems to me if we are going to get at this problem, this is the first thing we need to do, to be able to have a monitoring device to be able to recognize where the pollution is.

Dr. MIDDLETON. That is very true, Mr. Rogers. We collect particulate samples, which Dr. Carter showed an interest in earlier. We collect them on a screen. The samples require analyses. We have years and years of these things stacked up waiting for the methods and our operational capability to make the trace metal analyses.

So, we have a backlog of information to assess if we have the tools developed to make that assessment.

Mr. ROGERS. We need to know what we need to do to get that.

Who makes the evaluation of all of the data?

Dr. MIDDLETON. The evaluation of the data is done in our Bureau of Criteria and Standards.

Mr. ROGERS. Are you properly staffed there? Is there any backlog? Can they handle what needs to be done?

Dr. MIDDLETON. There is a very considerable backlog. Even the Congress has complained about the rate of our producing reports on the air quality data that we could collect.

Mr. ROGERS. What is the backlog? Could you estimate it?

Dr. MIDDLETON. We have about 3½ to 4 years backlog in analysis of trace metals. We have no capability at the present time to make analyses of many of the air quality data that we have in the sense of making projections and predictions. We feel lucky to stay with the data that we have and report them as quickly as we can. We have a real need to make better use of the data we collect, not just by stating what we find, for this information can be used in diffusion modeling, to make the projections which will be helpful in the State and local planning.

Mr. ROGERS. To know how to control it in the future. I would think this is very important. Is it?

Dr. MIDDLETON. I think it is extremely important.

Mr. ROGERS. Would you let us know what personnel and monies are needed to bring your effort up to where you can become current in this activity?

Dr. MIDDLETON. I will endeavor to put that together for you. (See "Air Monitoring Stations", on p. 75, this hearing.)

Mr. ROGERS. In approving State operations, do you have any criteria that they must go by as to having so many engineers or so many technical people in their operations in order to get a grant from the Federal Government?

Dr. MIDDLETON. In our Division of Control Agency Development, we have a staff that is employed solely for that purpose.

Mr. ROGERS. Yes, but do they do it?

Dr. MIDDLETON. They do. By regulation, we say what a program must have to qualify for grant funds. We make suggestions to agencies as to how they might be structured depending upon the size of the community and the nature of the problem, and we recommend to them the nature of the staffing that would be ideal.

Mr. ROGERS. But they don't have to do it, if they don't want to.

Dr. MIDDLETON. No.

Mr. ROGERS. But you don't have to approve their plan either, do you?

Dr. MIDDLETON. We will not approve their plan if their growth and development are not in keeping with the goals we agreed upon in the first place.

Mr. ROGERS. Or if the people are not technically competent.

Dr. MIDDLETON. That is judged in another way. If they don't have the competent people, they simply don't attain the goals. So, in fact, their likelihood of their being funded in the future is small, if they don't have the people.

Mr. ROGERS. I would think you would want to watch that and encourage the competency to be developed in these States.

Dr. MIDDLETON. That is why we have the training program addressing itself, hopefully, to providing some 8,000 people that would be required.

Mr. ROGERS. What are we doing as far as the Federal Government is concerned to control air pollution? Are you working with GSA, the Defense Department, and other governmental departments?

Dr. MIDDLETON. Yes. We have the responsibility of advising the Bureau of the Budget on the Federal plan for the control of air pollution at Federal facilities. As to which departments we work with, I think you can understand that most of our work is with the Department of Defense, the Post Office, and the General Services Administration simply because they have the largest number of installations. The General Services Administration has been notable in its response to requirements for clean air.

The Department of Defense has been extremely helpful in bringing about a change in the quality of fuels used by the Federal establishment. It is through their defense suppliers organization that the Federal Government now for the first time is having a real impact on being certain that Federal facilities do in fact use the kinds of fuels that meet the air quality requirements.

Mr. ROGERS. Can you require the governmental departments and governmental agencies to meet certain standards?

Dr. MIDDLETON. Yes, we can, in specific areas.

Mr. ROGERS. Do you?

Dr. MIDDLETON. We do.

Mr. ROGERS. Are they now meeting them?

Dr. MIDDLETON. They must meet them in these areas except where an exemption is requested in which case there has to be a specific petition made by the agency involved, stating which requirement it can't meet, and the Secretary then may grant an exemption for a specified period of time.

Mr. ROGERS. Who checks to see if they meet it?

Dr. MIDDLETON. We do, in our Office of Federal Facilities.

Mr. ROGERS. Do you have sufficient personnel to do this checking?

Dr. MIDDLETON. We do the best we can.

Mr. ROGERS. I know that. Do you have sufficient personnel? I am trying to help you, Dr. Middleton.

Dr. MIDDLETON. I appreciate that.

Mr. ROGERS. I am giving you direct questions where your bosses won't get on you. So, you can give me a direct answer.

Dr. MIDDLETON. The answer is no. We don't have enough people.

Mr. ROGERS. That is what I want to know. I would like to know how many you need. I would think you don't have enough people.

This problem is growing and the American people are very concerned about it. This committee really wants to know what is necessary to meet it. It may be that budget requirements are going to put some limit on what the Federal Government can do. But at least we want to know in all areas, and I want you to furnish that for the record, in all areas of air pollution what personnel are needed, what funding is needed, what instrumentation, what facilities are needed. You let us know that, then we will make a judgment and the Bureau of the Budget and the President will make a judgment.

But if you will give us the facts of what is needed, then that will help us, I think.

I want you feel you don't want to get out of certain categories, but we are asking specifically for this. I am sure the Department will stand behind you in submitting that information.

Dr. STEINFELD. That is correct.

Mr. ROGERS. So, let us have that.

(For the information requested see p. 102.)

Mr. ROGERS. I would like to know, too, what governmental agencies are operating under exemptions and for how long and if they have applied for any more.

Dr. MIDDLETON. I will give you that list. It is a very short list. (The following information was received for the record:)

The only Federal facility now operating under an exemption is the Great Lakes Naval Training Center. This facility currently has an exemption from the sulfur oxides pollution control regulations applicable to Federal facilities in the Chicago Area Air Quality Control Region. The exemption was granted in 1969 to permit use of approximately 7,000 tons of high-sulfur coal already on the premises, with the proviso that the coal would be used at a rate not to exceed 100 tons per day. On December 23, 1969, in response to an inquiry by telephone, the National Air Pollution Control Administration was advised that some of the coal still had not been used because the rate of use had been substantially less than 100 tons per day. The exemption will remain in effect until the supply is exhausted. Thereafter, only low-sulfur fuel oil will be used.

Mr. ROGERS. I want to know also, suppose we authorize GSA to buy automobiles and with certain requirements more strict than your normal requirement for production for the American people. Don't you think that might be a good idea and create a market?

Dr. MIDDLETON. I think the idea of creating a market is highly desirable and I would hope that the GSA would look to what HEW can offer by way of emission standards to meet as a way of making this a collaborative Federal effort.

Mr. ROGERS. I would hope you would work together. This would be our intent. This committee, as you may know, first started this with safety features. We got the program going nationwide starting from this beginning.

And I think we may want to consider this idea of doing it, except having stricter standards that you could set, that they can meet ahead of the normal production perhaps which would encourage this.

California, I understand, has stricter standards than we do nationally. Is that correct?

Dr. MIDDLETON. The Secretary has granted a waiver to the State of California because of its more compelling problem, to set more stringent standards than those now in effect nationally. The standards that the Department contemplates having in future years, however, would be more stringent than the ones in effect in the State of California.

Mr. ROGERS. When can we expect that to come forth?

Dr. MIDDLETON. I think the Secretary is expecting to make this announcement in the next several months.

Mr. ROGERS. So, we can expect some action when; within one month?

Dr. MIDDLETON. In the President's Environmental Quality Council it was stated that these standards would be announced within six months.

Mr. ROGERS. How long ago was that?

Dr. MIDDLETON. November 22.

Mr. JOHNSON. I think we need to make the record perfectly clear on this, Mr. Rogers.

The Secretary will announce standards that will be much more strict to take us down the road in terms of improving this situation, but it doesn't mean that the standards themselves would be in effect in six months. It very well may be that the standards will be in effect in some future production year.

Mr. ROGERS. I understand. But at least it would go into effect and then you give them a period of time to comply.

Mr. JOHNSON. That is correct.

Mr. ROGERS. This would be understandable.

Have you given any assistance in developing vehicle inspection programs?

Dr. MIDDLETON. Yes, we have.

Mr. ROGERS. What assistance?

Dr. MIDDLETON. To assist the State of New Jersey we have had a demonstration grant for exploration of what could be developed by way of an inspection program.

Mr. ROGERS. How many programs do you have operational?

Dr. MIDDLETON. We have only that program that directly relates to passenger car inspection in New Jersey. We have awarded a demonstration grant to the State of California to look at the possibility of evaluating diesels and others.

Mr. ROGERS. Let us have a rundown of those and what you think is being accomplished, if anything has.

(The following information was received for the record:)

DEMONSTRATION PROJECT

Project Title: New Jersey Motor Vehicle Emission Inspection Project.

Agency: State of New Jersey, Department of Public Health, Division of Clean Air and Water (Richard J. Sullivan, Director).

Grant Data: Federal Funds Provided \$813,581.

| Grant No. | Period | Budget | | |
|----------------|------------------------------------|------------|-----------|-------------|
| | | Federal | Local | Total |
| 67A-3301D..... | Dec. 6, 1966 to July 31, 1967..... | \$235, 300 | \$78, 434 | \$313, 734 |
| 68B-3301D..... | Aug. 1, 1967 to June 30, 1968..... | 174, 000 | 58, 012 | 232, 012 |
| 68B-3301D..... | July 1, 1968 to June 30, 1970..... | 404, 281 | 139, 513 | 543, 794 |
| Total..... | | 813, 581 | 275, 959 | 1, 089, 540 |

PROJECT ELEMENTS

(1) Evaluation of the feasibility of enforcing motor vehicle pollution control requirements by tests at the established State motor vehicle safety inspection stations.

(2) The procurement and evaluation of low cost smoke meters and smoke guides for on the road measurement of smoke from diesel powered vehicles.

(3) Development of an exhaust emission testing procedure and testing system for rapid emission tests in a safety lane.

(4) The installation and testing in six pilot locations in New Jersey Motor Vehicle Inspection Lanes and also in the States Motor Vehicle Laboratory, of a prototype system developed under this project for the purpose of demonstrating the practicability of the system under actual operational conditions, and to develop data for the establishment of legal standards.

(5) The construction of a mobile unit equipped with a prototype system to demonstrate its use at schools for mechanics, to test vehicles at automobile dealer showrooms and for related educational and surveillance purposes.

(6) Evaluation of the effectiveness of engine maintenance procedures recommended by the automotive service industry on vehicles which fail to meet hypothetical New Jersey standards when tested in the pilot safety inspection lanes. Results will be measured on effectiveness of work performed at (a) diagnostic tune-up centers, (b) new car dealers and (c) routine service stations and garages.

PROGRESS

(1) Testing cycle and equipment to perform inspection lane testing have been developed. The test takes 90 seconds. During the coming year, results of this quick test will be compared with results of seven-mode cycle test currently used to determine compliance with Federal standards.

(2) A diagnostic clinic has been constructed and will be operational later this month. Motorists whose vehicles fail the 90-second test will be invited to have their vehicles adjusted and retested. Results will assist the State in determining whether to develop courses on emission control systems for auto mechanics throughout the State.

Mr. ROGERS. What about registration of fuel additives? Are the oil companies coming and telling you what they are putting in their gasoline?

Dr. MIDDLETON. The Secretary has before him, as Dr. Steinfeld told you this morning, the proposed regulation to start the registration of fuel additives. It has not yet been signed.

Mr. ROGERS. Is there any difficulty there? Do you anticipate this will come out?

Dr. STEINFELD. Yes, I do.

Mr. ROGERS. It should be very soon.

Dr. STEINFELD. Yes.

Mr. ROGERS. So, we will know what additives are involved. I would think this would be very important in doing research and knowing how to cure the problems.

Dr. MIDDLETON. It is very important, and I am pleased that the National Advisory Committee on Fuel Additives has been helpful in getting these regulations prepared.

Mr. ROGERS. Are you having any resistance from any of the companies?

Dr. MIDDLETON. No, I think they understand what the nature of the game is. This is the time to comply.

Mr. ROGERS. How many requests have been made of industry to permit access to records?

Dr. MIDDLETON. I don't have that information available.

Mr. ROGERS. Could you furnish it to us?

Dr. MIDDLETON. Yes.

(The following information was received for the record:)

REQUESTS OF INDUSTRY TO SUPPLY INFORMATION RE AIR QUALITY CONTROL

The National Air Pollution Control Administration (NAPCA) often requests private firms and trade associations to furnish information on air pollutant emissions, design and use of control equipment, cost of controlling emissions, and so on. Such requests are made either directly by NAPCA or on behalf of NAPCA by contractors. They are made in connection with various activities under the Clean Air Act, as amended, including abatement activities, research and development, compilation of national and regional air pollutant emission inventories, and preparation of estimates of the cost of preventing and controlling air pollution. In large measure, industry response to such requests has been good, but there have been instances of refusal to provide requested information. Often, information is refused on the ground that it does not exist or because assembling it would be an undue burden on the company. There have been cases, however, in which refusal seemingly reflected an unwillingness to cooperate. The following is a brief resume of some typical experiences:

1. In the Parkersburg, West Virginia-Marietta, Ohio area, where interstate air pollution abatement action was initiated by the Secretary of Health, Education, and Welfare, an emission inventory was undertaken in February 1966. Questionnaires were sent to 34 industrial plants, including one operated by the Union Carbide Corporation, a major source of air pollution in the area. All 34 recipients completed and returned the inventory forms. At the abatement conference in March 1967, there was considerable dispute about emissions from the Union Carbide plant. Following the conference, NAPCA personnel asked Union Carbide officials for data on plant operations in order to obtain a technically sound basis for emission estimates. Plant officials refused to furnish the data and requested that further inquiries be made through the Ohio Air Pollution Control Board. In 1969, to prepare to reconvene the abatement conference, NAPCA requested and received updated information from 33 of the industrial plants in the area and from four large electric generating plants located just outside the area. In accordance with the procedure suggested by Union Carbide officials, questions on the Union Carbide plant were sent to the Ohio Air Pollution Control Board. At a meeting in September 1969, Union Carbide officials declined to furnish the Board any information for use in the abatement proceedings. NAPCA Commissioner John T. Middleton subsequently sent the company a registered letter directing that available information be furnished, in accordance with Section 108(j) of the Clean Air Act, as amended; the company has complied.

2. In August 1966, NAPCA sent emission inventory questionnaires to 54 industrial plants in the Steubenville, Ohio—Weirton-Wheeling, West Virginia area. Emissions data were provided voluntarily by all the companies contacted except Pittsburgh Steel (Wheeling Division) and National Steel (Weirton Division). Both companies refused to provide such data, apparently on the ground that they were not required to do so unless and until an abatement conference had been called.

3. In the Ironton-Ashland-Huntington area (Ohio-Kentucky-West Virginia), emissions data questionnaires were sent to 38 companies with plants in the area and one electric generating plant outside the area. Completed questionnaires were received from all companies except the Arnco Steel Corporation, Ashland, Kentucky. Arnco cooperated in the initial phases of this study and allowed NAPCA personnel to visit its plant but later declined to complete the questionnaire, apparently on the same ground as that cited above with regard to steel companies in the Steubenville-Weirton-Wheeling area; however, the questionnaire was later completed when section 108(j) of the Act was invoked.

4. In the Kansas City area, a questionnaire was sent to 819 industrial and commercial establishments. Through responses to the questionnaire and/or follow-up telephone calls, needed information was obtained on all major air pollution sources.

5. In connection with interstate air pollution abatement action in the New York City-northern New Jersey area, questionnaires were sent to 120 major industrial sources of air pollution in New Jersey. All provided the information needed for the survey.

6. In the Philadelphia area, a NAPCA questionnaire was sent to 750 industrial establishments in Pennsylvania and New Jersey. There was a response rate of about 50 percent. Responses were received from all major industrial sources of air pollution except the Texaco refinery in New Jersey; the company apparently objected to what it considered a duplication of previous air pollution surveys and communicated its objection to NAPCA. Though the need for more detailed data than had been obtained in previous studies was explained in NAPCA's reply, the company declined to complete the questionnaire. The United States Steel Corporation voluntarily supplied data sufficient for estimating emissions from its Fairless Hills plant but stipulated that the data not be published in such a manner as to permit identification of the plant or the corporation.

7. In connection with a study sponsored by the International Joint Commission (IJC), NAPCA sent questionnaires to more than 1,500 establishments in the Detroit area. Thirty-eight percent were returned with the requested information; as in other surveys of this type, the rest of the questionnaires were never returned or were returned unanswered because the addressees had moved, were out of business, maintained just sales offices in the area, etc. Following the survey, questions arose regarding the use to be made of the information. Accordingly, the IJC asked each respondent to consent to, or decline to permit, publication of portions of the information furnished. Exercising its prerogative to decline, the Detroit Edison Company withdrew data previously furnished on 18 electric generating and heating plants. No reason was given for the company's action. The Great Lakes Steel Corporation refused to complete a questionnaire but did provide some information when NAPCA personnel interviewed plant officials. About 85 percent of the major industrial sources in the area provided the requested information.

8. In the Chattanooga area, NAPCA asked the Chattanooga Bureau of Air Pollution Control and the Air Quality Subcommittee of the Chattanooga Air Pollution Control Board for their support in the conduct of an emissions survey. They welcomed the survey and agreed to solicit the support of industry and the local Chamber of Commerce. NAPCA's questionnaire was reviewed by the Chamber of Commerce and various industry officials. Just before the questionnaires were to be mailed, the Chamber of Commerce requested a delay; NAPCA was advised that some industrial firms had indicated they would not respond because of a lack of assurance that information they furnished would be kept confidential. NAPCA uses a questionnaire approved by the Bureau of the Budget. The questionnaire contains a statement as to the conditions under which information is received; this statement is reproduced in Appendix A. NAPCA subsequently received a letter from the Chattanooga Manufacturers Association, which confirmed that its industrial members would be encouraged not to complete the questionnaire unless further restrictions on use of the data were imposed. Accordingly, it was agreed that the survey would be conducted instead by the Chattanooga Bureau of Air Pollution Control, with the data to be made available to NAPCA on a restricted-use basis. The restrictions included collection of data by type of industrial operation and location (but without identification of the company), use of the data in technical reports in aggregate form only, and no use to be made of the data in Federal abatement action or local judicial proceedings. Even though the survey was conducted in such a way as to assure maximum confidentiality, the overall response was not good. Only 37 percent of industrial firms completed and returned the questionnaire used in the survey. Even after follow-up telephone calls from the

Chattanooga Air Pollution Control Bureau, at least six major air pollution sources refused to provide information. They were the Wheland Foundry Company, U.S. Pipe and Foundry Company (two plants), Signal Mountain Portland Cement Company, Vulcan Materials Company, and Rossville Development Corporation.

9. The Manufacturing Chemists Association (MCA) has cooperated with NAPCA for several years in technical studies of air pollutant omissions arising from production of sulfuric, nitric, and phosphoric acids and other chemical process operations. Now in progress are studies of the phosphate fertilizer and the chlorine and caustic soda industries. Though industry cooperation generally has been good, there have been problems. The study of phosphate fertilizer plants in Florida proceeded very slowly for several years because the companies involved would not furnish reliable emissions data or permit stack testing to be conducted at their plants; now, however, it appears that NAPCA will be able to proceed with the study. MCA's refusal to include data on cost of emissions control in information given to NAPCA also has been a problem; such data are needed to permit NAPCA to prepare the reports on air pollution control techniques required by section 107(c) of the Clean Air Act, as amended. In the study of chlorine and caustic soda manufacturing, NAPCA personnel were refused entry to plants leased from the Federal Government and operated by private firms; in this instance, NAPCA's interest was in obtaining information on certain unique processes, being used to control chlorine emissions. The Diamond Alkali Company, which manufactures chlorine at facilities leased from the U.S. Army at Edgewood Arsenal in Maryland and Pine Bluff Arsenal in Arkansas, declined to participate in the NAPCA-MCA study or to permit emissions tests to be made at its Edgewood Arsenal facility. A proposal that the Army make the tests also was rejected by the company.

10. In studies aimed at identifying needs for new or improved techniques to deal with industrial air pollution problems and in research and development on control techniques, NAPCA generally has received good to excellent cooperation from individual companies and industry associations. Several industry associations have cooperated with NAPCA in planning and conducting studies of air pollution problems and control technology needs. Nearly all companies contacted during studies of the non-ferrous smelting, iron and steel, and pulp and paper industries provided information.

11. Several companies have been of significant assistance in NAPCA's studies of factors affecting the use of limestone as a sulfur oxides sorbent material. Among them have been the Florida Power Corporation, Basic Chemicals (Cleveland), G. and W. H. Corson (Plymouth Meeting, Pennsylvania), General Motors Corporation (St. Louis plant), and Republic Coal Company (Chicago).

12. In studies of fabric filters, NAPCA generally has not received cooperation, from fabric filter manufacturers. The Industrial Gas Cleaning Institute (IGCI), an association of air pollution control equipment manufacturers, was asked for help in obtaining information from member companies. IGCI gave a number of reasons why the companies should not provide information; the reasons cited included lack of personnel to assemble the information, a need to protect proprietary information, a feeling that the gas cleaning industry is the best judge of needed research relating to gas cleaning techniques, and concern that Federal research and development might result in restrictions on free market competition in the gas cleaning industry. IGCI ultimately decided to suggest that member companies make their own decisions on providing information. Nine of the 11 member companies were contacted, but only three were willing to provide information. Pulverizing Machinery Company was particularly cooperative. American Air Filter was willing to have discussions with NAPCA but made no data available. Several non-member companies, including W. W. Sly, Air Preheater, Dusty Dustlers, and U. S. Hoffman, provided data. Most of the fabric filter manufacturers that refused to cooperate stated that they were too busy or did not have the manpower needed to assemble the requested information (though most were willing to assemble the information if they were to be paid to do so); this group included, among IGCI members, Research Cottrell, Buell Engineering, Pangborn, and Wheelabrator, and, among non-members, Aerodyne Machinery and United McGill.

13. NAPCA's experience in trying to obtain information for control technology studies also has included: Refusals by Republic Steel Corporation to provide information for several NAPCA studies; excellent cooperation from Kaiser Steel Corporation; refusal of data by the American Smelting and Refining Corporation

after it indicated that it had a significant amount of information; and cooperation from Research Cottrell in providing non-proprietary information for studies of electrostatic precipitators.

14. NAPCA has had mixed experience in obtaining information needed to make nationwide estimates of air pollutant emissions. In general, there has been a good response to requests for information in the primary air pollutants (e.g., sulfur oxides, nitrogen oxides, carbon monoxide, particulate matter, and hydrocarbons). Efforts to obtain data on other pollutants have been less successful. Under a contract from NAPCA, W. E. David and Associates currently is developing a nationwide inventory on the sources and magnitude of cadmium, nickel, and asbestos emissions. The questionnaire cited above in item 8 is being used in this project. Adequate data on nickel are being provided by various industrial firms, but this is not the case with respect to cadmium and asbestos. The major primary processors of asbestos are providing only token information; on the other hand, minor processors operating mines and mills in western States have been cooperative. Certain manufacturers of products containing asbestos have been uncooperative. Firms that have not provided adequate information include GAF Corporation, Union Carbide Corporation, and Ford Motor Company. Johns-Manville Company has agreed to furnish, but not in writing, an estimate of asbestos emissions from one plant of the 30 it operates. With respect to cadmium, there has been less than a 50 percent rate of satisfactory response from primary producers, reproducers, and ultimate users. This does not include the electroplating industry, which is a major user of cadmium but not a major source of cadmium emissions to the atmosphere, but it does include cadmium chemical formulators, manufacturers of cadmium-containing plastic bottles, refinery formulators of motor oils, diesel fuels, and heating oils, rubber manufacturers, and manufacturers of cadmium-containing pesticides. Firms that have not provided adequate information include Anaconda Corporation, Ferro Corporation, American Smelting and Refining Corporation, St. Joseph Lead Company, Firestone Rubber Company, Tenneco Chemicals Corporation, Union Carbide Corporation, Goodyear Rubber Company, and B. F. Goodrich Rubber Company.

APPENDIX A

A. Response on all parts of the survey form is voluntary.

B. Information provided to the National Air Pollution Control Administration in connection with this form is made confidential by section 1.103(c) of the regulations of the Public Health Service (42 CFR). In application of such section, public disclosure of information supplied in response to this survey, except as hereinafter provided, will be made only in the aggregate for statistical reports and other informational purposes which do not involve identification of plants.

(1) Public disclosure of data which identifies plants may be made as necessary in connection with official administrative or judicial proceedings in order to carry out the following functions of the National Air Pollution Control Administration:

a. Development and enforcement of ambient air quality standards and plans to implement such standards for designated air quality control regions as authorized by sections 107(a)(2) and 108(c) of the Clean Air Act, as amended;

b. Development and support of emergency measures to be imposed during acute air pollution episodes as authorized by section 108(k) of the Clean Air Act, as amended; and

c. Abatement of air pollution under section 108 (d), (f), and (g) of the Clean Air Act, as amended.

(2) Upon tender of assurance that public disclosures of identifying data will be made only in connection with official administrative or judicial proceedings pursuant to local, State, or Federal law, the emission data, including identification of plants, may also be disclosed to the following:

a. State or interstate air pollution control or planning agencies charged with responsibility for developing, enforcing, or implementing ambient air quality standards and plans, including emergency measures for designated air quality control regions;

b. Agencies or officials that receive technical assistance;

c. Agencies or officials of jurisdictions located wholly or partially within areas under investigation for an abatement proceeding; and

d. Agencies or instrumentalities of the United States.

C. If you feel that data reported on this form do not adequately describe your operation, please attach additional statements to this form. Should future events warrant amendment of the information submitted in this survey, please request the necessary forms.

From: *Air Contaminant Emissions Survey*, Form Approved, Budget Bureau, No. 85-R31.

Mr. ROGERS. Have you had any refusals?

Dr. MIDDLETON. Very often.

Mr. ROGERS. From what companies?

Dr. MIDDLETON. I can enunciate those for you.

Mr. ROGERS. I think the committee would like to know if you are not getting cooperation from the industry and why not.

Dr. MIDDLETON. We have a basic difficulty in access to records in many industries, but in those corporations and companies that have a desire for air quality improvement, that doesn't seem to be a big problem.

Mr. ROGERS. Let us know, and we will point up the problem. I think it needs to be pointed to.

What about airlines? Can't we do something about that?

Dr. MIDDLETON. I am sure something can be done about that.

Mr. ROGERS. Do you have current authority?

Dr. MIDDLETON. We don't have current authority to specifically regulate aircraft emissions.

Mr. ROGERS. Are you suggesting language to the committee to give you this authority or should it be placed in the FAA?

Dr. STEINFELD. At this point, we still have this under discussion.

Mr. ROGERS. I am sure you do. I am asking for your viewpoint. Can you handle it or should it be given to FAA?

Dr. STEINFELD. I think, in this instance, all of the activities should be in one department. I think the standard setting certainly should remain where it is.

Mr. ROGERS. To put enforcement in FAA or would you also enforce it? Can you enforce it?

Dr. STEINFELD. I think this probably would depend on the Congress and the administration.

Mr. ROGERS. I know that. But can you? Do you have the capability for enforcing? Do you think it is better to put the enforcement in an agency like FAA?

Dr. STEINFELD. I think we will go to the expert here.

Mr. ROGERS. We have a quorum that we are going to have to answer. We will stand in recess until the end of the quorum. Then we will be right back and try to finish up.

(Whereupon, a brief recess was taken.)

Mr. ROGERS. The subcommittee will come to order, please. We were talking about airline pollution, from aircraft. If you have any suggested language, I think it would be well to let the committee have that.

From what I have understood, there is a present device that can be used to clear up most of the pollutant material from aircraft, at least the particulates.

Are you aware of this?

Dr. MIDDLETON. Yes, we are. In our report to the Congress in January 1969, we gave rather an extensive accounting of that technique and its capability. It is approved by the Federal Aviation Administration as being safe. Both Pratt and Whitney and the General Electric Company are able to make these smokeless combustor cans. Our recommendation to the Congress, at that time, was that we since this technology was already developed and could be put into use, we thought that the airline industry should have voluntary compliance on the part of an opportunity to install the new combustors voluntarily.

On August 28th, we had a meeting with the airline industry for the purpose of discussing that very issue and inviting their participation in a rapid exchange of dirty combustors for clean combustors.

The airlines were not responsive to our requests. Except for three who were individually represented. The Air Transport Association represented the airlines. We could come to no agreement on having a voluntary action. I considered the meeting not only a disappointment but also a clear expression of disinterest on the part of the airlines.

In our January 1969 report, our recommendation to the Congress was that in the event that the effort to stimulate voluntary action failed, the Department would be in the position of having to ask the Congress for regulatory authority.

Mr. ROGERS. Will you let us have that language?

Dr. MIDDLETON. Yes, we will.

Mr. ROGERS. Because I agree with you, I think if the industry will not cooperate where there are existing devices, then we must give it the authority to the department to bring about some action.

(For the information requested see p. 102.)

Mr. ROGERS. Can the principle of that anti-air pollution device be applied to the buses, that same principle?

Dr. MIDDLETON. I can't answer that, since I am not an engineer. But I think the principle is the same but the actual mechanics of it are very, very different. It is a different way of combusting the fuels in a system that allowed for better burning. In the diesel, we are also talking about better burning but it won't be in the combustor can, as it is in the turbine.

Mr. ROGERS. What needs to be done to clear up the pollution from buses and trucks?

Dr. MIDDLETON. Mr. Rogers, this will be stated in a manual we are developing, which I would expect will be completed either late this year or early next.

Mr. ROGERS. Is this a voluntary approach?

Dr. MIDDLETON. This is voluntary.

Mr. ROGERS. Do you have authority to require it?

Dr. MIDDLETON. We do not have any authority to require that any used vehicle be brought into any particular kind of compliance.

Mr. ROGERS. What about the new vehicles?

Dr. MIDDLETON. In the case of the new motor vehicles, we can establish national standards and conduct enforcement activities, though the problems we identified before do stand in the way of an effective effort.

Mr. ROGERS. So in effect you have authority to require the proper pollution control put on new buses, and new trucks?

Dr. MIDDLETON. Beginning on the first of January, 1970, such requirements will be in effect.

Mr. ROGERS. Give us language that would give you what you think is necessary authority to correct used buses and trucks as to their air pollution problem.

Dr. MIDDLETON. In terms of commercial vehicles?

Mr. ROGERS. Yes, basically. Buses and trucks, large trucks, where the used vehicles have been on the highway and maybe a device could be placed on them that would clear it up. We want to know the language necessary to give you the authority to require that. Because we want to do something about this air pollution problem from trucks and buses.

At least I do, and I think Dr. Carter indicated his concern particularly on this and Mr. Nelsen.

(For the information requested see p. 102.)

Mr. ROGERS. Dr. Carter, do you have any questions?

Mr. CARTER. I have just one, I believe. I notice that you say that 23 grams of carbon monoxide and 2.2 grams of hydrocarbons are emitted per vehicle mile or will be. That is the permissible level in 1970. I believe you will follow the same figures perhaps in 1971. I wonder if you have any figures about the corresponding emissions of 27's per vehicular mile? 727's and 737's land at National Airport.

Dr. MIDDLETON. Dr. Carter, I do not have that information with me. There were extensive data given in the January 1969 report on emissions from jet aircraft; I will identify those and provide them for the record, if you wish.

I would like to point out that our concern with the jet aircraft relates not only to smoke, though that is the one thing that can be controlled now. We have to look at jet aircraft as being a factor adversely affecting the health and welfare when they are on the ground as well as in the air.

This arises not just from smoke, but also nitrogen oxides and the other pollutants that come from the combustion system.

Mr. CARTER. I did not mention smoke either time. I mentioned hydrocarbons, and carbon monoxide. I should have also mentioned particulate matter in addition to that and the other oxides of nitrogen.

We would like to see those figures, too.

If you have them.

Dr. MIDDLETON. We will supply that information.

(The following information was received for the record:)

JET AIRCRAFT AIR POLLUTION PROBLEMS

The major air pollution problems associated with jet aircraft occur during the landing-take off (LTO) cycle. The LTO cycle consists of descent from 3,000 feet, landing, taxi, idle, take off, and climb to 3,000 feet. The approximate emissions from a 727 aircraft powered by three JT8D engines during the LTO cycle are: 768 grams per mile of carbon monoxide, 157 grams per mile of hydrocarbons, 146 grams per mile of nitrogen oxides, and 88 grams per mile of particulates.

Mr. ROGERS. The national emissions standards study—when is this to be expected?

Dr. MIDDLETON. Within the next 8 weeks.

Mr. ROGERS. Are there any other matters that you think are important in this field that are not being handled properly or that you may need additional authority for?

Mr. JOHNSON?

Mr. JOHNSON. I believe you have had a pretty thorough hearing, Mr. Chairman. Certainly if anything comes to mind, we will get in touch with the committee.

Mr. ROGERS. Dr. Middleton?

Dr. MIDDLETON. Since you indicated you are interested in this program broadly and in its needs and since we are not able to reflect all of them here, we will supply them for the record that you have requested.

Mr. ROGERS. I think that would be helpful.

I realize we have given a lot to supply for the record, but I think as soon as we get it it would be helpful.

Dr. MIDDLETON. We want air pollution control, and not just studies. I agree with you.

Mr. ROGERS. I agree. This is what the committee is going to pursue. Thank you for coming.

You have been most helpful. We appreciate your indulgence and time here today.

Thank you.

Dr. MIDDLETON. Thank you, Mr. Chairman.

Mr. ROGERS. The Honorable Robert M. O'Mahoney, Commissioner, Transportation and Communications Services, General Services Administration.

Commissioner, we are delighted to have you and appreciate your sitting through and waiting for us all day. We apologize to you.

**STATEMENT OF HON. ROBERT M. O'MAHOONEY, COMMISSIONER,
TRANSPORTATION AND COMMUNICATIONS SERVICE, GENERAL
SERVICES ADMINISTRATION; ACCOMPANIED BY WILLIAM
FOOTE, ACTING DEPUTY COMMISSIONER FOR TRANSPORTATION
AND MOTOR OPERATIONS**

Mr. O'MAHOONEY. Thank you, Mr. Chairman.

I am delighted to have the opportunity to appear before the committee. I don't have a prepared statement. I was called in Chicago last Thursday.

Mr. ROGERS. It was very short notice.

Mr. O'MAHOONEY. I was attending a seminar on gas powered vehicles. As it happens, the remarks that I prepared, that is the preparation I made for that particular appearance, is I think germane to this one. So I am prepared to make a statement, even if I don't have a statement prepared.

Mr. ROGERS. We will put that statement into the record at this point. It may be you would rather just discuss some highlights.

Mr. O'MAHOONEY. That was a symposium and I did not have a written statement prepared for it either but I did do my homework. I have with me Mr. Foote, William Foote, Acting Deputy Commissioner for Transportation and Motor Operations.

Mr. ROGERS. We are delighted to have you, Mr. Foote.

Maybe we could get the discussion on the way by getting your viewpoint of the authority, if the Congress were to direct GSA to set certain standards after consultation with the Department of HEW, for emission, to help control air pollution on automobiles bought for the government.

What is your feeling on this?

Mr. O'MAHONEY. Before I answer that question, and to put it in context, I would like to tell you a little bit about what we are doing right now in the area of emission control. On October 27, this year, we inaugurated a program at the West Los Angeles Veterans Administration hospital which is a subpool of our Los Angeles GSA motor pool, to use natural gas to power vehicles.

We have some 24 vehicles involved in that experiment. Twelve of them are operated on natural gas and 12 control vehicles of virtually identical type and year as the natural gas-powered vehicles to use for comparison purposes to get research data.

If you would like, I could provide for the record the list of the vehicles and types.

Mr. ROGERS. I think that would be fine.

(The following list of vehicles were received for the record:)

DUAL-FUEL PROJECT TEST & CONTROL VEHICLES—VETERANS' ADMINISTRATION HOSPITAL, LOS ANGELES, CALIF.

Test Vehicles:

G11-41198, 1968 Chev. Sedan.
G11-41277, 1968 Chev. Sedan.
G11-47694, 1969 Ford Sedan.
G11-47754, 1969 Ford Sedan.

G41-32807, 1968 Chev. Pickup.
G41-41026, 1969 Chev. Pickup.
G41-41050, 1969 Chev. Carryall.
G41-41072, 1969 Chev. Pickup.

G43-21763, 1966 Ford 1-ton S&P.

G71-1480, 1960 Int. Stake.
G71-1494, 1962 1½ T. Chev.
G71-5011, 1965 1½ T. Van, Ford.

Control Vehicles:

G11-41209, 1968 Chev. Sedan.
G11-41278, 1968 Chev. Sedan.
G11-47843, 1969 Ford Sedan.
G11-47772, 1969 Ford Sedan.

G41-32803, 1968 Chev. Pickup.
G41-41042, 1969 Chev. Pickup.
G41-32814, 1969 Chev. Carryall.
G41-41025, 1969 Chev. Pickup.

G43-20604, 1966 Ford 1-ton S&P.

G71-1477, 1960 Int. Stake.
G71-340, 1959 1½ T. Chev.
G71-5010, 1965 1½ T. Van, Ford.

Mr. ROGERS. Give us an example or two.

Mr. O'MAHONEY. There are four sedans.

Mr. ROGERS. What make?

Mr. O'MAHONEY. Two of them are Chevrolets and two of them are Fords. The two Chevrolets are 1968's and the two Fords are 1969's and we have two 1969 Chevrolet pickup trucks, one 1969 Chevrolet carry all, still another Chevrolet pickup, three all together.

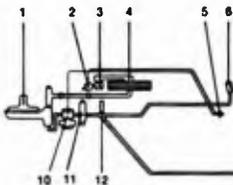
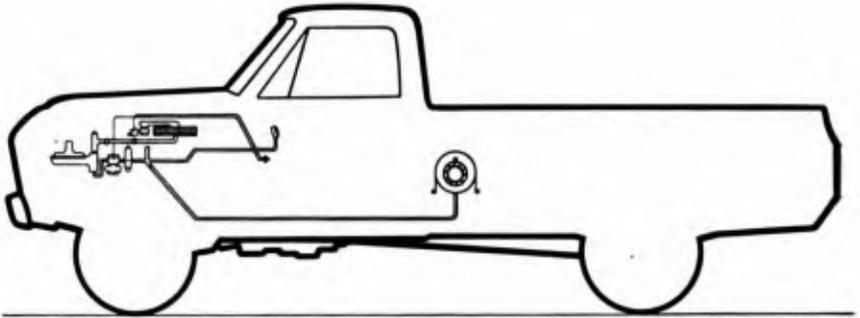
We have a one ton Ford truck, we have an International truck, we have a 1 ton Chevrolet and a one and a half ton van Ford. That comprises the 12 vehicles in the fleet.

Mr. ROGERS. Can they operate them with the present engine?

Mr. O'MAHONEY. The system is called a dual system. This operates and I would provide for the record, in case you would like to examine it, a schematic of the system.

Mr. ROGERS. We will make this a part of the record at this point.

(The following schematic drawing of a dual-fuel system was received for the record:)



1. 2nd Stage Regulator
2. Gasoline Solenoid Valve
3. Gasoline Carburetor
4. Gas-Air Mixer
5. Fuel Selector Switch
6. Natural Gas Fuel Gauge
7. Pressure and Temperature Safety Valve
8. Shut-off Valve
9. Conventional 220 Cu. Ft. Gas Cylinder
10. Natural Gas Solenoid Valve
11. 1st Stage Regulator
12. Natural Gas Fill Valve and Pressure Safety Valve

Dual-Fuel System—The above schematic drawing shows equipment involved in General Services Administration's "dual-fuel" system for motor vehicles. The system enables the vehicle to operate alternately on natural gas or gasoline and is designed to combat air pollution and cut operating and maintenance costs. The natural gas moves from pressurized cylinders, located in the bed or trunk of the vehicle, to a standard carburetor, undergoing pressure reduction at two stages. The natural gas and gasoline can be used alternately through the same carburetor.

Mr. O'MAHONEY. The system is called dual fuel because you may operate a vehicle either with natural gas or with gasoline.

There is a lever on the dashboard of the vehicle which allows the driver to switch from one fuel to another. Generally he would switch when he runs out of natural gas. We put two tanks in the vehicles that we have converted, and they have a range roughly of 80 miles which is half of the normal range, roughly, you would have with the standard fill of gasoline in the tank.

The program is based on a similar experiment or rather it is more than an experiment, it is actual commercial use of natural gas by the gas company in Los Angeles. They have been operating for over a year with 35 vehicles using this identical system quite successfully and so successfully that they are about to convert 1,000 vehicles to the use of natural gas.

Mr. ROGERS. Now how do the operating costs compare?

Mr. O'MAHONEY. The operating costs according to them—one of the things we are doing is compiling those costs and since our program is a little more than a month old we have not got good data—but the fuel cost is less, almost one third less.

That difference in cost I don't consider too significant because most of it represents tax, so that the actual fuel costs if there were actual comparable user taxes on the gas as compared to gasoline, would probably be about the same, if maybe a little less.

There is a real saving however in maintenance because the natural gas operates at about the 90 percent reduction in air pollution, that is, in fuel pollutants, over a vehicle meeting the 1969 emission standards. Thus there is a significant reduction in maintenance caused by the reduction of deposits of carbon and lead in the engine of the cars.

This means virtually no spark plug changes or oil changes. This system has been used on a bus that Disneyland operates, a vehicle that operates at very low speeds, 12 miles an hour over a two block distance in the park.

They used to have to change spark plugs daily and they changed oil at least once a week. They operate now on that system and they have not changed spark plugs since they started using natural gas.

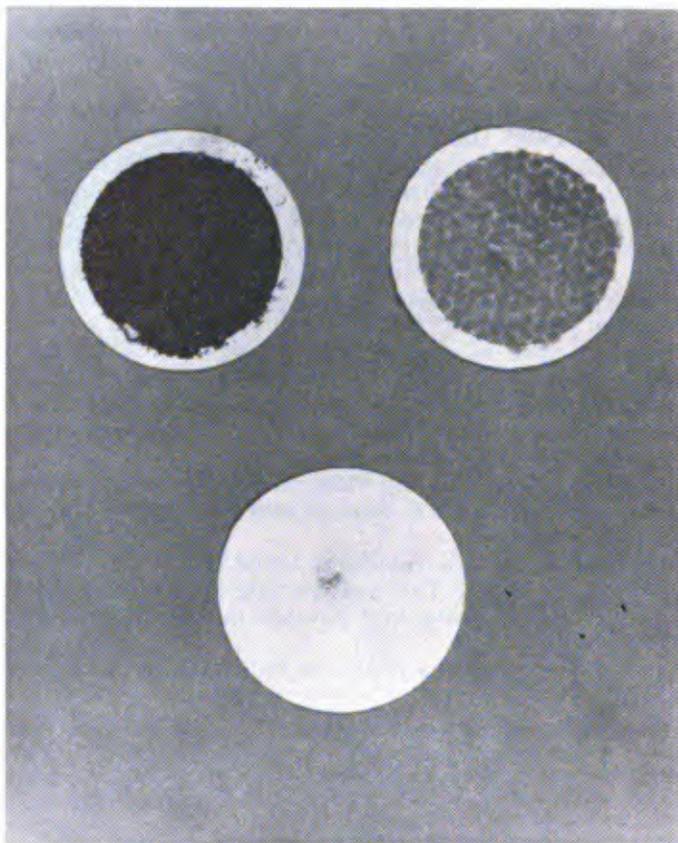
This is a picture made. These are filters. I will be happy to give this to the committee for the record.

These are the filters. The top filter on the left is a filter on a truck without any emission control devices and that shows the pollutants produced in the exhaust.

The right top filter is a vehicle, a truck, with the 1969 pollutant control devices in effect. The bottom one is a vehicle operated on natural gas. That little tiny spot you see in the center, I think, is a finger print.

This sort of illustrates the dramatic reduction in air pollution that we have seen.

(The document referred to follows:)



The three filters, pictured above, are a graphic example of the clean burning properties of natural gas.

They were used in actual exhaust emission tests of GSA vehicles conducted by the West Coast Field Testing Laboratory for the National Air Pollution Control Administration.

Upper Left—The deposits on this filter came from the exhaust of a 1960 $1\frac{1}{2}$ ton truck. Its gasoline powered 264 cubic inch engine did not contain smog control equipment.

Upper Right—The deposits on this filter came from the exhaust of a 1969 $\frac{1}{2}$ ton pickup truck. Its gasoline powered 250 cubic inch engine was equipped with smog control devices.

Bottom—This filter shows the clean burning properties of natural gas. The exhaust of a 1969 $\frac{1}{2}$ ton pickup truck, running on natural gas, produced only a slight discoloration.

Mr. ROGERS. That is very impressive.

Do you think this offers a possibility of a practical approach to the problem?

Mr. O'MAHONEY. I should explain. The committee I think may be well aware. But I think it would be useful to have it in the record at this point. GSA operates a fleet of 51,000 vehicles in 97 motor pools all over the United States.

These vehicles are operated on a business like basis. We rent them really, if you will, these vehicles to the other Government agencies and they pay us the cost operation plus a slight margin.

It is operated on a businesslike basis. We are approaching this project on a business like basis. We expect these vehicles to recover the cost of the installation which is about \$340. We think we will get that recovery in about 16 to 18 months for each vehicle.

We may do better than that. We just won't know until we have had some experience.

Mr. ROGERS. The cost of the conversion to the dual system is \$340?

Mr. O'MAHOONEY. Yes. That does not include the labor cost. That is the cost of the kit and two tanks off the shelf. We have a plan. We are going to go next to the Mississippi test site and convert additional vehicles there.

We will probably convert about 30. The number is not set exactly yet. This will begin in January of 1970. From there we are going to go to the Houston Manned Spacecraft Center. Again we hope to convert about 30 vehicles at that point. If our experience is good, if the economics of the project is good and the mechanics of it are satisfactory, we would hope at that point to have a conversion of about 60 vehicles a month at other motor pools selected throughout the United States.

We would hope to get nearly 1,000 vehicles converted by the end of 1970, calendar year 1970.

There are problems with this system, there are problems with logistics in fueling. The vehicles in Los Angeles, both the gas company's and ours are fueled on a system called a slow charge system. This takes about 4 hours then at night to fuel a vehicle. They go into a facility and are plugged into a compressor.

The gas comes off the regular gas line into the compressor and it has to be compressed into the tanks. When we go into the Mississippi city and into Houston, we are going to use a larger tank, a surge tank, which will have a larger capacity and which will fuel vehicles in a very short time, and well, when I say short, vehicles can actually be fueled in a matter of seconds if you have pressure in the tanks.

But the basic problem is, this system is suitable for fleet operations. You can't go down to the corner filling station and buy compressed natural gas.

That is one basic problem. There is another basic and very important problem that I asked at the seminar, at IGT on Thursday, that they have a seminar later this year on the problem of the supply of natural gas as a fuel.

We believe in demonstrating a commercially feasible use of this fuel on a large scale that will at least inspire others to look for similar methods. We also think that there is some possibility of the use of this kind of fuel for large fleet operations in cities such as Los Angeles, where much of the pollution caused by vehicles is caused by vehicles operated all day, buses, taxicabs, dairy delivery trucks; those vehicles that pile up hundreds of thousands of miles every year and which are operating almost round the clock.

If large segments of those fleets could be converted in the near future, like in the next three years, we would have not just talk, we would have reduced on a rather large scale the pollution.

We think this is a real possibility. Right now, with present technology off-the-shelf hardware in existence, which I think by the way with the assistance of the automobile industry, if they would look at this from that point of view, could be reduced in cost considerably, like half, on a mass production basis.

Mr. ROGERS. Half?

Mr. O'MAHONEY. I am just estimating, Mr. Chairman. We are buying in lots of 30 or 40 from a small company in California. Large fabrications of this equipment certainly could reduce the cost of it.

Mr. ROGERS. That is very interesting and I think encouraging. Is there enough natural gas available to make it feasible to consider this method of powering vehicles nationwide?

Mr. O'MAHONEY. I get different answers from different people on that. One thing is quite clear. If there is enough gas, there is not an adequate distribution system for it. We are talking about 100 million vehicles in the national system.

There just is not enough natural gas storage capacity and distribution capacity right now to handle adequately much of the business they are already doing. So that would be a problem very definitely.

Mr. ROGERS. I presume like you say it would have to be first started with just commercial fleets probably.

Mr. O'MAHONEY. That is right.

Mr. ROGERS. Which is what you are thinking of?

Mr. O'MAHONEY. Yes.

Mr. ROGERS. That sounds very encouraging. I think this is something the committee would want to pursue, too.

What about the possibility though of going ahead, sir, since this could maybe would not be feasible to have this apply to all of the automobiles in the Nation, at least for awhile, what about putting higher standards on the cars that you may buy and allowing the manufacturers to try to get them?

What is your feeling on that? Like we started the seat belt and the safety programs. This committee started that some years ago.

Mr. O'MAHONEY. I am quite familiar, sir. I was formerly counsel to the National Highway Safety Bureau. So seat belts ring a bell with me.

I am well aware of the pioneering work that GSA did in this area. I think the primary problem is cost. We are limited to \$1,500 for a sedan.

That is the price we can buy them at. There is pending before the appropriations committee an amendment which would raise that limit. Any significant amount of anti-pollution devices different than those currently produced by Detroit would certainly raise the cost well above our statutory limit.

Mr. ROGERS. Perhaps we could put the necessary authority in the law to allow you to raise it.

Mr. O'MAHONEY. I must say, Mr. Chairman, as you know, I don't have a prepared statement. Therefore, I really am not in a position to take a position on legislation that might be considered in this area.

Mr. ROGERS. Do you think it is a good idea?

Mr. O'MAHONEY. I am not sure that it is, Mr. Rogers. I think that if it would help stimulate, fine. But the market, it seems to me, exists without—this is a personal opinion—the government market. The

government market isn't that big for one thing. It is large. We bought 85,000 vehicles last year, GSA for the various government agencies, including itself. That is a large amount of vehicles.

But, on the other hand, that is in the scale of annual production a fairly small percentage.

Mr. ROGERS. Yes, but I would think perhaps they would go, and I presume you use the bidding method, don't you?

Mr. O'MAHONEY. Yes.

Mr. ROGERS. So, if you have certain standards you want to try to encompass, I think this would be a little encouragement for a company to go a little beyond what they normally do and try to bring about some improvements.

In other words, use this as almost an experimental model of some of the newest thoughts.

Mr. O'MAHONEY. Speaking for myself only, and taking refuge in the fact that it is not the Transportation and Communication Service that purchases the vehicles, but it is the Federal Supply Service that does so, I would say we are interested in anything that is going to generate progress in this area, and in safety, too, by the way. We think we can also do some work there.

For our service, we are interested in retrofit. In fact, that is what we are involved in here in our experiment in Los Angeles. We are retrofitting vehicles with a device. We hope to do this at no expense, really. In fact, we hope to make a little money on it. But we are interested in anything that is going to help, that is, going to help reduce smog.

I think there are a number of approaches that can be taken.

We have never been approached by the industry on this idea, but we certainly would be receptive to such approaches.

Mr. ROGERS. Have you approached the industry on it to encourage them to take these steps?

Mr. O'MAHONEY. I have only in this sense: At the seminar in Chicago, there was one industry representative there. And I told him that I hoped Detroit would look at, at least the system we are looking at and come up with some positive suggestions like a design or a vehicle design that would get us a better location for our tanks, get a kit to convert the vehicles that cost considerably less than we are paying for kits and that sort of thing. I think if they want to, they could do that.

Mr. ROGERS. Have you made any specific requests for them to do it in writing?

Mr. O'MAHONEY. No.

Mr. ROGERS. To see if you could get your cooperation? Do you think this would be a good idea?

Mr. O'MAHONEY. I think it would be a good idea, yes.

Mr. ROGERS. As far as you feel, and I realize you may not be stating the agency's position, but you personally feel that anything we can do to bring about better control over pollution in automobiles would be desirable and if this could be helpful, to have a block of cars here to kind of set the pace, you would have no objections to that.

Mr. O'MAHONEY. That is my own personal opinion, and I would predict that that would be pretty well the agency's position. I am certain that the administrator shares my feeling. He is very enthusi-

astic supporter of the project we are involved in. It is only the details we might have problems with; particular approaches, how they are funded and how they are to be done.

Mr. ROGERS. Are you aware of what is being done with your installations, as such, on the air pollution problem? Are you aware of this?

Mr. O'MAHONEY. Do you mean public buildings?

Mr. ROGERS. Public buildings and installations?

Mr. O'MAHONEY. No, we are not. This is a separate service of GSA.

Mr. ROGERS. Dr. Carter?

Mr. CARTER. I am certainly interested in what you have had to say. You say that with the two containers, which you put on one of these cars, that you have a range of 80 miles?

Mr. O'MAHONEY. That is correct. About 40 miles to a tank. You can put more tanks on a vehicle. Eighty miles for our operation in the VA hospital is a perfectly practical range because that is just about what they operate a day. Two of the cars we have converted there are patrol cars that drive 24 hours a day. We have a quick charge fuel facility for them.

So, we keep them operating continually on natural gas without any difficulty.

Mr. CARTER. Do you have any figures on the emissions from these cars?

Mr. O'MAHONEY. We have no figures of our own, as yet, Doctor. We will have them. But we won't have any good ones for about 60 days from about right now. We have the figures that the gas company in Los Angeles obtained. We would be happy to give those to you. Those are the figures on which I based the 90 percent reduction.

Mr. CARTER. As far as carbon monoxide, 90 percent reduction?

Mr. O'MAHONEY. Carbon monoxide is 90 percent.

Mr. CARTER. Hydrocarbons?

Mr. O'MAHONEY. Hydrocarbons is not quite 90 percent, but it is better than 90 percent of the more harmful oliphants. Nitrogenoxide is a little better than 90 percent, I believe. I can give you those figures.

Mr. CARTER. I would like to have those for the record.

Mr. O'MAHONEY. All right. (See p. 101.)

Mr. CARTER. It is certainly a very interesting presentation. There are many sources of natural gas.

Thank you, Mr. Chairman.

Mr. ROGERS. Have you done any studies on the emissions of oxides of nitrogen?

Mr. O'MAHONEY. The only figures we have right now, Mr. Chairman, are the figures that the gas company in Los Angeles compiled using the same system. And I can supply those for the record.

Mr. ROGERS. Are they higher?

Mr. O'MAHONEY. They are lower.

Mr. ROGERS. They are considerably lower.

Mr. O'MAHONEY. Again, we are talking about 90 percent reduction.

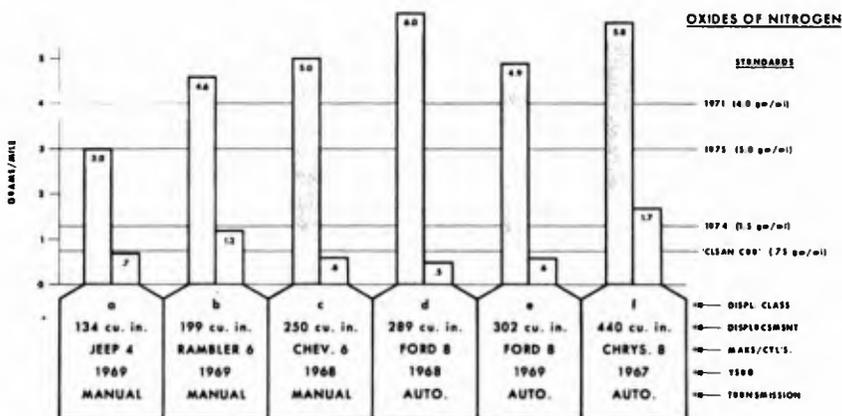
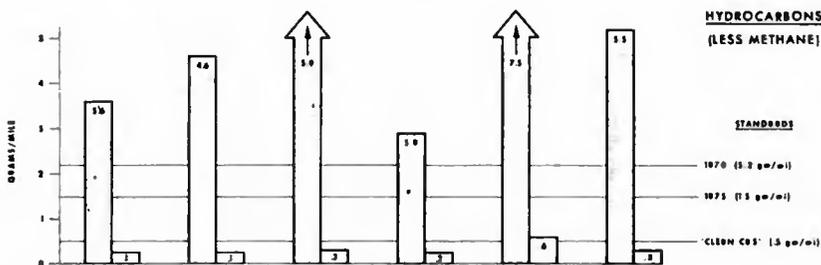
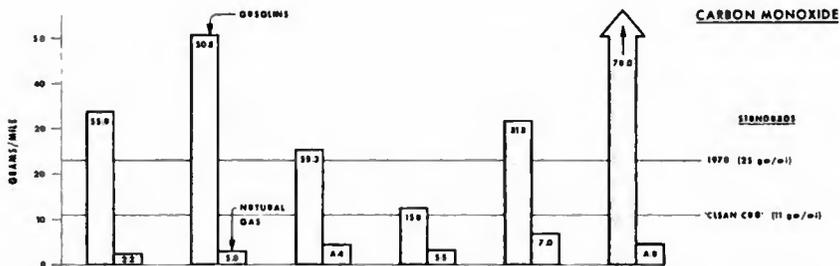
Mr. ROGERS. We would like to have those studies for the record to show what the emissions are.

Mr. CARTER. It is almost a 90 percent across the board reduction.

Mr. O'MAHONEY. That is correct.
(The following chart was received for the record:)

CURRENT EMISSION VS FUTURE STANDARDS

1965 T22



Mr. ROGERS. Thank you so much for presenting that testimony. It is most interesting. The committee I know is grateful for your being here.

The committee will adjourn until 10 o'clock tomorrow morning. (The following information was received for the record:)

(The following information was requested on p. 49 of this hearing:)

The National Air Pollution Control Administration is in the process of preparing a description of each State and local air pollution control program receiving Federal grant support under the Clean Air Act. Each such description will contain

information on laws and regulations, budgets, manpower, area of jurisdiction, etc. This compilation will bring up to date information furnished the Congress three years ago during hearings on the Air Quality Act of 1967. As soon as the descriptions are completed, they will be made available to the Committee.

[The following information was requested on p. 82 of this hearing:]

Subsequent to the Subcommittee's December 8, 1969 hearing, the Administration's budget request for Fiscal Year 1971 for air pollution control was submitted to the Congress in the amount of \$106,003,000. This request was intended to provide for carrying on the Fiscal Year 1971 program under the Clean Air Act as then amended and in effect. It did not make provision for additional expenditures that would be called for in the event of adoption of the Administration's legislative proposal submitted to Congress February 10, 1970, or of other possible changes in the Clean Air Act. Subsequently, on March 5, 1970, at further hearings held by the Subcommittee, Congressman Rogers raised the question (transcript, page 52) of the funding requests anticipated to implement the Administration's bill for air pollution control for Fiscal Year 1972 and Fiscal Year 1973. An insert for the record of the March 5, 1970 hearing has been provided.

[The following information was requested on pp. 90 and 91 of this hearing:]

In connection with the consideration of extension and amendment of the Clean Air Act, the Subcommittee requested technical assistance from representatives of the Department of Health, Education, and Welfare. A number of the major proposals under examination by the Subcommittee were discussed and, in cooperation with Subcommittee staff members and the House Legislative Counsel's Office, HEW representatives participated in the drafting of legislative language in areas requested by the Subcommittee.

(Whereupon, at 4:15 p.m., the committee adjourned to reconvene at 10 a.m., Tuesday, December 9, 1969.)

AIR POLLUTION CONTROL AND SOLID WASTES RECYCLING

TUESDAY, DECEMBER 9, 1969

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON PUBLIC HEALTH AND WELFARE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room 2322, Rayburn House Office Building, Hon. John Jarman (chairman of the subcommittee) presiding.

Mr. JARMAN. The subcommittee will please be in order.

We continue the hearings on H.R. 12934 and all similar bills to extend the Clean Air Act.

Our first witness this morning is Dr. Paul Chenea, vice president in charge of research laboratories, General Motors Corp., and I will ask Dr. Chenea to introduce any associates who are appearing with him.

STATEMENT OF DR. PAUL F. CHENEA, VICE PRESIDENT, RESEARCH LABORATORIES, GENERAL MOTORS CORP.; ACCOMPANIED BY DR. FRED W. BOWDITCH, DIRECTOR, EMISSION CONTROL

Dr. CHENEA. Mr. Chairman, and members of the Subcommittee on Public Health and Welfare, I am Dr. Paul F. Chenea, a Vice President of General Motors Corporation, and in charge of the Corporation's Research Laboratories.

I have with me Dr. Fred Bowditch, who is director of the Emission Control for the Corporation.

The purpose of this hearing is to consider H.R. 12934 and H.R. 14960, bills to extend the Clean Air Act of 1963. I am here on behalf of General Motors to discuss before this committee the progress made by General Motors in controlling emissions from automobiles since the Clean Air Act was first enacted in 1963.

I have been associated with General Motors Research Laboratories since June 1967. Prior to that, I was Vice President for Academic Affairs of Purdue University and Acting Dean of the School of Science, Education and Humanities from 1961 to 1967 and was a Professor and Administrator in Engineering and Mathematical Sciences at Purdue during 1952-1961. I was on the University of Michigan Engineering Faculty during 1946-1952.

During those years, I also was a consultant to Government and industry.

At the outset, I want to emphasize that air pollution problems are taken very seriously by General Motors. We have already made substantial progress in reducing emissions from our engines, and we are continuing to reduce emissions each year. But most important—and I cannot emphasize this too strongly—General Motors is irrevocably committed to finding a solution to automotive emission problems at the earliest possible time. And in seeking solutions we will have no hesitation in using a power source other than the internal combustion engine if it will meet the needs of our customers, at a price they can pay, and will solve the emission problem.

General Motors has already made much progress in reducing automotive emissions. Recent GM models have significantly lower emissions than models of only a few years ago. Our current cars emit approximately 70 percent fewer hydrocarbons than the uncontrolled cars of 1960; next year the reduction will be 80 percent. Carbon monoxide emissions have been reduced nearly 65 percent in the same period.

In 1952, General Motors intensified its research into auto emissions control systems. The reductions we have noted result from systems we have developed since then to control all sources of emissions from the automobile; including blowby gases from the crankcase, exhaust gases from the tailpipe, and evaporative losses from the fuel tank, and carburetor.

More importantly, while emission levels of our current cars are substantially lower than emissions of pre-control vehicles, achievement of the levels now being considered for 1975—and we certainly are hopeful of achieving them—would result in reducing auto emissions even further, with hydrocarbons at a 95 percent reduction and carbon monoxide 85 percent below those of the uncontrolled cars of 1960.

Turning now to our efforts for the future, first in regard to conventional internal combustion engines and then in regard to other possible power sources.

One of the most promising emission-reducing methods we are investigating for internal combustion engines is a manifold reactor as a part of the exhaust system. If high enough temperatures can be achieved and sustained inside the reactor, many of the emissions from the vehicle can be disposed of by literally burning them up. However, there are serious problems which must be solved in order to make the manifold reactor feasible. The high temperature requirement of this device necessitates a heat-resistant material that is longer lasting than any material available today.

Another promising method we are studying for use with internal combustion engines involves a catalytic converter as a part of the exhaust system. Catalytic converters also reduce emission levels by converting emissions into harmless substances. Here, too, substantial obstacles exist. For example, we and others have found that the catalysts known to us are rendered inert by leaded gasoline, and in a relatively short mileage. Materials, too, are a problem, as we require temperature-resistant materials and catalysts that do not use scarce materials.

A number of other methods also show promise in attaining lower emissions for internal combustion engines. These involve combustion

chamber design, fuel injection, valve timing optimization and exhaust gas recirculation.

As to our efforts on alternative power sources, a gas turbine engine for trucks, buses and stationary applications is scheduled for production by our Detroit Diesel Engine Division. Our gas turbine research dates back 20 years and has included experimental trucks, buses, and the first gas turbine automobile in the United States, built and tested in 1953.

Our research indicates that the turbine in the present state of development is much better suited to the requirements of trucks and buses. For passenger cars, disadvantages of the present turbine include poor fuel economy and inadequate response in traffic. However, we are continuing to search for new designs and lower cost materials that could make this low emission engine practical for production automobiles. This appears to be a promising possibility.

Interest in steam engine research and development has been running high. Government-sponsored programs for the testing of steam-engine buses are underway in Dallas and San Francisco.

One of two steam vehicles we have experimented with is a Chevrolet Chevelle, powered by a steam engine designed and installed by Besler Developments, Inc. The second car, a Pontiac Grand Prix, contains an engine designed and constructed at the Research Laboratories.

We have found that there are many problems relating to size, cost, fuel consumption, lubrication and weight—not to mention cold weather freezing. Future research must be devoted to solving these problems.

The Stirling engine is an external combustion engine which is quiet, vibration free, and about twice as efficient as the steam engine. The GM Research Laboratories have done development work on Stirling engines over the last 12 years. Our experimental hybrid Stirling-Electric car, the Stir-Lec II, features a battery-powered electric drive system with the 8-horsepower Stirling engine driving an alternator for battery charging.

At its present state of development, the Stirling is still bulky, heavy, complex and expensive, requiring extensive cooling for its high temperatures. It requires materials not readily available in quantity, and both durability and maintainability are unknown. Our current research is directed toward designing lighter, smaller, less costly engines.

In addition to our work on these three heat engines, General Motors has several active programs on electro-chemical energy converters and electric drives.

No one has yet produced a battery which meets all the requirements for general purpose passenger cars. We are continuing development work on some of the most promising contenders. One of these is the zinc-air battery, which has about three to five times the range performance of the lead-acid battery. In addition, we are studying the lithium-chlorine cell. It has more than adequate power and the energy storage capacity is 10 to 15 times greater than a lead-acid system. However, it operates at extremely high temperatures, in the neighborhood of 1200 degrees fahrenheit. Vehicular application is still many miles down the road.

We have researched and built a limited application or short range "shopper" vehicle—something between our compact-sized Electrovair II and a golf cart. Although slightly smaller than most electric cars built today, its performance characteristics are similar to those of other electric vehicles.

A vehicle of this type would be used almost exclusively for local shopping, driving to a commuter station, various short-distance community errand-type driving and other limited range transportation tasks.

A number of limitations compared to current all-purpose cars are imposed by this type of vehicle. These include limitations on range, speed and cold weather usefulness, relatively frequent and expensive battery replacement requirements, and the possible safety hazard involved if such vehicles are permitted on urban expressways and comparable roads where constant speeds of 40 miles per hour or more are maintained.

One major electric vehicle problem in many metropolitan areas is the availability of adequate power. Nationally, utility companies are expected to increase generating capacity four-fold by 1990 just to meet normal demand.

As you may be aware, switching personal transportation to battery-powered vehicles would shift the problem of emissions from the automobile to the stationary generating source.

Our Progress of Power exhibit was held last summer at the GM technical center near Detroit and featured many of the working, experimental vehicles and propulsion systems we are investigating. I have with me today for members of the Subcommittee copies of reports describing these experimental vehicles and power plants in some detail.

All of the gasoline engine approaches reviewed previously have important fuel composition requirements if we are to achieve maximum control of emissions. The most important of these is the elimination of lead from gasoline, which affects catalysts and manifold reactors. Government agencies have expressed interest in reducing particulates, and if this is to be achieved lead must be removed from gasoline.

In discussing General Motors vehicle emission research, I am sometimes asked which of the various power source alternatives offers the most promise. In my judgment, the internal combustion engine is the best overall power plant for the short term. This is so because, first, our research indicates that an improved piston engine can provide the same very low level of emissions as any of the continuous combustion engines. Second, there are fewer problems remaining to be solved in improving the piston engine. Therefore, we believe we can achieve a production version of a low-emission piston engine sooner than for any other engine. The improved piston engine thus represents the fastest route to lower vehicle emissions for the short term.

For the long term, on the other hand, power sources quite different from the internal combustion engine may prove to be a better answer. But much development work must be done to make these engines practical for the automobile.

There have been a variety of opinions expressed as to the sources of polluted air in urban areas. Admittedly, the automobile is a contributor

to the problem. Because carbon monoxide is the largest tonnage pollutant emitted to the atmosphere, it is often assumed that this is the principal pollution problem. Since most of the carbon monoxide comes from automobiles, it is further assumed that the automobile is the major pollution problem.

However, if potential health harm of these individual pollutants is considered as well as tonnage, the relative importance of present levels of carbon monoxide in the atmosphere becomes much less. On this basis automobile emissions become approximately 10 percent of the national air pollution problem rather than approximately 60 percent when tonnage alone is considered.

This does not mean at all that we believe there should be any relaxation in efforts to control emissions from the automobile, but it does mean that the Government at all levels should at all times keep the total problem in mind if proper and meaningful pollution controls are to be achieved. It is clear that even if auto emissions were zero, the pollution problem will not just go away.

For our part, we have undertaken extensive projects to control emissions from our manufacturing facilities, as well as emissions from the cars we produce.

As to H.R. 12934 introduced by Mr. Rogers and H.R. 14960 introduced by Mr. Springer, we certainly support extension of the Clean Air Act, which has been an important factor in reducing air pollution in the United States. We recognize the Government's role in this most serious problem and the necessity for mutual efforts by Government and industry in the interest of diminishing air pollution.

Finally, the automobile industry can perform most effectively in reducing emission levels if future standards are set sufficiently far in advance to allow time for development of the optimum approach to the solution of the problem.

Gentlemen, I have appreciated the opportunity to appear here today. In closing, I want to emphasize once more that General Motors is fully aware of the seriousness to all of us of the air pollution problem, and that we are actively exploring all avenues to remove the automobile from the list of significant pollution sources.

Thank you.

And, with your permission, I would like to file a fuller statement for the record, if I may.

Mr. JARMAN. The committee will be glad to receive it, Doctor.

(The following statement by Dr. Paul F. Chenea was received for the record:)

STATEMENT OF DR. PAUL F. CHENEA, VICE PRESIDENT, RESEARCH LABORATORIES, GENERAL MOTORS CORP.

Mr. Chairman and members of the Subcommittee on Public Health and Welfare, I am Dr. Paul F. Chenea, a vice president of General Motors Corporation and in charge of the Corporation's Research Laboratories.

The purpose of this hearing is to consider H.R. 12934 and H.R. 14960, bills to extend the Clean Air Act of 1963. I am here on behalf of General Motors to discuss before this Committee the progress made by General Motors in controlling emissions from automobiles since the Clean Air Act was first enacted in 1963. I am accompanied by Dr. Fred W. Bowditch, director, emission control, of the GM Engineering Staff.

I have been associated with General Motors Research Laboratories since June, 1967. Prior to that I was vice president for academic affairs of Purdue

University and acting Dean of the School of Science, Education and Humanities from 1961 to 1967 and was a professor and administrator in Engineering and Mathematical Sciences at Purdue during 1952-1961. I was on the University of Michigan Engineering faculty during 1946-1952.

During those years I also was a consultant to government and industry.

At the outset, I want to emphasize that air pollution problems are taken very seriously by General Motors. We have already made substantial progress in reducing emissions from our engines—including a number of improvements adopted by others in the industry—and we are continuing to reduce emissions each year. But most important—and I cannot emphasize this too strongly—General Motors is and will be irrevocably committed to finding a solution to automotive emission problems at the earliest possible time. And in seeking solutions we will have no hesitation in using a power source other than the internal combustion engine if it will meet the need of our customers, at a price they can pay, and will solve the emission problem.

We are concerned about the health and safety of the public. The cars we are producing right now—not some time in the future—are in themselves evidence of our concern. Our cars emit approximately 70 per cent fewer hydrocarbons than the unequipped cars of 1960; next year it will be 80 per cent. Carbon monoxide emissions have been reduced nearly 65 per cent in the same period.

More importantly, while emission levels of our current cars are substantially lower than emissions of pre-control vehicles, achievement of the levels now being considered for 1975—and we certainly are hopeful of achieving them—would result in reducing auto emissions even further—with hydrocarbons 95 per cent and carbon monoxide 85 per cent below uncontrolled cars of 1960.

The facts clearly demonstrate that our current model General Motors' cars greatly reduce the automotive contribution to atmospheric pollution.

This effectiveness of emission control systems on 1970 cars was recognized recently by a most eminent public authority on air pollution, Dr. A. J. Haagen-Smit. He is chairman of both California's Air Resources Board and of President Nixon's Task Force on Air Pollution.

Dr. Haagen-Smit discovered how photochemical smog found principally in the Los Angeles basin is formed. He said in an address* last month that the sum total of hydrocarbon and carbon monoxide emissions from motor vehicles on the road today are lower than they were last year.

He continued: "They will be even lower next year and the year after that. This is true even though we will have more cars each year. The decrease in total emissions will soon be true for oxides of nitrogen. The above are significant accomplishments and are ones that should not be casually accepted as having been easily accomplished."

This has been accomplished despite the number of older used cars that lack emission control equipment.

All of our air pollution work at the Research Laboratories has had three basic objectives: the understanding of the nature of atmospheric effects, the understanding of the nature of vehicle emissions, and the development of new control concepts.

We started intensive research into automotive emissions and their relationship to photochemical smog in 1952. The main effort in the beginning was to determine the nature of the problem and develop instruments needed in such research. As knowledge was gained, hardware was developed.

One of our first tasks was to develop techniques for analyzing trace components in exhaust gas. Automobile exhaust contains more than a hundred different hydrocarbons—some of which form photochemical smog a thousand times more readily than others. Some lead to eye irritation and some do not.

However, even today many mysteries remain concerning exhaust gas and the atmosphere. For example, carbon monoxide disappears from the atmosphere rather than accumulating, and the scientific community has never been able to determine where it goes. This illustrates the difficulties of the area in which we have been working.

We are participating in an \$11 million, three-year cooperative research program which was started in January, 1968, to find answers to such questions as to what happens to carbon monoxide. It is funded by the federal government, the petroleum industry and the auto industry.

* At Governor's Conference for California's Changing Environment, November 17-18, 1969, Los Angeles, California.

We are also seeking answers to questions concerning the effect of pollution on plants, the causes of haze formations, the effect of low level carbon monoxide on human and animal behavior and the concentration of carboxy hemoglobin in the blood.

Since 1952—when our intensive air pollution research program was launched—a great deal has been accomplished by General Motors. Systems have been developed to provide controls for all sources of emissions from the automobile—blowby gases from the crankcase, exhaust gases from the tailpipe and evaporative losses from the fuel tank and carburetor. These accomplishments have included the following:

1. The Positive Crankcase Ventilation control system (PCV) developed by General Motors.
2. The GM Air Injection Reactor system (A.I.R.).
3. The GM Controlled Combustion System (CCS).
4. Evaporative controls, which will become standard on our 1971 model cars.

These developments were aided immeasurably by the GM smog chamber—the first and largest privately-owned facility for laboratory simulation of actual smog formation—and the GM laboratory at El Segundo, California, to monitor exhaust emissions of the GM vehicles in the hands of the public. This was the first facility of this type in the industry.

We have taken the most productive steps first in achieving the 70 and 80 per cent reductions referred to earlier. The remaining, smaller segments will be much harder to achieve.

Regardless of what we have done so far—and whatever GM and other manufacturers may be able to do in the immediate future—we should all clearly understand a few facts as to existing problems that limit the impact of reductions achieved with new auto emissions on the total automotive pollution problem. For example:

The lower emissions of present model automobiles will not have full effect on air quality until *older cars that lack effective emission control systems are eliminated from the vehicle population.*

While we are working on the problem, no practical system has been developed to retrofit older model cars with current, improved control systems, with the exception of PCV valves, which can be installed in pre-1963 model cars. PCV valves are available at GM dealerships, but owners of pre-1963 cars have shown little interest in having them installed.

Moreover, if there is a desire to speed up the impact of improvements on new cars, then:

Owners of cars must recognize the extreme importance of improved maintenance of emission control systems.

Changes in fuel will be needed, such as lower volatility.

Looking forward, we feel that it is our responsibility to develop the technology which, with time, can eliminate the automobile from the list of significant air pollution sources.

Reaching lower pollutant levels may require substantial technological breakthroughs in hardware and materials, or major modification of fuels—whether by alternate power plants or improved piston engines.

The required advances will be the products of research. Research is the product of ideas. Even unlimited sums of money do not assure the needed ideas.

Research is to manufacturing as prospecting is to mining. In research it is our business to explore, to learn, to know and to understand. Design for production comes later and is a different matter entirely.

In research we seek to prove that there are no laws of nature that prohibit what we wish to do. Making a production prototype is quite another matter.

The researcher makes apparatus which can be made to work in a laboratory. The production engineer strives to make devices which will not fail. An automobile, for example, which is produced in volume, not only must operate properly, but it must continue to function over a long period of time even when used under adverse conditions or not properly maintained.

To attain even lower levels of emissions of new vehicles we have intensive, parallel programs involving development of alternate forms of automotive power and improvements of the internal combustion engine.

There is no one, quick answer to the total problem. It will take contributions from many design parameters to minimize emission from any power source.

ALTERNATE POWER PLANT DEVELOPMENT AT GM

Now, let us look at the work we are doing on alternate power plants. Specifically, these include continuous combustion engines—that is gas turbines, steam and Stirling engines—as well as electric power systems and hybrids, which are combinations of two or more power plants.

Continuous combustion engines offer the opportunity for more complete, steady and, therefore, more precisely controlled combustion. They can be designed to have reductions perhaps 80 to 95 per cent below the emission level of the 1960-level uncontrolled internal combustion engine. This is an emission level to which the internal combustion engine can be reduced by further improvement.

One of the most promising continuous combustion engines is the gas turbine. Our gas turbine research dates back 20 years and has included experimental trucks, buses, and the first gas turbine automobile in the United States, built and tested in 1953.

For the immediate future, a gas turbine engine is scheduled for production by our Detroit Diesel Engine Division for trucks, buses and stationary applications. This power plant, aimed at the heavy vehicle market, will be a relative of the experimental gas turbine developed by the Research Laboratories a number of years ago. The GM turbine-powered bus will have an automatic transmission comparable to those in present buses rather than a manual shift.

While research indicates that the turbine is much better suited to the requirements of trucks and buses, we are working on designs for passenger cars, too. Disadvantages of the turbine for passenger cars in the present state of development include poor fuel economy and inadequate response in traffic.

One possible limitation on mass production feasibility of the gas turbine for passenger cars is the fact that a major required material is not available in sufficient abundance. Present turbine engine components require large amounts of nickel, perhaps more nickel than present free world availability. However, we are continuing to search for new designs and more available materials that could make this low emission engine practical for production automobiles.

As to steam engines, interest in research and development has been running high. At General Motors, we also have had a number of steam engine research and development programs in progress.

We exhibited two working steam engine test vehicles last summer at a "Progress of Power" exhibit. We are continuing to do experimental work with them.

One is a Chevrolet Chevelle, powered by a steam engine designed and installed by Besler Developments Inc. The second car, a Pontiac Grand Prix, contains an engine designed and constructed at the GM Research Laboratories.

We have found that size, cost, fuel consumption, serious lubrication problems and weight are formidable obstacles—not to mention the cold weather freezing problem.

An external combustion engine, the Stirling, is quiet, vibration free, and about twice as efficient as the steam engine.

The GM Research Laboratories have done development work on Stirling engines over the last 12 years. Our experimental hybrid Stirling-electric car, the Stir-Lec II, features a battery-powered electric drive system with the 8-horse power Stirling engine driving an alternator for battery charging.

At its present state of development, the Stirling is bulky, heavy, complex and expensive. It requires materials not readily available in quantity, and both durability and maintainability are unknown. Our current research is directed toward designing lighter, smaller, less costly engines.

In addition to our work on petroleum-burning engines, General Motors has several active programs on electro-chemical energy converters and electric drives. We demonstrated our Electrovaire II and other battery-powered cars at our "Progress of Power" exhibit. These vehicles, built as prototypes to gain more definitive answers in our research, were the products of several years of investigation into various electric drive vehicles. The Electrovaire II, successor to Electrovaire I built in 1963, was demonstrated in Washington in 1967 in connection with a Congressional hearing.

Our intensive investigations of the electric car have shown that the major advantage of this vehicle is reduction of air polluting emissions.

We have researched and built a limited application or short range "shopper" vehicle—something between our compact-sized Electrovaire II and a golf cart. Although slightly smaller than most electric cars built today, its performance characteristics are similar to those of other electric vehicles.

A vehicle of this type would be used almost exclusively for local shopping, driving to a commuter station, various short-distance community errand-type driving and other limited range transportation tasks.

A number of limitations compared to current all-purpose cars—at the present state of battery development—are imposed by this type of electric vehicle. For example:

Top speeds range up to approximately 45 miles per hour.

This poses a safety hazard if such vehicles are intermixed with larger cars on urban expressways and comparable roads where constant speeds of 40 miles and more per hour are maintained.

Besides initial cost, replacement of batteries approximately every two years could be expected to cost in the area of \$200 in today's market.

Cold weather and passenger compartment heating would place heavy burdens on performance. Battery performance deteriorates in cold climates. At zero degrees Fahrenheit, a lead-acid battery will deliver only about 60 per cent of the driving range and peak power that it will at 80 degrees.

A "shopper" that has a range of 40 miles on an 80 degree day would be cut back to a range of 24 miles on a zero degree day if the heater were not used, and only 12 miles if the heater were used.

In our battery work, we are faced with an age-old problem. For vehicular propulsion, a battery must deliver high power for acceleration and hill climbing, and it must offer high energy storage for traveling long distances. The lead-acid battery provides enough power but inadequate range. Fuel cell characteristics are just the opposite and the other concepts fall in between. Cost, size, weight and availability of materials represent a continuing challenge.

No one has yet produced a battery which meets all the requirements. We are continuing development work on some of the most promising contenders. One of these is the zinc-air battery, which has about three to five times the range performance of the lead-acid battery.

In addition, we are studying the lithium-chlorine cell. It has more than adequate power and the energy storage capacity is 10 to 15 times greater than a lead-acid system. However, it operates at extremely high temperatures in the neighborhood of 1200 degrees Fahrenheit. Vehicular application is still many miles down the road.

One major electric vehicle problem in urban areas is the availability of adequate power. As you know, problems related to both air and thermal pollution have limited the utilities in expanding economical power availability. Nationally, utility companies are expected to increase generating capacity fourfold by 1990 just to meet normal demand. This expansion does not provide for capacity that would be needed to recharge batteries of electric vehicles.

In addition to problems related to potential inadequacy of power supply in some locations, shifting motorists from present passenger cars to electric vehicles could produce side-effect problems. True, use of battery-powered vehicles would eliminate auto emissions. However, generating additional electric power to charge the batteries could result in increased pollutants emitted by stationary sources.

In summary, some of the various alternate power plants that we are investigating have more promise than others in certain respects and our development programs on these concepts will continue. However, in view of the apparent shortcoming of these alternate power plants in various respects, we have continued to work intensively on further development of the internal combustion engine. We will now review this work.

GM DEVELOPMENT OF IMPROVED INTERNAL COMBUSTION ENGINE

Our programs in General Motors to provide additional reductions of emissions from the internal combustion engine have produced most encouraging results. We have been able to obtain very low emission levels with experimental engines in the laboratory.

Exhaust manifold reactors are one of the routes to still lower emissions from the internal combustion engine. Basically, these are large volume exhaust manifolds from two to four times the size of conventional manifolds. These are devices to consume gases in the exhaust. Their effectiveness depends upon the temperature that can be maintained and how long the exhaust gases mixed with additional air can be kept at the elevated temperature.

Extremely low levels of emission compared to even the currently controlled emissions have been obtained. This effectiveness is offset by a number of problems

which we are trying to solve. The principal problem is that of a material. We need heat-resistant material that is longer lasting than any available today.

Another system also involves enlarged manifolds but does not require added air and does not have the fuel economy penalties and high temperature material problems of the previously described reactors. However, these lean-fuel manifolds do not produce as low emission levels, and there are difficulties in providing satisfactory engine operation.

We have actively conducted efforts to apply catalytic control to exhaust emissions—an effort started in the middle 1950's. To date we have been unsuccessful with any catalyst if the gasoline fuel contains lead. The catalysts are rendered inert in a relatively short when mileage leaded gasoline is used.

Our work now is concentrated on catalysts for use with unleaded fuels. We have found that this approach is very effective in further reducing emissions from the internal combustion engines.

However, this success has been attained with precious metal catalysts which require materials limited in availability. Problems of catalyst durability and temperature control must also be solved.

A number of other techniques for emission improvement have been developed which show promise as an aid in attaining lower emissions. These involve combustion chamber design, fuel injection, valve timing optimization and exhaust gas recirculation.

Our studies and experience with these experimental systems have indicated that an improved piston engine has the potential to provide the same very low level of emissions of carbon monoxide, hydrocarbons and nitrous oxides achievable with gas turbine, steam or Stirling engine.

As a result, selection among these power plants for future production will be based upon characteristics other than emission level. Further, we believe on the basis of the problems yet to be solved that we will be able to achieve a production version of the improved piston engine earlier in time than any of the alternate power plants.

This makes it clear that we must continue to develop the improved piston engine if we are not to delay the advent of still lower emission level automobiles.

Considering all the relative advantages and disadvantages of the various power plants which might be used in automobiles, the internal combustion engine offers at present the best pollution control value. All of the potential power plants must be measured against each other on the basis of emission level potential and value—in all its aspects—to the owner of the car.

We would like to make it absolutely clear that General Motors has an open mind as to power plants for automobiles and will continue to explore all possible alternatives.

"PROGRESS OF POWER"

Recently, we demonstrated to many scientists and others interested in power plant development some of the latest results of our continuing investigation of various possible forms of automotive power.

We showed examples of working, experimental propulsion systems at a "Progress of Power" exhibit at our Technical Center near Detroit. These experimental designs still under investigation included both alternate power plants and improved internal combustion engines. We are continuing our work to develop these laboratory prototypes toward manufacturing feasibility.

A booklet containing copies of reports on these various power plants is submitted with this statement.

We invite you to visit the GM Technical Center to see these vehicles and, more importantly, the work we are doing in emission control research and engineering.

PROBLEMS RELATED TO LEAD IN GASOLINE

All the gasoline-burning engine approaches reviewed previously have important fuel composition requirements if we are to achieve maximum control of emissions.

The most important of these is the elimination of lead from gasoline. Lead creates several problems, such as making exhaust manifold reactors less effective and destroying effectiveness of catalysts.

Use of leaded gasoline rather than gasoline without lead may also cause greater emission control deterioration with accumulation of mileage due to combustion chamber deposits. Also, lead deposits form rapidly in some of the narrow passages which form a major part of some contemplated control systems.

Recently, various government agencies have indicated interest in eventual control of particulates from automobiles. By far, the major share of such particulates are lead or lead products. If significant reduction in these particulate levels is to be achieved, lead must be removed from gasoline.

THE IMPACT OF AUTO EMISSIONS ON POLLUTION

We have talked so far about the automobile and what we have done and what we are trying to do with respect to auto emissions.

As we go further down the road, reduction of car emissions to an acceptable level would solve only the automotive emission segment of the total air pollution problem.

We are confronted with far-reaching air quality problems that will not be solved even with reduction of auto emissions to zero. This is a fact beyond question. Air pollution will not go away just by restricting auto emissions.

AUTO EMISSIONS AND URBAN AIR POLLUTION

There have been a variety of opinions expressed as to the sources of polluted air in urban areas. Admittedly, the automobile is a contributor to the problem.

There is a tendency to measure gross tonnage and place equal value on all the various types of pollution tonnage in the atmosphere. This type of assessment is misleading.

The tonnage figures should be weighted by the potential harm to health that any given type of pollutant will produce. Even this does not give adequate recognition to time concentration or dosage.

Nevertheless, if we use assessments of the toxicity of the various types of pollutants to modify the tonnage, we obtain a more factual picture of the importance of the individual pollutant in a city's atmospheric problems.

Pollutants present in urban atmospheres include hydrocarbons, carbon monoxide, nitrogen oxides, sulfur oxides and particulates.

On a tonnage basis, slightly over 50 per cent of the urban air pollutant volume is attributable to automobiles.

Because carbon monoxide is the largest tonnage pollutant emitted to the urban atmosphere, it is often assumed that this is the principal urban area pollution problem. Since most of the carbon monoxide comes from automobiles, it is further assumed that the automobile is the major cause of this area's pollution problem.

According to government figures, carbon monoxide is far less significant in terms of potential harmful health effect than are many other pollutants.

If potential health harm of these individual pollutants is considered as well as tonnage, the relative importance of present levels of carbon monoxide in the atmosphere becomes much less. Rather than being responsible for more than 50 percent of the problem, automobile emissions become less than 10 percent of the urban air pollution problem.

We think this type of assessment is important in keeping in proper perspective the relative role of the automobile in contributing to harmful pollution. This does not mean, of course, that we believe there should be any relaxation in efforts to control emissions from the automobile, but it does mean that the government at all levels should at all times keep the total problem in mind.

Thus, it follows that regardless of the improvements in automobile power plants, air pollution will continue to be a problem and will continue to concern all citizens and governments for many years.

This is a by-product of our continuing urban growth, population growth and the proliferation of additional products that have their own role in atmospheric pollution. Just as we are dedicated to reducing auto emissions, General Motors supports all useful efforts to find solutions to other sources of atmospheric pollution. This is a big job, and all of us as good citizens must work toward the goal of cleaner air.

For our part, we have undertaken extensive projects to control emissions from our manufacturing facilities, as well as emissions from the cars we produce.

The criteria established in studies of what represents suitable air quality should become the basis for control standards with which automobile manufacturers and all other contributors would comply, taking into account both technological and economic feasibility.

The automobile industry can perform most effectively in reducing emission levels if stable standards are set sufficiently far in advance to allow time for development of an optimum approach to solution of the problem.

As to H.R. 12934 introduced by Mr. Rogers and H.R. 14960 introduced by Mr. Springer, we certainly support extension of the Clean Air Act, which has been an important factor in reducing air pollution in the United States. We recognize the government's role in this most serious problem and the necessity for mutual efforts by government and industry in the interest of diminishing air pollution.

Gentlemen, I have appreciated the opportunity to appear here today. In closing I want to emphasize once more that General Motors is fully aware of the seriousness to all of us of the air pollution problem, and that we are actively exploring all avenues to remove the automobile from the list of significant pollution sources.

Thank you.

Dr. CHENEA. Thank you.

Mr. JARMAN. Thank you very much for your statement, for adding to the record of this hearing on this very serious subject and problem in our country.

Yesterday, the Subcommittee heard the testimony and one reference was made to the need to secure greater assurance that prototype capabilities in automobiles are translated into production realities. I wondered if you care to comment on that.

Dr. CHENEA. Yes. I understand the question. The vehicles which we produce, of course, do meet the standards as they are established and we intend to meet future standards as they are established. There is a maintenance problem, however, and more effort needs to be placed on keeping these vehicles maintained. Certainly if the vehicles aren't maintained they will not continue to operate at the levels in which they were manufactured and we would urge serious consideration of this and will be willing to do anything we can do to help.

Mr. JARMAN. Do you feel that the car models that come off the general production line are comparable to the standards achieved in the prototype models that are tested by Government inspectors?

Dr. CHENEA. I am sure they are. I am sure they are.

Mr. JARMAN. You feel that any difference, then, in performance is largely a matter of maintenance after the car comes off the line?

Dr. CHENEA. It is largely a matter of maintenance and there are mechanics who attempt to adjust them and get them out of adjustment but the vehicles that come off the production line are meeting the standards.

Mr. JARMAN. Doctor, as you know, one charge has been made by some critics that the automobile companies have kept their research and development budgets small in comparison to what they should be to help solve the air pollution problem. Would you care to comment on that as far as General Motors is concerned?

Dr. CHENEA. Our budget is governed by the research that we do and the ideas that we think are worth pursuing. At no time since I have been associated with the Research Laboratories have we really been limited by money or facilities. We are primarily limited by ideas that look sufficiently promising to be worthwhile pursuing. Every idea that we know of that seems to have any hope of helping with the problem we are pursuing at least far enough to see whether it is worth pursuing further.

I would like to also add that Mr. Roche and Mr. Cole, on several occasions, have asked me whether or not there was anything further that I thought we ought to be doing to get closer to a solution of this problem. They are most anxious to do all that we can do.

Mr. JARMAN. Can you roughly estimate what money General Motors is spending in its research in this field?

Dr. CHENEA. In the last three years in the research in air pollution and alternative power plants, we have spent in excess of \$125 million in the corporation.

Mr. JARMAN. In the last three years?

Dr. CHENEA. Yes, and it is roughly \$30 million to \$40 million a year.

Mr. JARMAN. Thank you very much.

Mr. ROGERS?

Mr. ROGERS. Thank you, Mr. Chairman.

Doctor, we appreciate your statement.

Pursuing just a little bit the question there, when did you actually first start research into air pollution control? Do you recall?

Dr. CHENEA. There has been research in air pollution control at General Motors for a long, long time. However, it was in 1952 that the problem came to our attention very forcefully and we started to intensify and expand our program.

Mr. ROGERS. Now, how many personnel do you have assigned to work on the air pollution control problem?

Dr. CHENEA. In the Research Laboratories, or in the whole corporation, sir?

Mr. ROGERS. Let's break it down, the research laboratories and then in the corporation.

Dr. CHENEA. In the Research Laboratories, we have about 400 to 500 people actively employed in air pollution or alternative power plants or devices to control air pollution.

The total corporation has around 1,400 people involved in this activity.

Mr. ROGERS. And how many people are employed overall by your company?

Dr. CHENEA. The total corporation?

Mr. ROGERS. Yes.

Dr. CHENEA. All employees?

Mr. ROGERS. Yes.

Dr. CHENEA. Worldwide?

Mr. ROGERS. Yes.

Dr. CHENEA. About 757,000, I believe.

Mr. ROGERS. About 757,000?

Dr. CHENEA. Yes.

Mr. ROGERS. Has the number grown, those that are devoting their time to air pollution? Has this number been increased, say, in the last three to five years?

Dr. CHENEA. Yes, it has, very much so, particularly as we have increased our activities in alternative power plants. The actual growth in the last three years in the research laboratories in the alternative power plants has been such that we are spending half again as much on alternative power plants as we are on the internal combustion engines.

Mr. ROGERS. What percentage would the air pollution control research budget be of your total research dollar?

Dr. CHENEA. It is approximately a third to a half.

Mr. ROGERS. One-third to one-half?

Dr. CHENEA. Of the research laboratories' budget.

Mr. ROGERS. Are any tax benefits realized from this type of research program?

Dr. CHENEA. I don't know, sir.

Mr. ROGERS. You don't know?

Dr. CHENEA. No, sir.

Mr. ROGERS. How do you arrive at the amount you will spend? Is there any formula?

Dr. CHENEA. How do we arrive at our budget?

Mr. ROGERS. Yes.

Dr. CHENEA. Our budget is formulated around our program. We lay out our program based upon what we think needs to be done, what looks promising, and then the budget is formulated to back this up in terms of manpower and supplies and equipment to carry out that program.

Mr. ROGERS. What has been your experience as far as cooperating with the Government in this area? Has the Government been helpful?

Dr. CHENEA. It has been very good.

Mr. ROGERS. Have you had working relationships?

Dr. CHENEA. It has been very good.

Mr. ROGERS. Has there been any problem as far as records? We understood from the Government witnesses yesterday that some companies had not helped with furnishing records. Are you aware of any problem?

Dr. CHENEA. I am not aware of any problems.

Mr. ROGERS. Would you check that and let us know?

Dr. CHENEA. I will be glad to, sir.

(The following information was received for the record:)

General Motors is not aware of any problems related to cooperation with the government. We have submitted all records requested by the Department of HEW and are not aware of any outstanding requests for records of information.

Mr. ROGERS. What are your comments on cross-licensing?

Dr. CHENEA. I don't honestly think, sir, that I am in a position to comment on cross-licensing. As Director of the Research Laboratory, I don't get involved in this sort of thing. I am not really in a position to comment.

Mr. ROGERS. What would be your reaction if we included in the law a provision to provide that there should be inspection off the production line to check prototype models? It would be a spotcheck. I presume that is the type of activity they would have. What would be your reaction to that?

Dr. CHENEA. I would think that this would be a good way of assuring the Government that the vehicles actually do meet the requirements.

Mr. ROGERS. Do you have any in-house check yourself on these cars as they come off the production line?

Dr. CHENEA. Only to the extent that we make sure they are assembled in proper adjustments. We do not make emission measurements.

Maybe, Fred, you would like to add to that.

He is in charge of emission controls.

Mr. ROGERS. Surely.

Dr. BOWDITCH. We do run an audit that amounts to about two to

five percent of our California cars, to give you a roundhouse figure, in which we do run the full Government test on cars as produced.

Mr. ROGERS. On all of them?

Dr. BOWDITCH. On all of them.

Mr. ROGERS. That go to California?

Dr. BOWDITCH. No; 2 percent in California.

Mr. ROGERS. Two percent of the California production?

Dr. BOWDITCH. We started in this area and plan on expanding in due time, but this is about the level of it at this time.

Mr. ROGERS. How long does it take for that test?

Dr. BOWDITCH. The test itself requires one day for the vehicle to sit in order to assure proper temperature and then the test itself takes around 20 minutes.

Mr. ROGERS. And if the car does not meet the test, then it is rejected?

Dr. BOWDITCH. We attempt to repair it, fix it as appears necessary.

Mr. ROGERS. I was interested in your comment about maintenance, and I can understand how maintenance would have an effect on air pollution, but I was somewhat interested in the figures that were presented by the Department yesterday. They have a research project going on where they have tested cars as to whether they are meeting the standards of the prototype and I think on the Chevrolet almost three-fourths of those tested, not quite—73 percent, I guess it was—failed to meet one of the two standards and yet another automobile company, Chrysler, only had 19 percent.

Now, I presume those were cars of the same year. I don't know that to be a fact.

But if this is so, this would indicate to me that it may not necessarily be only a problem of maintenance because this is run by a rental agency and I presume their cars are pretty much uniformly maintained. They do the maintenance on them for the most part. I would question that, and I thought you might want to check into that and let us have your thinking because if this fact is so it would indicate to me that there must be a production problem if three-fourths of one model is not meeting either of the standards.

(The following information was received for the record:)

GM did not conduct the tests and therefore does not have any information regarding the condition of the cars at the time they were tested. It is extremely important to note that an important initial step to be taken in evaluating the effectiveness of the emission control systems would be to ascertain that the systems had been operated within, and were adjusted to, the specifications set by General Motors. We cannot emphasize too strongly that the emission systems must be properly maintained after the vehicles are in use so that the systems may continue to function properly.

We do know that Chevrolets—and all other GM vehicles—are manufactured in compliance with the provisions of the Clean Air Act, and, with proper maintenance, will continue to meet all legal requirements.

Mr. ROGERS. Now, you mentioned that you expect to find a solution to automobile emission problems at the earliest possible time. Do you have any estimate of time when you think this will be met?

Dr. CHENEA. We expect to meet the 1975 standards that are being discussed. We have several approaches to this particular problem. We have met them in the laboratory and we think we can find ways

to meet them in mass production. The job that remains to be done is converting what we know to a mass production technique.

Mr. ROGERS. Can it be speeded up?

Dr. CHENEA. I do not believe that we know how to speed it up. We have adequate people, competent people, working on all the approaches that we think are promising. We are not really short people or money to get on with the job. It is going ahead just as fast as we can push it.

Do you want to add anything?

Dr. BOWDITCH. Yes, if I may, sir.

The present levels of controls that we have on cars in the field, and these are the numbers that we were citing in our text, are such that the automotive pollutants in the atmosphere are on the decrease at present as a result of the present control system, so it isn't a case of having no control measures on the cars today or an insufficient number of controls so that the automotive-related air pollution problem is becoming more severe.

Mr. ROGERS. That is if all of the models are meeting the standards?

Dr. BOWDITCH. The numbers that we presented in our text are what is going on in the field. These are not the prototype levels that are quoted in our text. This is what actually is happening in the field with the production vehicles, with customer maintenance.

Mr. ROGERS. This study from HEW would not indicate that.

Dr. BOWDITCH. Well, we find that both the HEW prognostications as well as the California prognostications agree with ours as to what is going on in the atmosphere is a constant decrease in terms of carbon monoxide and hydrocarbon levels at the present, so we don't feel the problem is completely out of hand at the moment. We are making very significant inroads into both of these pollutant problems.

Mr. ROGERS. You talk about the different power systems and you still think, though, that the combustion engine is the one that probably will be perfected where you reduce emissions?

Dr. CHENEA. In the shortest time.

Mr. ROGERS. You also mention that gas turbine engine for trucks, buses, and stationary applications is scheduled for production by the Detroit Diesel Engine Division. When would that be?

Dr. CHENEA. We expect to have them on the market at the end of 1971, sir.

Mr. ROGERS. 1971?

Dr. CHENEA. Right.

Mr. ROGERS. What would be the result on air pollution from this engine?

Dr. CHENEA. The pollutants from gas turbines in general, as far as hydrocarbons and carbon monoxide are concerned are down about the 10 or 15 percent level of the uncontrolled internal combustion engine. They tend to be a little higher than the 10 percent to 15 percent level in NOx's, nitrous oxides. They are a little higher than that.

Mr. ROGERS. You would think this would be done like putting them on buses, truck lines, the larger commercial vehicles?

Dr. CHENEA. This kind of duty cycle is best adapted to this kind of engine.

Mr. ROGERS. Thank you very much.

Thank you, Mr. Chairman.

Mr. JARMAN. Dr. Carter?

Mr. CARTER. Thank you, Mr. Chairman.

It is a very interesting statement. It seems you gentlemen are making quite an effort towards developing means of locomotion that will not further pollute the air. We are glad to see that.

Continuing on the statement of the distinguished gentleman from Florida concerning 73 percent of the Chevrolets tested showing emissions of carbon monoxide and hydrocarbons which exceeded the standards, that is a pretty high percentage of a company's vehicles to exceed the standards. The prototypes were all right, but we wonder if through mass production perhaps your cars are not given the attention that the prototype automobiles were. Do you think that is right?

Dr. CHENEA. I have no reason to believe, sir, that the vehicles coming off the line aren't meeting the standards. I think it must be a matter of maintenance and maladjustment.

Mr. CARTER. I would have to disagree with that. The figures are just too startling there in view of the fact that 44 percent, I believe, of another manufacturer's cars had defects, which was, I think, too high, another one only 17 percent, but it seems that on the assembly line the job must not be being done as well. There is another comment. I believe you stated that you had diminished the emissions of carbon monoxide by 80 percent. Our figures don't show that much; about 73.6 percent, I believe.

Dr. CHENEA. I think my comment with regard to 80 percent, sir, was that the 1975 standards correspond to reduction of 80 percent in carbon monoxide.

Mr. CARTER. I believe you stated that your company had diminished emissions of carbon monoxide by 80 percent.

Dr. BOWDITCH. No, sir. If we stated that, that was in error. What we meant to indicate was that the carbon monoxide was reduced by 65 percent, the hydrocarbons by about 70 percent, on the present models, 1970 models, and by 80 percent on our 1971 models.

Mr. CARTER. Of course the national standards will reflect a reduction of 73.6 percent of carbon monoxide in 1970 and approximately the same, I believe, in 1971. I was puzzled by a statement on page 9. You arrive at a conclusion here. You state:

However, if potential health harm of these individual pollutants is considered as well as tonnage, the relative importance of present levels of carbon monoxide in the atmosphere becomes much less. On this basis automobile emissions become approximately 10 percent of the national air pollution problem rather than approximately 60 percent when tonnage alone is considered.

Dr. CHENEA. Approximately 60 percent, sir.

Mr. CARTER. Yes, sir.

Would you care to explain that a little more fully? I don't know that I understand.

Dr. CHENEA. Yes; this is a matter of attempting to take into account, sir, the relative toxicity of these various pollutants. Some of them are much more harmful than others and if one weighs them properly in accordance with their relative harm to the human body those which come from the automobile really make up a much smaller percentage of the harmful pollutants in the air.

Mr. CARTER. You don't think carbon monoxide is as harmful perhaps as sulfur oxide from a smokestack, is that correct?

Dr. CHENEA. This is correct. We have used Government figures here with regard to the harmfulness.

Mr. CARTER. What about hydrocarbons? Do you regard them as being harmful, as harmful as sulfur oxide particularly?

Dr. CHENEA. I don't recall how those rate.

Dr. BOWDITCH. At the present time, the ambient air standards, which are the bases which we have used in arriving at the relative toxicities, if you will, do not rate hydrocarbons in terms of the health problem at the present ambient levels. It is for this reason that we make the same consideration with regard to hydrocarbon, so the main health-related problems here are the particulates, sulfur oxides, nitrogen oxides, and carbon monoxide.

Mr. CARTER. We do know hydrocarbons help produce lung cancer almost 100 percent in experimental animals in the National Institutes of Health when they have been exposed to them.

Dr. BOWDITCH. I believe these are much higher concentrations than we are finding in the atmosphere.

Mr. CARTER. Yes, I should think so, perhaps.

Dr. CHENEA. Sir, may I comment on that?

Mr. CARTER. Yes.

Dr. CHENEA. Much more research needs to be done on this whole medical question with regard to pollutants in the air. We find it most difficult to find reliable data in this regard and I would urge you people to think seriously about research in this area. It is research that we cannot carry on in the automotive industry and it is a very important part of the whole problem.

Mr. CARTER. I assure you that we are doing our best to urge the people in NIH and the Surgeon General to do this research.

Thank you, Mr. Chairman.

Mr. JARMAN. Mr. Kyros?

Mr. KYROS. Do you have in your parts catalog air pollution devices as replacement parts? When these items wear out eventually you do catalog them now as replacements?

Dr. CHENEA. Oh, yes.

Mr. KYROS. And they are standard throughout the repair shops in the country now?

Dr. CHENEA. For all vehicles in which we furnish devices for air pollution, we furnish parts, yes, sir.

Mr. KYROS. Do you have any sales history on these items? Are they moving? Do you have a history already as to how you stock them?

Dr. CHENEA. I am sure we have a history. I don't know what it is. I am sure we have a sales history of them.

Mr. KYROS. But you do have how many are sold and priced and you could provide them for the committee if we asked you to?

Dr. CHENEA. Yes.

Mr. KYROS. What about the durability of these parts, their lives? Has it measured up to what you expected?

Dr. CHENEA. Yes. We have no evidence otherwise. We are, as I say, running into this problem of keeping them tuned up. It isn't a matter of durability of the parts; it is a matter of getting out of adjustment which seems to be plaguing us.

Mr. KYROS. What about profit on these parts? Do you know specifically what the profit margins are, what you are doing for profit mark-up on these specific parts?

Dr. CHENEA. I have no information on that; no, sir.

Mr. KYROS. I have no further questions.

Mr. JARMAN. Mr. Hastings?

Mr. HASTINGS. Thank you, Mr. Chairman.

I would be interested in knowing what your experience has been with the various States through statutes passed by States, contemplated or already in regulation by States, as it relates to the standard that we are looking at here. Have you had much difficulty with States other than California? What is the current situation as to States requiring standards perhaps higher than the Federal Government is requiring?

Dr. CHENEA. Dr. Bowditch administers these, and I will ask him to answer.

Dr. BOWDITCH. Under the present Federal statute only the State of California, as we understand it, has the opportunity to be different from the Federal Government, and then only at the permission of the Secretary of the HEW, so California is the only one that can be different.

Mr. HASTINGS. I understand there are States who would like to be included in that with California, though, and some attempts have been made legislatively. Is there any recent experience with these State legislatures along these lines?

Dr. BOWDITCH. No, sir.

Mr. HASTINGS. None whatsoever?

Dr. BOWDITCH. No, sir.

Mr. HASTINGS. Do you feel that the Federal Government is in a much better position to set those national standards rather than allow the various States to set them?

Dr. BOWDITCH. Yes, sir. Fifty different sets of requirements would be rather disastrous to an industry such as ours.

Mr. HASTINGS. I certainly agree with that.

I have no further questions.

Mr. SPRINGER. Would the gentleman yield?

Mr. HASTINGS. Certainly.

Mr. SPRINGER. I would just like to ask one question, with the permission of the Chairman.

How much lower are the standards in California than the Federal standards?

Dr. CHENEA. Today, sir?

Mr. SPRINGER. Yes.

Dr. BOWDITCH. The present difference revolves about the evaporative losses from our cars which becomes a requirement in the other 49 States beginning with the next model year, with the 1971 model, so for this year the difference is only in the control of evaporative losses. For 1971 there will be another difference because California at that time will begin control of oxides of nitrogen as a requirement. The Federal Government does not have that requirement at this time.

Mr. SPRINGER. Oxidization—what?

Dr. BOWDITCH. Oxides of nitrogen. It is another compound in

addition to the carbon monoxide and the hydrocarbons, a third chemical compound that will come under control in California.

Mr. SPRINGER. Would you have to comply with that in order to sell cars in California?

Dr. BOWDITCH. Yes, this comes about primarily as a result of the requirement for control of the photochemical smog problem, which is primarily a problem in the Los Angeles area.

Mr. SPRINGER. Let me ask you why can't that same limitation then, if you are producing in General Motors, be produced in the rest of the country as we are progressing.

Dr. BOWDITCH. Certainly these things can be done in due time. There is no reason why they can't, other than the cost that obviously must be passed on to the consumer.

Mr. SPRINGER. Would the price of the car be higher in California as a result of this?

Dr. BOWDITCH. I can imagine it will be. This hasn't been established at this time. Our present models in California are more expensive.

Mr. SPRINGER. How much more expensive?

Dr. BOWDITCH. I believe in our case it is \$30 or \$35. I would have to check. It is on the sticker as is required.

Mr. SPRINGER. And this is a result of the increased cost of doing what is required under the law of California, am I right?

Dr. BOWDITCH. This is the evaporative control system that is required now in California in this year's model.

Mr. SPRINGER. Is there any way that you can give us some idea of what the increased cost per car is going to be when you get full compliance?

Dr. BOWDITCH. I don't have that information.

Mr. SPRINGER. Can you give us an estimate, roughly?

Dr. BOWDITCH. I think we would have to be quite specific as to which particular standards we are talking about and then—

Mr. SPRINGER. Federal standards.

Dr. BOWDITCH. For which year?

Mr. SPRINGER. Let's say ultimately.

Dr. BOWDITCH. Well, we have been given some guides, I believe they were called, by Secretary Finch at a meeting with the President here that went up to the year 1980.

Mr. SPRINGER. All right, now, what in the year 1980 then do you anticipate the increased cost will be?

Dr. BOWDITCH. I think I would have to ask to be allowed to furnish this to the committee at a later time. I am not in a position to furnish that cost. I don't know what kind of hardware it would really take.

Mr. SPRINGER. I am trying to be fair and I realize the trouble and the problem that you are faced with, but are we talking about in the area of one percent, or three percent, five percent, ten percent—I am not going to hogtie you with this—so this committee understands that there is either going to be an increase or there isn't going to be, and the committee ought to understand that at this time.

Dr. BOWDITCH. Certainly there will be an increase. My estimate at this time would be that it would be a substantial increase, perhaps of the order of 10 percent, but I would hope that this committee would not hold us to that figure.

Mr. SPRINGER. So you are talking about, then, on a car of \$3,000 in the neighborhood of \$300?

Dr. BOWDITCH. It would be quite possible, but I must again emphasize—

Mr. SPRINGER. Let's say five to ten percent. You are talking in the area of \$150 to \$300 on a \$3,000 automobile?

Dr. BOWDITCH. I can imagine it would be that much.

Mr. SPRINGER. I thank the gentleman.

Mr. HASTINGS. If I may proceed for just one moment on the California question, do you consider the new standards that would be required by California to be reasonable?

Dr. BOWDITCH. Which standards are you referring to?

Mr. HASTINGS. The standards you just referred to.

Dr. BOWDITCH. The 1971 requirement?

Mr. HASTINGS. Yes.

Dr. BOWDITCH. The ambient air authorities in the area believe that this is necessary for their atmosphere, so, therefore, we, of course, accede to their—

Mr. HASTINGS. They think they are reasonable, but do you think they are reasonable?

Dr. BOWDITCH. I don't think we have an adequate basis on which to judge what is reasonable and what isn't. As you may be aware, we have indicated from our own research that the control of oxide of nitrogen won't help the ambient photochemical smog situation in California. The California authorities decided to the contrary. Obviously, they are the proper group to make that judgment.

Mr. HASTINGS. The one obvious question in relationship would be should HEW consider adopting the same standard?

Dr. BOWDITCH. As I said earlier, the reason for control of oxides of nitrogen in California is because of the special photochemical smog problem that occurs primarily in the Los Angeles area, to a much greater degree than anywhere else in the country.

Mr. HASTINGS. I have no further questions, Mr. Chairman.

Mr. JARMAN. Mr. Rogers?

Mr. ROGERS. What is the charge for your present air pollution control device?

Dr. BOWDITCH. When we first introduced devices on our California cars and when at that time we indicated a price at that time of about \$50.

Mr. ROGERS. What is the present price?

Dr. BOWDITCH. That price is not segregated out and I don't have that figure with me.

Mr. ROGERS. Could you furnish it for the committee?

Dr. BOWDITCH. I am sure that we could.

(The following information was received for the record:)

When the original exhaust emission control system was introduced in the State of California for the 1966 model, it carried a suggested retail option price of \$47.50. In accordance with Federal regulations, the system was added to all 1968 models as standard equipment and the announced price of all 1968 models included the system. While changes have been made in the system since that time, it has remained an integral part of the car, and as such is included in the total price of the car.

At the same time, it is not feasible to attribute any specific amount of the

price to any one item such as the exhaust emission control system. Our automobile prices comprehend the vehicle as an entity and take into consideration many factors including cost, competitive conditions, and the general economic situation.

In order to comply with emission control standards set by the State of California for 1970 models, GM is installing an additional system on cars sold in California. This is an evaporative control system, which consists basically of a sealed fuel system and canister of activated carbon and has a suggested retail price of \$35.

Mr. ROGERS. Has it gone down, do you think, or up?

Dr. BOWDITCH. I am afraid I don't know and I would ask that we furnish this to you, sir.

Mr. ROGERS. You don't know whether the device has gone up or down?

Dr. BOWDITCH. The price?

Mr. ROGERS. The cost.

Dr. Bowditch. Again, I am not a financial expert for the corporation. I am a technical man.

Mr. ROGERS. I won't pursue that other than ask that you furnish it for the record.

Dr. BOWDITCH. All right.

(The following information was received for the record:)

As previously mentioned, the current exhaust control system is an integral part of the car, and is included in the total price of the car.

Mr. ROGERS. Can you tell me are there any differences in your devices from 1968 to the 1969 models?

Dr. BOWDITCH. Essentially none.

Mr. ROGERS. None?

Dr. BOWDITCH. Essentially. We do use two exhaust control systems and the application has varied between models between these years but the basic systems remain the same.

Mr. ROGERS. I think the committee would like to have a rundown on each one and what changes, if any, and what the changes would be in the 1970-71.

(The following information was received for the record:)

Starting with the 1968 model year, GM has used two types of exhaust emission control systems. One is known as the Air Injection Reactor System (AIR), and the other is the Controlled Combustion System (CCS). In 1968 the AIR system was used on all Cadillacs. It was also used on most of the GM cars that were equipped with manual transmissions. There were essentially no major changes on 1969 models in either of these control systems, nor to the specific vehicle models to which each was applied. Although the same basic systems are still being used on 1970 models, a new feature, the GM Transmission Controlled Spark (TCS), was introduced on most models to further reduce emissions of hydrocarbons.

(It should be noted that TCS also reduces emissions of oxides of nitrogen.) California requires an evaporative emission control system on all 1970 models sold in the State. This requirement will be extended nationwide for all 1971 models.

Mr. ROGERS. What is the total gross income of your company? Would you know that figure?

Dr. CHENEA. I could only guess at it. I don't remember it exactly.

Mr. ROGERS. I understand. You supply it for the record.

Dr. CHENEA. The total gross sales of the corporation is in the neighborhood of \$22 billion a year, sir.

Mr. ROGERS. \$22 billion?

Dr. CHENEA. Right. I think it is a little less at the moment. It has been that high.

(The following information was received for the record:)

Total worldwide sales for General Motors Corporation for the 1968 calendar year amounted to \$22.8 billion.

Mr. ROGERS. And you are spending, I believe, thirty to forty million dollars a year on this problem?

Dr. CHENEA. In the corporation, right, on just the emissions and alternative power plants.

Mr. ROGERS. Do you think your company's pollution control is as effective as your competitors'?

Dr. CHENEA. I have no reason to believe it isn't and in many regards I think it is better.

Mr. ROGERS. In what regard?

Dr. CHENEA. I think we have in a few cases better solutions than they have. I am sure they don't agree with this, but we think we have approached it in a better way.

Mr. ROGERS. Would you specify for the record—you may not have this now—where your device is superior in your own mind?

Dr. CHENEA. All right.

(The following information was received for the record:)

We believe that our systems are superior in two areas. First, with regard to the exhaust control system, GM has a system for maintaining constant carburetor air temperature independent of ambient air temperatures. This feature provides more accurate carburetor metering so that consistent air-fuel ratios are delivered under all ambient conditions. This system is in use on practically all GM models. Second, with regard to the evaporative control system, GM is using a charcoal canister as a means of storing evaporative losses. The canister configuration has the capacity of considerably more vapor storage than can be accommodated by other known methods. This feature is currently being used on all GM models sold in California.

Mr. ROGERS. American Motors, as I recall, developed a device that was rather simple. I think you developed one that was a little more complicated. You in effect went almost to the American approach, didn't you? Didn't you make a change there and have a less—

Dr. BOWDITCH. I am not sure which device you are referring to, sir.

Mr. ROGERS. I recall hearing something of that, an exhaust emission device.

Dr. BOWDITCH. We initially in California introduced our models with an air pump system. We called it A.I.R.

Mr. ROGERS. Did you change that?

Dr. BOWDITCH. We have since changed on many models to an engine modification type of approach.

Mr. ROGERS. Was that the type that American Motors had at first?

Dr. BOWDITCH. I don't believe that American Motors was different. I am sure you will best ask the other manufacturers. It could be you are referring to the initial Chrysler approach rather than American Motors.

Mr. ROGERS. Perhaps. I just recall one of them and then the other companies came to that.

Dr. BOWDITCH. This could be the situation that you are referring to.

Mr. ROGERS. And wasn't that one sold for \$35 where the others were about \$50?

Dr. BOWDITCH. I believe you are essentially correct.

Mr. ROGERS. And there was a change but there was no change in price, was there?

Dr. BOWDITCH. I hesitate to comment on the price.

Mr. ROGERS. Would you let us have that for the record?

Dr. BOWDITCH. I will certainly attempt to do it.

(The following information was received for the record:)

In the 1966 model year, General Motors introduced in the State of California only an exhaust emission control system which used Air Injection Reactor System (AIR) to burn off the unburned hydrocarbons and carbon monoxide in the manifold of the exhaust system. This unit has a suggested retail option list price of \$47.50.

At the beginning of the 1968 model year, when Federal standards were introduced, exhaust emission control systems were installed on all passenger cars sold in the United States. An engine modification approach, the Controlled Combustion System (CCS), used by General Motors in certain models achieved more complete combustion of hydrocarbons and carbon monoxide in the firing cylinder and also incorporated pre-heating the air before it is mixed with the fuel.

As mentioned above, the exhaust emission control system became an integral part of the car, so that the announced price of the vehicle included any changes in the system.

Mr. ROGERS. Thank you.

Thank you very much, Mr. Chairman.

Mr. JARMAN. Are there further questions?

Dr. Carter?

Mr. CARTER. How many cars are there in our country at the present time?

Dr. CHENEA. Approximately 100 million.

Mr. CARTER. Approximately 100 million. How many are produced each year?

Dr. CHENEA. About 10 million.

Mr. CARTER. About 10 million?

Dr. CHENEA. In round numbers.

Mr. CARTER. About how many will we have in 1975?

Dr. CHENEA. How many automobiles on the road, sir?

Mr. CARTER. Yes, sir.

Dr. CHENEA. I don't have those estimates. People have estimated it. I think it is somewhere in the neighborhood of 120 million, something like that.

Mr. CARTER. And we would lose some by normal attrition then.

Dr. CHENEA. Oh, yes.

Mr. CARTER. Although we produce 10 million and have 100 million now in 1975 we would have 120 million?

Dr. CHENEA. I think that is the estimate that most people would make.

Mr. CARTER. Even though we diminish the percentage of emission of pollutants per car if we increase the number of cars we can still have the same amount of pollution?

Dr. CHENEA. You certainly can, sir. The total amount of pollution is a product of the number of cars and the average pollutant per car and to make progress on this you must gain on this reduction in average per car to offset the increase in number.

Mr. CARTER. Increased number of cars. Do you think that we will do that in view of the fact—

Dr. CHENEA. We are doing that now, sir.

Mr. CARTER. Even in 1975 with 20 million more cars the pollution at that time will be less than it is today?

Dr. CHENEA. The contribution from the automobile nationwide will be less, there is no question about that.

Mr. CARTER. I would certainly hope so.

Thank you, Mr. Chairman.

Mr. JARMAN. Are there further questions?

Gentlemen, the subcommittee appreciates your being with us this morning.

Dr. CHENEA. Thank you very much, sir.

Dr. BOWDITCH. Thank you.

Mr. JARMAN. Our next witness is Mr. Herbert L. Misch, Vice President-Engineering, Ford Motor Company.

Mr. Misch, would you present your associates who may participate with you?

STATEMENT OF HERBERT L. MISCH, VICE PRESIDENT-ENGINEERING, FORD MOTOR CO.; ACCOMPANIED BY DONALD A. JENSEN, DIRECTOR, AUTOMOTIVE EMISSIONS OFFICE; ROSS E. TAYLOR, ASSISTANT CHIEF ENGINEER IN CHARGE OF ADVANCE ENGINEERING, ENGINE DIVISION; AND JAMES MAC NEE, ASSOCIATE COUNSEL, OFFICE OF GENERAL COUNSEL

Mr. MISCH. Yes, sir.

Mr. Jarman, and members of the committee, I am Herbert L. Misch, Vice President-Engineering, Ford Motor Company, and I have with me Donald A. Jensen, Director of our Automotive Emissions Office.

I welcome the opportunity to appear before you today to support the extension of the Clean Air Act. It may sound incongruous for a large corporation to ask for an extension of government controls but our experience to date has convinced us that the Clean Air Act should be extended.

As a matter of policy, Ford Motor Company is committed to work for a cleaner atmosphere and supports government controls which help to achieve our mutual goals in this respect. To put this position in perspective, I think it might be useful to recount briefly the history of our efforts to control vehicle emissions.

In the early fifties, when it was first recognized that the automobile played a role in the formation of photochemical smog in Los Angeles, Ford initiated research efforts in four fields. First, we helped to develop instrumentation to measure contaminants in extremely small quantities—parts-per-million—from the automobile exhaust. This was the necessary first step upon which all further progress was dependent.

Second, we cooperated in a program to take these instruments into the field, where, working with California air pollution officials, we did two things. We determined typical driving patterns of the general Los Angeles population, and we measured the amounts and

concentrations of pollutants emitted by typical automobiles when driven in these typical patterns.

Third, knowing how to measure emissions with a high degree of accuracy and knowing what typical automobiles in customer operation emitted, we were able to make meaningful comparisons in the laboratory between various approaches to reducing the amount of emissions. These laboratory methods, which simulated the conditions created in typical Los Angeles automobile operation, became the basis for what we now refer to as the seven-mode vehicle emission test procedure, formally adopted by California in May 1961.

Fourth, with these preliminary, but essential steps accomplished, we were able to concentrate on emissions control research and technology. In reality, of course, we had been carrying on control hardware research and development concurrently with our research programs on emission measurement, driving patterns, and test procedure.

Initially, it appeared that a device controlling the deceleration driving mode would be sufficient to reduce hydrocarbon emissions to the desired level of air quality. We engineered workable, effective deceleration devices for hydrocarbon control but on the basis of data furnished to them by the industry, government authorities concluded that emissions during deceleration were relatively unimportant in the total picture. Thereafter, our work recognized the need to control emissions during various driving modes.

At the urging of California authorities, we concentrated our efforts at finding a device that would control emissions of hydrocarbons. We succeeded in developing a catalyst (vanadium pentoxide) that was extremely effective. At about this time, however, California enacted a CO requirement. Since vanadium pentoxide was not effective in controlling CO, we redirected our efforts toward solutions capable of controlling both hydrocarbons and carbon monoxide.

Contemporary research led to the identification of another significant source of hydrocarbon emissions, namely crankcase "blow-by." It was determined that crankcase "blow-by" was responsible for 20 percent of the total hydrocarbon emissions from an automobile. Utilizing crankcase fume recirculation systems, designed earlier for other purposes, we engineered crankcase control systems and voluntarily installed them on California cars in the fall of 1960 (1961 models).

In the ensuing years, we experimented with numerous exhaust control systems utilizing not only our own research efforts, but also those available from others. Specifically, we made significant advances in thermal reactor systems and complex catalyst control methods.

In preparation for the introduction of exhaust controls in California for 1966 models, we reviewed our engineering research and adopted a variation of our thermal reactor. The result was Ford's Thermactor System, consisting of an air pump supplying oxidizing air at the exhaust valve seats of the engine (in the exhaust port) to help burn polluting contaminants. Subsequently, we perfected an engine modification system that we call IMCO—Improved Combustion.

IMCO has, for the most part, replaced the Thermactor as a method of Ford's exhaust control. These controls (IMCO) were extended to heavy gasoline powered trucks in California on 1969 models and nationwide on 1970 models.

My purpose in reviewing the history of emission control is twofold. First, I cannot overemphasize that the task was made exceedingly difficult initially by the absence of a fixed target and later by the tendency to have moving and shifting targets. Second, we were able to respond, with a degree of dispatch, to the original Federal standards only because they gave some consideration to the industry's needed leadtime and to the existing state of the art in emission engineering.

Relative to the point when the Clean Air Act became effective, the regulated levels in 1971 on a nationwide basis will represent an 80-percent reduction in hydrocarbons and a 70-percent reduction in carbon monoxide.

As we look back, it is apparent that the fundamental principles which Congress and this committee, gentlemen, incorporated in the Clean Air Act have been successful in encouraging cooperative industry and Government progress in reducing vehicle emissions.

Let me outline some of the basic tenets of the law which have contributed to that progress.

As you know, the 1967 amendment of the Clean Air Act required the control of emissions nationwide. We were able to comply with this requirement because of the experience we gained in California.

Subsequently, controls for evaporative emissions from the fuel tank and the carburetor were adopted. These were introduced on 1970 models in California and will be extended to all U.S. cars and light duty trucks for 1971 models.

Final work is now in process to control oxides of nitrogen for 1971 models to be sold in California and the control of diesel smoke from new engines will become effective on January 1, 1970.

Quite apart from government requirements Ford started a comprehensive quality control program to monitor emission controls. A sample of vehicles are checked each day to ensure the integrity of our production cars. Ford has an elaborate pressurized room where 100 percent of our carburetors are "flowed" and checked to be certain they are within necessary emission control tolerances. Idle adjustments are set at the factory and idle adjustment limiting devices are installed to help maintain the emission characteristics of our cars when they are in the hands of our customers. We also issue basic instructions in our manuals and on decals in the engine compartment to aid mechanics for proper engine adjustment.

First, the law provides a framework for a balanced attack on air pollution from both motor vehicle and stationary sources. In effect, HEW is required to establish the "need" for new or more stringent standards. Secondly, Congress established policy direction but entrusted the complex administration of test procedures, setting standards, and similar matters to the expertise of HEW's National Air Pollution Control Administration. We regard this approach as being extremely important. When standards are written into the law itself, the administrator is deprived of the flexibility he needs to maximize the policy objectives of the law within the framework of a rapidly moving research and engineering effort.

Finally, the Clean Air Act expressed a recognition of such practical considerations as technological feasibility, economic costs and leadtime. Leadtime is of critical importance to a mass production industry as complex as the one we represent.

As a result of these basic principles of the law, numerous segments of Ford Motor Company are working for the near-term and far-term future low emission or "smog free" vehicle. One important endeavor is the Inter-Industry Emission Control (IIEC) Program. This is a cooperative effort which began in April 1967, with Ford as the project manager. It includes six petroleum companies and four foreign car manufacturers.¹

The goals of this program are to reduce emissions to:

65 p.p.m. HC approximately equivalent to 0.82 grams per mile HC.

0.3 mole % CO approximately equivalent to 7.1 grams per mile CO.

175 p.p.m. NO_x approximately equivalent to 0.69 grams per mile NO_x.

This is the inter-industry emission control program definition of a "smog free" vehicle and represents a 90 to 97 percent emission reduction from the levels of pre-control vehicles. The participants in the IIEC Program contribute their support both technically and financially in an effort to find the optimum combination of hardware and fuel.

These objectives have been achieved in the laboratory by means of various approaches. Today, "concept" cars are on the test track to determine whether these approaches are feasible in respect to durability and performance. After much preliminary research and culling of a host of alternatives, IIEC work now is concentrated on four basic ways of achieving the project goals. They consist of "concept emission packages"—experimental smog-control systems installed in test vehicles. (These packages are described in Attachment I). The next step will be to explore the adaptability of the most promising of these "concepts" to mass production.

Although much of our research and engineering is proprietary, we have disclosed our findings in this program to appropriate Government agencies. Copies are forwarded to the President's Scientific Adviser, the National Air Pollution Control Administration, and to California authorities. In addition, at the appropriate stage of development, we plan to make the most promising of these concepts available to government activities for cooperative evaluation. We have displays of two of these concepts here today to provide the committee with the opportunity to see examples of our cooperative research effort.

Although today I have emphasized the Inter-Industry Emission Control Program, there are other promising development efforts at Ford Motor Co. We have publicly announced our intent to produce the turbine truck commercially in the early 1970's. Experimental turbine powered trucks are running daily to accumulate experience. Application to automobiles is still a bit down the road, however.

Preliminary analysis indicates that the use of gas turbine engines in passenger cars would entail a significant cost penalty and, in the case of city driving, higher fuel costs. These factors will have to be overcome before the gas turbine can be considered as an attractive substitute for the internal combustion engine in passenger cars.

Incidentally, we have a Continental Trailways bus starting, I hope,

¹Participating companies include: American Oil Co., Atlantic Richfield Co., FIAT S.p.A., Ford Motor Co., Marathon Oil Co., Mitsubishi Heavy Ind., Ltd., Mobil Oil Corp., Nissan Motor Co., Ltd., The Standard Oil Company of Ohio, Sun Oil Co., Toyo Kogyo Co., Ltd.

today on the East Coast and will be carrying passengers to the West Coast powered by a Ford 707 gas turbine.

Before closing, I would like to make a few remarks concerning other alternate power sources.

We have prepared rather elaborate paper studies on the Rankine cycle and carefully analyzed all publicly available literature on the subject, but we found no cause to become optimistic about steam engines. In our opinion, the Rankine cycle is too complex and has too many seemingly insoluble problems to be considered a likely successor of the internal combustion engine.

Our activities in electric vehicle research have included development work on a concept battery—sodium-sulfur—a zinc air battery concept, improved motors and control systems. We had hoped that these major advances in battery development and in control and motor technology might give the electric vehicle a good chance to succeed as a small urban-surburban passenger car and delivery or service vehicle within a decade.

Then, as now, the principal problem was to find ways to minimize the electric vehicle's disadvantages, namely short range, poor speed and acceleration, slow hill climbing, and long recharge time.

Problems associated with the fabrication of sodium-sulfur batteries have proved to be more difficult to solve than had been anticipated. As a result, we are nowhere near as far along at this time as we hoped we would be.

Some research with lead acid batteries appears promising. This development, if successful, would permit the production of a city car with about 40 miles range in city driving. This represents a two- to-four-fold improvement over previous technology. It also has been the motivation to re-examine the hybrid engine, electric vehicle concept.

Whether or not any of these alternate power sources ever proves to be worthy of becoming a volume-produced power plant remains highly speculative at this point. The near term improvements for vehicle emissions must be realized from the internal combustion engine system. Further, we think any objective analysis of the evidence supports our conclusion that the goal of a virtually emission free power source can be reached sooner with the internal combustion engine than with an entirely different and unproven powerplant.

For these reasons a greater share of our efforts is directed toward the control of emissions from the internal combustion engine.

I want to conclude by stating that the Clean Air Act has proved to be based on sound principles and as a result has contributed significantly to the progress made to date. The Act has been ably administered. We endorse its extension. We believe that by extending it Congress would encourage industry's efforts to achieve a virtually emission free vehicle.

(The attachment referred to follows:)

ATTACHMENT I—CONCEPT EMISSION CONTROL PACKAGE
DESCRIPTIONS

CONCEPT EMISSION PACKAGE "A" incorporates (1) thermal reactors, (2) a secondary air pump, (3) enriched and staged carburetion, (4) exhaust gas recirculation, (5) an IIEC crankcase valve to control "blow-by" gases, (6) evaporation control, and (7) over-temperature controls.

This package uses reactors (similar to enlarged exhaust manifolds) and secondary air (not passing through a carburetor) to cope with hydrocarbons and carbon monoxide, and exhaust gas recirculation (feeding some exhaust gas back through the engine's carburetor) to control nitrogen oxides.

CONCEPT EMISSION PACKAGE "B" combines catalysts and exhaust gas recirculation systems. It consists of (1) a catalytic converter for control of hydrocarbons and carbon monoxide; (2) exhaust gas recirculation and enriched carburetion to reduce nitrogen oxide emission levels, (3) IIEC crankcase valve (4) programmed protection control, and (5) evaporation control.

Programed protection involves the use of a small computer containing a logic system to feed exhaust into the catalytic converter or by-pass it depending on information received from engine water temperature, vehicle speed, engine load, and catalyst bed temperature sensors.

CONCEPT EMISSION PACKAGE "C" uses dual catalyst converter systems. It incorporates (1) a dual converter containing a nitrogen oxide catalyst followed by a secondary air manifold and a hydrocarbon-carbon monoxide catalyst, (2) a secondary air pump, (3) enriched carburetion, (4) exhaust gas recirculation, (5) IIEC crankcase valve, (6) programed protection system, (7) evaporation controls, and (8) non-lead fuel.

CONCEPT EMISSION PACKAGE "D" makes use of direct air injection and exhaust gas recirculation. The package includes (1) air injection into cylinder heads, (2) a secondary air pump, (3) enriched and staged carburetion, (4) exhaust gas recirculation, (5) IIEC crankcase valve, and (6) evaporation control.

In this approach, air is pumped into cylinder heads to achieve better combustion and thus better hydrocarbon and carbon monoxide control. Exhaust gas recirculation is used for nitrogen oxide control.

Mr. MISCH. Now, Mr. Chairman, as I indicated a little earlier in my statement, we have two examples of hardware in the form of displays that are set up just outside the main committee hearing room at the east front of the Rayburn House Office Building. One of them is an experimental low emission car and the other is a display of an engine with a different concept. They are examples of two approaches. One is predicated upon use of lead-free fuel. The other is designed to accomplish the task with lead in fuel. I believe this display would be of interest to the subcommittee and I wonder if it would be possible to arrange for a brief recess so that these displays might be explained and then we could reconvene for any questions you have for the record.

Mr. JARMAN. I think this display would be of real interest to the subcommittee.

Unless there is objection, the committee will stand in recess until we have had a chance to observe the display.

Mr. MISCH. Thank you, Mr. Chairman.

(Brief recess.)

Mr. JARMAN. The subcommittee will please be in order as we continue the hearing.

The Chair will comment, we think both the testimony and the exhibit that we have just seen are impressive and encouraging certainly for the future, and we appreciate your bringing this before the committee today.

Mr. MISCH. Thank you.

Mr. JARMAN. I think that the statement on page 6 may well have answered one question that the Chair had originally intended to ask but for the record I would like to elicit a comment. With gasoline engines and gasoline constituting two parts of a single system, is research into improved engines and research into improved gasolines carried on separately by the automobile manufacturers and the oil

companies, or have they joined forces? I am aware, of course, of your testimony with reference to the Inter-Industry Emission Control program and those companies participating in that effort, and I assume from your testimony that the plan of the Inter-Industry Control Program is going into both aspects of the problem, both engines and gasoline. Am I correct in that?

Mr. MISCH. Yes, sir, that is exactly correct. The concept of the program was to combine the expertise of the petroleum industry and those who represent the hardware side of the business, the automobile manufacturers, so that we could work both individually and at the same time together on these problems.

We recognize that it is a total system of fuel and the device that uses the fuel and turns it into useful energy, so that this is the reason why the program was devised and we are happy that we have six participants from the petroleum industry joining with us in this program.

Mr. JARMAN. May I ask how was the decision made as to the participating companies?

Mr. MISCH. I believe that a large number of companies were invited to participate. The program was explained to them and those who have joined are those that elected to do so.

I think if I recall there were 30 or 40 invitees initially who were exposed to the program and invited to join.

Mr. JARMAN. I notice, I believe, that three Japanese companies are participants. Is some of the experimental work being carried on in Japan?

Mr. MISCH. Yes, they are carrying on some of the work. It is not a large magnitude of the work, but actually one of the concepts that is being considered—and in addition to the four that we show here—relates more specifically to small engines. This is being carried on by the Japanese members because their interest and experience is more in this area.

Mr. JARMAN. Mr. Rogers?

Mr. ROGERS. Thank you.

I, too, was impressed with your demonstration and I think this is a real breakthrough if you are getting 90 to 97 percent emission-free vehicles. Ninety percent free of which of the emissions? Could you give us that?

Mr. MISCH. Mr. Taylor?

Mr. TAYLOR. The oxides of nitrogen would be reduced 90 percent, the carbon monoxide 97 percent, and the hydrocarbons about 93 percent.

Mr. ROGERS. That is a real breakthrough.

When can these devices, do you estimate, be actually incorporated in the vehicles that the public will buy? Is there any estimate of this?

Mr. MISCH. There isn't an estimate at this point because we have yet to select the concept that we would ultimately go with. The next phase, selecting the concept, is timed for the end of next year—the phase after that would be to reduce the concept to a practical design for mass production and start developing and testing to get the durability, reliability, and serviceability that is required.

One of the reasons we want to carry this program to its completion

is that we have a dual thrust in this research; one, to look at devices and concepts that are probably only of interest so long as you have lead-free fuels; the second concept considers the use of leaded fuel. But at the same time we recognize that the consideration of the elimination of all lead in fuels presents a rather complex problem and it may or may not be a reality in the near term.

Mr. ROGERS. Isn't there one gasoline now that is lead-free, or isn't there?

Mr. MISCH. There is one such gasoline on the market.

Mr. ROGERS. It is marketed and is lead free.

Mr. MISCH. That is right.

Mr. ROGERS. What has been the reaction of the companies that you dealt with, the oil companies, as far as the lead-free problem is concerned? Are they encouraging to you that this could be done by more than one company?

Mr. MISCH. I would have to say at this point in time they have encouraged us to work on both approaches, and they are participants in both approaches. I think this is an important point. At the conclusion of this research program six petroleum companies and at least one automobile manufacturer will be looking at the same data and should be drawing the same conclusions. I think it would be premature to say that they are either supporting or suggesting that we do not consider lead-free fuels at the moment.

Mr. ROGERS. What is the advantage of having lead in the fuel, actually?

Mr. MISCH. From a hardware standpoint we require an octane rating with a capability to avoid detonation and preignition. The net capability is related to the octane rating and one way of getting higher octane ratings is the addition of tetraethyl lead and other additives.

Mr. ROGERS. But this is handled in your car with lead-free?

Mr. MISCH. We are presently experimenting with lead-free fuels in the car you saw today.

Mr. ROGERS. And you had no problem on the octane?

Mr. MISCH. Well, no, because it is a lead-free fuel that has an equivalent octane number developed by other means than additives.

Mr. ROGERS. I see.

But it can be done?

Mr. MISCH. It can be done, yes.

Mr. ROGERS. It was interesting to me that you said it is good to have a goal and that one of the problems has been because all the goals have been ambulatory and changing. Well, now, if we can develop something like this perhaps we ought to think of setting some goal to try to reach if we can clear the air of these emissions from 90 to 97 percent and when we have the oil companies in, and I presume we will next year, because we will have to continue these hearings undoubtedly, I am sure we can pursue this question with them. It could be possible to do this, I presume, through legislation, although I don't know that that would be a necessary step to take. Let me just ask you quickly these questions and then I will conclude.

When did you first start research into air pollution control?

Mr. MISCH. It was in the early fifties.

Mr. ROGERS. The early fifties. And the percentage of improvement you have realized presently on the market is what percentage?

Mr. Misch. Actually, it represents the same improvement that the other auto manufacturers make in meeting the present standards.

Mr. ROGERS. For next year?

Mr. Misch. For next year 80 percent on hydrocarbons and 70 percent on CO.

Mr. ROGERS. How many employees are hired by your company? It would be an estimate. You can furnish it for the record.

Mr. Misch. I can submit a better number for the record. My estimate would be around 350,000.

Mr. ROGERS. And you can submit the exact figure.

Mr. Misch. Thank you.

(The following information was received for the record:)

FORD MOTOR COMPANY AVERAGE EMPLOYMENT

(Nine months ended September 30, 1969)

| | |
|------------------------------------|----------|
| United States..... | 242, 422 |
| Overseas..... | 188, 835 |
| Total Consolidated Operations..... | 431, 257 |

Mr. ROGERS. How many are assigned to work on air pollution control problems?

Mr. Misch. I have the figure just in this country and not on a worldwide basis; in this country almost 700 people.

Mr. ROGERS. Is this in research alone?

Mr. Misch. No, it is not.

Mr. ROGERS. Overall?

Mr. Misch. This is overall but working specifically with regard to the control of emissions from vehicles.

Mr. ROGERS. How many in your research program?

Mr. Misch. I don't have that breakout here.

Mr. ROGERS. What would you estimate, and I realize you may have to furnish for the record the figure later.

Mr. Misch. Yes, sir. Actually, I will say this. A greater percentage of our efforts are for the improvement of the internal combustion engine and a lesser percentage is directed towards alternates to the internal combustion engine such as the gas turbine. Both we and one of our competitors made statements today as to how close we are to production of the gas turbine, and I would prefer not to indicate in too exact a form how much we are doing on the gas turbine. It is obvious we are going to have a race to the pole here, but the majority of the people are involved with the internal combustion engine.

Mr. ROGERS. What I want to know is how many of your people are actually doing air pollution research. You could break that figure down for us. Would you know how many are actually doing the research as such?

Mr. Misch. I will try and provide some meaningful statement for the record.

(The following information was received for the record:)

We request that the testimony be corrected to read that Ford Motor Company has approximately 900 people working on vehicle air pollution problems in the United States, and that approximately 300-350 of these persons are working directly on emission research activities.

Mr. ROGERS. All right.

What is your budget for air pollution control?

Mr. MISCH. As such, we really don't have a budget in that term, but I will give an example.

In calendar year 1969 for our research and engineering on the control of the internal combustion engine and alternate sources we spent between \$28 million and \$30 million.

Mr. ROGERS. A year?

Mr. MISCH. A year.

Mr. ROGERS. Could you give us the breakdown on what the actual research is, separated from engineering, if you could furnish that for the record?

Mr. MISCH. I will see what we can do with regard to a breakdown. I don't have it.

(The following information was received for the record:)

\$17-\$18 Million of the \$28-\$30 Million is Research.

Mr. ROGERS. What is your estimated gross from sales? I realize you may not know the exact figure.

Mr. MISCH. I think last year we reported around \$14 billion gross sales—\$14,075,100,000. Profits after taxes were \$626,600,000.

Mr. ROGERS. How do you arrive at the amount you will spend for air pollution work? Do you have a formula? Is it a formula or a certain percentage?

Mr. MISCH. No, sir, it isn't. We are dedicated to arrive at the point where we have a virtually emission-free vehicle. We are spending money and devoting technical talents wherever we think there is a payout and the expenditure is going to be worthwhile. We prioritize our efforts. As in the case of most research and industrial activities, we are probably more limited by the number of innovative, competent people, than by dollars.

Mr. ROGERS. If you put in more dollars, do you think you could make greater progress?

Mr. MISCH. I don't think just putting in more dollars is the answer. I categorically would say that if you put more dollars in anything, more progress will be made, but whether it is going to add confusion and get our eye off the ball so that we start dubbing down the fairway, I don't know. I think we are doing all we know how to do and do well.

Mr. ROGERS. What is your feeling as far as an inspection over and beyond just the prototype stage to make sure that cars remain in compliance with the certification on emissions? In other words, have the Government spotcheck off your production line.

Mr. MISCH. Well, I certainly think the Government should have means to know what our vehicles are doing in the hands of customers. I think that they should have means for knowing what our vehicles are doing off the end of the production line.

We are now spotchecking, that is, we make a percentage check of our production vehicles. Much more than a percentage check would become a very complicated situation simply because of time involved in making the test. I think that none of us would want to be spending more time and money testing than we are spending in actually improving the problem. Testing won't make it go away, so if we have good statistical evaluation of what our cars are doing, I think that is the best of all worlds.

Mr. ROGERS. Well, what we are concerned with is they give a certificate of compliance—

Mr. MISCH. Yes.

Mr. ROGERS.—on a prototype model. Information the Department gave us yesterday on a study they have done would indicate that cars that are coming off the production line are not necessarily meeting the standards as proved by the prototype. Therefore, we asked the Department if they should not make some spotchecking to see if from the production line these standards are being met.

Mr. MISCH. Yes. I am not familiar with the report that you cite but—

Mr. ROGERS. This was done with rental cars and I think, as I recall, for Ford 64 percent of those checked did not meet one of the two tests, of the two emission tests, and so this would indicate that the production line here, again, may not be producing the car as the prototype would indicate.

Mr. MISCH. I would like Mr. Jensen to add to this particular point by relating a little bit of what we know of how our cars are doing in the field.

Mr. Jensen?

Mr. JENSEN. Mr. Chairman, Mr. Rogers, we have not been furnished a copy of the report that was given to you yesterday. Let me say several things first, though. It was from what we heard a very limited sample of a 289 cubic inch displacement, Ford engine, which is outdated. We don't make it any more and haven't since 1968. A more meaningful sample to us would be the spotcheck without what is, in effect, a prejudicial sample of rental cars. The State of California, for example, checks emissions at the Motor Vehicle Offices. When people come in for a driver's license.

The State makes an emission test on an automobile in the parking lot while the individual is inside going through that questionnaire we all go through in renewing our drivers licenses. On those emission test results you get a good cross-section of the population. The State of California has tested around 5,000 cars. Certainly I can make this recent California report of their surveillance results available to your staff. I have here a report which we received November 24th and it indicates, Mr. Chairman, and Mr. Rogers, that Ford, for example, had 1966 models tested which were above the standards, 1967 was better as were 1968 and 1969 models. So there has been a gradual improvement in the field based on this spotcheck. We think more needs to be done, but this, I think, is more meaningful than the HEW limited data that was given to you yesterday.

Mr. ROGERS. Well, that may be and I would agree it is a very limited test, although I presume it is a more thorough test probably than that given in California.

Doesn't it take about 24 hours really to test these effectively?

Mr. JENSEN. What you do, Mr. Rogers, is to seek to obtain correlation between a hot start and a cold start test. You establish that correlation over a period of many tests. The result is a general relative factor between a 20 minute test and the 12 hour test. At any rate, regardless of that, on September 19th I think the committee should know that we met with the Department of Health, Education, and Welfare, and indicated that on January 1 we would start furnish-

ing information of what emission results we are obtaining in our own tests at the end of the assembly line. These will be submitted on a voluntary basis so the Department of HEW can be informed regularly as to what we were finding on this small percentage of cars in a complete full scale 12 hour test.

Mr. ROGERS. You would have no objection for them to spotcheck, I presume?

Mr. MISCH. No, sir. They are doing it now.

Mr. ROGERS. Thank you.

Let me just ask one question and I will conclude.

Are there any differences in your 1968-1969 pollution devices?

Mr. MISCH. Yes.

Mr. ROGERS. Would you furnish for the record what the differences are and the price of each and also for your 1970 models?

Mr. MISCH. Well, we can tell you the differences. We can tell you price when we had a different vehicle for the State of California than we had on a nationwide basis.

When it becomes nationwide, frankly we haven't necessarily priced emission controls separately any more than anything else.

Mr. ROGERS. Don't you have a spare part for it? Don't you have a part that costs so much to have it put on?

Mr. MISCH. No, there isn't—

Mr. ROGERS. No?

Mr. MISCH. There is no inclusive spare part list that is identified for emission control only. Some of the spare parts are involved only with emission control but many of the basic parts of the automobile also are involved in emission control.

Mr. ROGERS. I understand that, but I am thinking of those that are directly related to emission control and wouldn't be there except for emission control. I presume there are some like that.

Mr. MISCH. We can provide you with our spare parts and spare parts pricing to the degree that we think it is applicable to your question; yes, sir.

(The following information was received for the record:)

A list of spare parts prices will not provide a meaningful indication of the cost to the consumer of emission control systems.

Most of the emission control improvements have been achieved through redesign of the basic engine, carburetor, distributor, cooling system, and other components. This increases the cost of the component, but only a portion of the spare part price of a carburetor, for example, can be attributed to emission control. Few additional parts related exclusively to emission control are installed on our cars. Thus, the consumer cost of emission control cannot be obtained by adding parts prices.

There are some parts that would not be installed except for emission control. For example, listed below are several components which are used solely for purposes of emission control. These components are not used together on any given vehicle, nor are they the only parts added exclusively for emission control; rather, they represent a cross-section of such parts. The first item listed is used widely, the last four items are used on a small percentage of our cars.

| <i>Component</i> | <i>Suggested Retail Price</i> |
|----------------------------|--|
| PCV Valve..... | \$1. 60 (for most 1970 cars). |
| Distributor Modulator..... | 28. 30 (for several 1970 high volume V-8 engines). |
| Thermactor Air Pump..... | 62. 20 (for 1970 Lincoln). |
| Air Bypass Valve..... | 15. 45 (for 1970 Lincoln). |
| Exhaust Air Tube..... | 1. 85 (for 1970 Lincoln). |

Mr. ROGERS. Well, that is all I would want, because I would hope you could let us know that.

Thank you.

Thank you very much, Mr. Chairman.

Mr. JARMAN. Mr. Nelsen?

Mr. NELSEN. Many people are on the road driving to work in the morning and occasionally see an old jalopy really pouring it out. It seems to me this must be one of the major problems in the areas where you do have a problem with emissions? Wouldn't you agree?

Mr. MISCH. Well, I would certainly say that a great deal of the automobile's contribution to pollution comes from the uncontrolled vehicles in the population, yes.

Mr. NELSEN. Yes. I wondered if the time would come when a policeman could intervene when he sees such an excessive emission and require that it be checked. This might be something that we could take a look at.

I am curious about some of the testimony that has been given relative to the equipment that goes on the manifold that burns up the emissions in the exhaust pipe or the muffler. I am curious how the heat is generated in this piece of equipment to burn up the material that we want to dispose of. How is that done?

Mr. MISCH. Well, in the case of the display engine that we have downstairs, the engine is set to run very rich, that is, an excess of fuel to air. In the cylinder this generates carbon monoxide in large quantities and we add air in the large manifold. The added air burns or oxidizes the carbon monoxide and this is a heat generation process.

Mr. NELSEN. Does this increase fuel consumption very much?

Mr. MISCH. Yes, if you have to enrich it results in an increase in fuel consumption.

Mr. NELSEN. I was also curious about your reference to a Stirling engine. I don't understand the term "external combustion".

Mr. MISCH. We are doing very little on Stirling engines. I am not sure but I think General Motors and Dr. Chenea, mentioned the Stirling engine. Actually, it is an engine in which air as a fluid is used instead of water as in a steam engine. A chamber is heated and then that air is expanded to do work. I am not too well versed, however, in the Stirling cycle.

Mr. NELSEN. It is your competitor's product?

Mr. MISCH. That is right.

Mr. NELSEN. Referring to this cooperative program that has been set up, referred to on page 6 of your statement—how is this financed and how are the various companies' contributions determined? It might be good for the record if we had this background information. How do you determine how much each company puts in and how do you arrive at the amount they put in, or is it strictly one of their own internal decisions?

Mr. MISCH. I would say the admission fee is a share-of-the-cost situation. I think there are a few members who jointly share a membership in this activity and, consequently, they then share that part of the cost between them. Primarily participation, I believe, is based on what companies feel their expertise would represent as a contribution. By and large the programs are all generated by the total group

and those who have a particular expertise elect to do portions of it. The program is managed by Ford Motor Company. All of the reporting, and administrative activity, are handled by Ford as well as a major share of the research.

I don't know whether I have responded as well to your question as you would like. If you would like more information, we can give either a description of the total program, its basis, and how it all was formulated for the record, or we can ask one of the other gentlemen here to explain it in more detail, if you would like.

Mr. NELSEN. Well, we were just interested in how the agreement was reached and how you determined how much each one pays. I presume to some degree it is sort of a voluntary arrangement where mutually you agree on how it is to be handled.

Mr. MISCH. I think it would be worthwhile if Mr. James MacNee of our Office of General Counsel would explain this because he has been involved in it since its inception.

Mr. MacNee?

Mr. MACNEE. Gentlemen, when the program was initiated, well, going all the way back, I think pretty much of a public invitation was extended to the whole world to join. It was an open-ended agreement. Meetings were held at Ford where the program was described to one and all and, as a result, as the program has finally materialized we have at present 11 member companies.

Now, the only real agreement that anybody had to make in order to become a participant was to pay an equal share. At the risk of oversimplifying, it is a share and share alike agreement. There is an exception to that. The exception, frankly, is that two sets of oil companies banded together, if you will, to become a single member, each with a half vote, so that we have 11 participants, but only nine votes.

Mr. NELSEN. I see. I think that is basically all we need. Thank you.

I have no more questions.

Thank you.

Mr. JARMAN. Mr. Kyros?

Mr. KYROS. Just one question.

Mr. Misch, is there competition between car manufacturers to improve existing engines, as you develop new ones, in the reducing of the pollutants in the emissions field here?

Mr. MISCH. Yes.

Mr. KYROS. There was some kind of consent decree which the car manufacturers entered into, didn't they, in regard to this matter?

Mr. MISCH. Yes.

Mr. KYROS. What is that all about, for the record?

Mr. MISCH. Once again, I am not a lawyer. I am an engineer, and I would like Mr. MacNee to explain this, if you will, please.

Mr. MACNEE. Gentlemen, the question is rather difficult to answer. I have in front of me a copy of the consent decree in printed form and, as you can see, it runs a few pages.

Mr. JARMAN. I think it might be well to submit that for the record.

Mr. MACNEE. I shall be happy to furnish each member with a copy of the consent decree.

I don't know that any purpose would be served by trying to tick off the specific provisions of the decree. I think perhaps of greater

interest to you gentlemen—correct me, if I am wrong—is our motive for having accepted the decree in lieu of litigating the Government suit.

Mr. KYROS. First, I suggest just briefly tell us what is the nature of the decree without going into all the particulars.

Mr. McNEE. In substance, the decree prohibits the interchange between manufacturers of motor vehicles or of motor vehicle emission control devices of what is defined in the decree as restricted information, information that heretofore had been freely exchanged between the members of the industry pursuant to a so-called AMA cross-licensing agreement. With the entry of the decree on October 28, the free interchange of information has come to a halt.

Now, I might say at this point that an appeal has been lodged in the Ninth Circuit by one of the individuals who sought to prevent the entry of the decree. From our standpoint the decree is final and binding. We are adhering to all of its terms, but, as a point of information, there is an appeal on file in the Ninth Circuit in California.

Now, there are many provisions in it, Mr. Kyros but, from our standpoint, that is probably the single biggest change in the way of life within our industry, emission control-wise. We dedicated, in effect, all of the patents or restricted information, a word of art, that had accumulated from 1954, 1955, to date. It is on record and references may be found in the back of the decree, in an appendix, for anyone in the world to come and pick up royalty free with no strings attached. But getting back to the motive question if I might for a moment, we feel rather strongly about the charges that were made. We are on record as denying those charges, and from our standpoint, and we have said this on public record, too, our every interest would normally have been to fight those charges to the bitter end. The fact of the matter is that the program in which my company, my client, and the other members of the industry have been involved for many years in controlling emissions we think is a most important one. From a lawyer's standpoint, knowing that your client, the engineers, are striving to achieve what is basically a pretty noble objective, is something that we ought to encourage and make easier for them to do without subjecting them to unreasonable legal risks.

Speaking for Ford, our primary reason for accepting the decree was to get a set of government-approved guidelines by which the engineers might conduct their future course of dealings in this area without running the risk of indictments or grand juries or anything of the like.

Mr. KYROS. Thank you very much.

At least we have that on the record now, as I thought we should and I think that explains it very thoroughly.

Mr. MacNEE. May I add for the record just one further statement by way of supplementing my earlier statement?

The IIEC program started as a \$7 million program and I think that figure ought to be considered in the context of the share and share alike arrangement. With its extension, and it will be extended through December 1970, there will be an increase in this amount. I am really not sure what that increase is, but it will be greater than the \$7 million authorized in the original program.

Mr. KYROS. The consent decree, of course, doesn't prohibit what you describe as the industry efforts.

Mr. MACNEE. Yes, it would have, in point of fact, because of the presence in the program of two companies, each of whom account for more than two percent of world vehicle production. Had no provision been made, Ford would have been required to withdraw from that program.

Now, we addressed a formal request to the Antitrust Division that they consent to our continued participation in that program through December 1970, notwithstanding the makeup of the group that forms the program. The Division, we are quite pleased, has granted our request to that extent, December 1970.

Mr. KYROS. Thank you, Mr. Chairman.

Mr. JARMAN. Dr. Carter?

Mr. CARTER. With your systems which you are installing on your cars for lowering the emissions, you will need throughout your chain of dealerships in the country trained mechanics to repair or remove and replace any which might be defective. Do you have mechanics who have been trained throughout your dealerships in the country to repair, replace, or whatever is necessary in your system?

Mr. MISCH. Yes, I would like to ask Mr. Jensen to answer your question.

Mr. JENSEN. There are two ways I would like to answer your question. In the first place, we do have this training book, Vehicle Emission Control System, a training handbook—there is more but this is indicative of the effort at Ford—which goes to all our mechanics in the various dealerships and explains in detail how they can keep the emission systems operating. One of the problems, and this gets to the second answer to your question, has been that there has been no real simple instrument available to aid the mechanic in seeing if the results of his work ends up in cleaner air coming out the tailpipe. We have just recently announced a new instrument for mechanic and service use that will be of some assistance. Ford worked this out in our Service Research Center with Minneapolis-Honeywell and it has gone into production in the last month or so. It has limited use but it does help the mechanic to check a car at idle to see if some of the things he does in this vehicle emission control system training handbook do result in cleaner fumes as far as the exhaust pipe is concerned.

If you want, I can supply copies of this material for the record.

Mr. CARTER. Have you gone further than supplying handbooks? Have these men had actual training?

Mr. JENSEN. Yes. When we first started, Dr. Carter, and Mr. Chairman, we set up training supervisors and, like a lot of other things in this program, we first used California the first year or two as a test area to see how the training would go. We gave training courses there which were expanded nationally in 1968. So there has been a considerable effort and individual person-to-person effort as well as the literature.

Mr. CARTER. Do you ever rate the mechanics in the field as to their effectiveness in not only this but in repairing other mechanical troubles with Ford cars?

Mr. JENSEN. Let me talk to emissions, and, Mr. Misch, you may want to talk about the other aspect of this.

As far as emissions are concerned, we do some spotchecks. For example, Mr. Misch, in his statement, indicated that when we set carburetors we have adjustment limiters, idle limiters, that we put on Ford products. We check to be sure that these are being maintained and not being taken off by mechanics with subsequent maladjustments which could raise emissions. When we find a dealer where this situation exists we send field people to visit them and if necessary to talk to the mechanics. Sometimes we write letters, but it is more effective to go and see them through our field staff and have person-to-person contact.

They are independent dealers, as I understand it.

Mr. MacNee can speak to that better than I. But certainly we are as persuasive as we can be and we have a real interest, as you can imagine, as manufacturers in seeing that our dealers do maintain the emissions of our vehicles at low levels. The results, I think, in the field in California for the 1969 models show that we are well within the standards in State measurements of customers' cars. So I think our program has been successful to a certain extent.

Mr. CARTER. Do you rate your mechanics as being 97 percent efficient? Is that right?

Mr. JENSEN. I would certainly not say they are 97 percent efficient, no, sir.

Mr. CARTER. I am just reminded of a gentleman over at Cherner's here with one of your Thunderbirds not too long ago and the automatic locks were out of shape and he had it repaired. Some other repairs were made there. He went back to reclaim this vehicle and the mechanic who brought it around to him couldn't get out of the car, so he turned it back to the company for further repair and after paying an additional \$20 he received the car back and still the car didn't work too well. The reason why I know it so well is I was the man who was there.

Mr. NELSEN. Were you locked in the car?

Mr. CARTER. No. I couldn't get in and the mechanic couldn't get out. But I did pay the extra \$20.

Thank you, Mr. Chairman.

Mr. JARMAN. Are there further questions?

Mr. Misch, and Mr. Jensen, we appreciate your being with us and the very effective testimony and demonstration that you and your colleagues have given us this morning.

The House of Representatives is in session, and we will ask permission to resume hearings at two o'clock this afternoon.

The subcommittee will stand in recess until two o'clock.

Mr. MISCH. Thank you.

(Whereupon, at 12:35 p.m., the subcommittee recessed, to reconvene at 2 p.m., the same day.)

AFTER RECESS

(The subcommittee reconvened at 2 p.m., Hon. John Jarman, chairman, presiding.)

Mr. JARMAN. The subcommittee will please be in order as we continue the hearings.

Our next witnesses representing the Chrysler Corp. are Mr. Sydney L. Terry, the vice president of Engineering, and Mr. C. M. Heinen, chief engineer, Emissions Control and Chemical Development.

STATEMENT OF SYDNEY L. TERRY, VICE PRESIDENT OF ENGINEERING, CHRYSLER CORP.; ACCOMPANIED BY C. M. HEINEN, CHIEF ENGINEER, EMISSIONS CONTROL AND CHEMICAL DEVELOPMENT

Mr. TERRY. Mr. Chairman, Mr. Heinen was here just a moment ago. He will be here in a second.

Mr. JARMAN. That will be fine.

Would you care to continue.

Mr. TERRY. I will go right ahead. He is thoroughly familiar with the prepared statement.

Mr. Chairman, my name is Sydney L. Terry. I am vice president-Engineering of the Chrysler Corp.

Mr. Heinen, who is with me, is chief engineer in charge of Emissions Control and Chemical Development for us, and incidentally Mr. Heinen has been engaged in emissions work for most of his active career at Chrysler Corp., and was in on the original California research back in the early '50s.

Our purpose here today is to support the extension of Public Law 90-148 sometimes referred to as the "Air Quality Act of 1967," and particularly those sections of it dealing with research and development.

In general, we believe that it has served the Nation well in that it has provided a framework within which substantial reductions of automotive emissions have been accomplished.

We believe it can continue to serve clean air objectives as the technology advances.

At this point, I would like to share with you some of the ways and means by which our automotive engineering office applies its talents and other resources to a product need or a solution.

The engineering approach I am about to discuss has been applied to the automotive air pollution problems of the past and now we expect to use it in the future.

The first necessary step is, of course, the definition of the engineering project. We try to understand all of the aspects involved. In studying the automobile as an air pollutant, we deeply explore the fields of medicine, meteorology, atmospheric chemistry, and many others. We carefully catalog what is known and, above all, what is unknown. This process is constantly reviewed because that which is truth today has a way of becoming questionable tomorrow.

As an example: Marquette University has just completed a study of carbon monoxide which shows that there are no untoward effects on healthy non-smokers as a result of exposures to 100 parts per million of carbon monoxide for eight hours. This is a gratifying finding in a way since this level is several times higher than that for any street concentration currently known. It should certainly result in a con-

scientious review by government and industry of plans for carbon monoxide control in the future.

As engineers, after following quickly on the initial review of the problems, we undertake the second step of thorough exploration of all possible solutions. I emphasize quickly and all because altogether too often a problem is either reasearched ad infinitum and nothing is accomplished, or even worse a snap judgment is made which later proves to be inadequate, uneconomical, or both. In the air pollution field, for example, we have looked at literally hundreds of ideas which were at one time or another hailed as the "magic" solutions. When tested against all of the requirements of the problem and objective, they just did not make the grade.

The third step is to select from the possible alternatives, those which appear to meet all of the technical requirements. These are then reviewed for compatibility with the rest of the transportation requirements of the vehicle, economy of manufacture, and value to the customer.

The successful system or systems are then subjected to intensive testing of all designs until the beginning of production. Even when production takes over, our engineers still have a responsibility for solving any difficulties which arise. We must be certain that the customer is getting what he is paying for, namely the lowest-priced complete solution to the problem which we know how to provide.

Finally, experience has taught us that in spite of all of the care which we take during the engineering and production process, problems occur in the field. Consequently, we maintain procedures to evaluate vehicle performance in the field—everything from a complex unit such as the automatic transmission to an apparently simple part such as a connecting rod bolt.

In summary, we must do a thorough engineering job on all aspects of the task. These include:

1. Definition of the problem.
2. Exploration of alternative solutions.
3. Selection of the best solution for production.
4. Control of the production process.
5. Evaluation of the performance in the field.

In 1953, it was brought to Chrysler Corporation's attention that the automobile might be substantially involved in the air pollution problem of Los Angeles. This came as a surprise at that time. There was no indication up to that time that automobiles were substantial contributors to any pollution problems. Except for cars of severe maladjustment, smoke and odor had been conquered by the piston engine.

Chrysler immediately investigated the work of Professor Haagen-Smit who said that hydrocarbons and nitrogen oxides from automobiles and other sources reacted photochemically to produce irritants in the atmosphere. Chrysler agreed after some looking into the problem that the automobile was probably substantially involved and that it would try to do something about it as quickly as possible.

In accordance with our engineering tradition, we immediately started to define the problem. We found that:

1. There was very little information on levels of nitrogen oxides or hydrocarbons in the atmosphere. This is still a problem.

2. There was considerable controversy about the levels or ratios at which these materials would react to create smog. The controversy still goes on.

3. There was very little knowledge about the nature of emissions from automobiles.

4. The instrumentation for evaluating vehicle emissions was virtually non-existent.

5. The effect of driving patterns on emissions was not known, although preliminary data indicated that it might be substantial.

The only thing we had to work on was the general agreement that if we could reduce total hydrocarbons to the 1940 level, we would probably have the job accomplished.

In other words, although we were asked and accepted the job of reducing hydrocarbons to the 1940 level, we were flying blind when it came to information, facts, knowledge, instrumentation and all other essentials that we needed to tackle the job as engineers.

I am proud to say that Chrysler took a leadership role in running the massive traffic studies and field surveys necessary to establish the 1940 level. In the field of instrumentation, we had several first—in fact many of the test techniques now used by government regulatory bodies originated in our laboratories.

By 1956, we had enough information to start the second phase, namely a massive exploration of alternate solutions. Chrysler investigated over 100 proposals, including all of those currently being discussed. It was suggested to us by the Los Angeles authorities that we add carbon monoxide reduction to the criteria for emission reduction devices, although hydrocarbons were still the main task.

By 1960, with the help of research data compiled by Chrysler, the regulatory authorities were in a position to establish some specific standards for exhaust controls. When the standards were set, we then were able to start on the third phase of our engineering task—the selection of the best solution for production.

At about this time, General Motors announced that the crankcase is a major source of hydrocarbons. This was a major discovery. The crankcase alone accounted for more than 20 percent of the hydrocarbon emissions. By 1961, we developed and put into production systems to control crankcase fumes.

After many tests, we at Chrysler Engineering selected a system of engine modifications which we called the "Cleaner Air Package" as the most effective and economical way of reducing hydrocarbon and carbon monoxide emissions from the exhaust. Our engineering tests included a 1,000 car run to establish production feasibility.

By the 1966 models, we had established elaborate production controls to assure that what we had developed in the laboratories would be reproduced in the field. In that year, production of these devices for California was started and, at the present time, modification of this approach is used on most vehicles, both domestic and import.

We have followed up the performance of these vehicles and we find that the early nonindustry fears of major deterioration in the field were unfounded.

As a result of several major studies, we established that evaporative losses from the gas tank and carburetor are substantial. In 1970, we added our Vapor Saver package to California vehicles to reduce these losses. These devices will be installed on 1971 vehicles nationwide.

The result of all of this work is that we have now exceeded the goal originally set up for the automotive industry, which is to get back to the 1940 level.

By about 1980, the much-higher total population of U.S. vehicles will emit no more carbon monoxide and hydrocarbons than the total population of vehicles in 1940. It would take place sooner if we could replace the older vehicles faster.

By 1980, based on present economics, the owners of Chrysler vehicles will have spent more than one and one-half billion dollars for these devices and due to the thoroughness of our engineering job, we feel that the owners and the public will get their money's worth in cleaner air. So much for history. We have accomplished the first job, at least the first objective that was set for us. Now what is next?

If all vehicles are equipped and if no other improvements in devices are made, an increase in vehicle population beyond 1985 will gradually increase total hydrocarbons and carbon monoxide. It is also felt by some that other exhaust pollutants also require control. The need and extent of additional controls and the time frame in which they should be applied should be thoroughly explored.

Among the exhaust pollutants which have drawn considerable attention recently are the oxides of nitrogen. They were largely disregarded for about ten years. As a result, the only restriction of oxides of nitrogen was that they not be increased by more than 15 percent as a result of the other controls. There were several reasons for this, including cumbersome and inaccurate instrumentation, lack of adequate field data and the fact that there are many other sources of oxides of nitrogen other than automobile. The best information that Chrysler has been able to gather is that the increases have been less than 10 percent over unequipped cars.

Probably the most important cause for inaction, however, is the confusion that existed and continues to exist about the effect that reducing oxides of nitrogen will have on the photo-chemical products. Just to illustrate that this confusion still exists, an article in the October issue of the Air Pollution Control Association Journal reports that "a large reduction in nitrogen oxide concentration reduced nitrogen dioxide dosage and eye irritation response, but with the penalty of a large increase in oxidant dosage." This article was authorized by some of the most outstanding photochemists in the Federal government.

Meanwhile, California has passed legislation calling for the lowering of oxides of nitrogen in 1971 and 1972. These two steps, if accomplished, will provide no increases in nitrogen oxide levels from the automobiles over today's level until 1990. In 1974, California insists on much more drastic reductions. They have indicated that by 1975 they will also want further drastic reductions. They have indicated that by 1975 they will also want further drastic reductions in hydrocarbons and carbon monoxide. The Federal Government has indicated an interest in similar standards.

Present methods of control with some modifications we believe will suffice to meet the 1972 requirements. This will mean a relatively modest increase in control costs to the customer. To the best of our present knowledge, these controls will be inadequate for the 1974 and later standards proposed. Chrysler has investigated all of the approaches which have been reported earlier today and we have reached three conclusions:

1. None of the proposed approaches are at the stage where it can be said that they can meet all of the anticipated requirements. Among the many unknowns are durability, materials of construction, protection against self-destruction, compatibility with other components, and many others.

2. Even if all of the laboratory problems are solved, it will not be possible to put any of the proposed alternatives for control of the internal combustion engines into production by the 1974 models, even in California. Unconventional power sources will take much longer. We have so informed California authorities.

3. Any of the proposed approaches—conventional or unconventional required to meet these increased standards—will result in at least trebling the cost of controls. This will mean an added bill of about three billion dollars to Chrysler customers.

As responsible engineers, we have been trying to determine the need for rushing into new standards and new expenditures for the customer. Frankly, we are puzzled. Recently the Ministry of Transport of the United Kingdom announced that at the present levels, carbon monoxide regulations were unnecessary in their country. You may recall that their vehicular concentration per square mile is four times that of the United States and nearly twice that of California. They have no controls at all on their vehicles. We wonder how such totally different conclusions could be arrived at by their authorities and those of our government.

We find that in spite of a substantial increase in automobiles, there has not been an increase in the emission levels measured by the government test stations. Unfortunately, the government has only six test cities to cover the whole country. These are inadequately supplemented by networks in three or four cities. Neither we nor anyone else knows at this time how to translate the effect of vehicle controls into atmospheric concentrations.

The medical evidence for any health effect besides eye irritation from photochemical smog as a result of present levels of automotive pollution seems to consist of suspicions, suggestions, and inferences. There are practically no hard facts.

Through the Coordinating Research Council and other sources, including a thorough study of government research, we are trying energetically to help define the problem, namely the needs for controls beyond 1980. The picture is very unclear. Nothing of a technical nature that we have encountered seems to justify any control levels before 1980 beyond those specified for California in 1972.

In view of the present situation, we wish to indicate again, our support for the Cleaner Air Act. Our only qualification would be that this may not be enough to sort out all of the questions about atmospheric chemistry, health effects, atmospheric levels, and other subjects which literally cry for answers.

We respectfully recommend that every available cent be spent in diagnosing the problem. The citizens of this country should not be asked to make new expenditures which run into many billions of dollars for additional equipment on their vehicles on the basis of the type of information currently available.

We have been asked to comment on S. 3072 which seeks to encourage development of "low pollution" vehicles by having the government purchase such vehicles for a premium up to 25 percent. We doubt if this bill, or others with the same objective, are necessary.

We have already spent many millions of dollars exploring all known paths for emission controls on conventional and unconventional engines. We have budgeted many millions more dollars to continue this study. It is not in this area that we need help. You may be interested to know that safety and air pollution are by far the two most important projects in our laboratories both in terms of money and people involved.

Where we need help is in defining the exact needs. This definition should be backed by sound scientific evidence and not oratory, conjecture, or suspicion. We would hope that this could be done by 1975, so that standards could be written in time for us to do a thorough job of engineering vehicles for 1980. This time frame will guarantee that the gains predictable by that date will continue or, if necessary, increase.

With this course of action followed, we are relatively certain that our customers and your constituents will have spent their money wisely for justifiable devices in an appropriate course of time to maintain technically established air quality standards.

Mr. JARMAN. Thank you, Mr. Terry. Could you tell us how much money has Chrysler budgeted for continuation of the study of the problem?

Mr. TERRY. We are spending between \$5 and \$10 million annually on air pollution problems.

Mr. JARMAN. And can you estimate the number of people you have?

Mr. TERRY. That would be an equivalent number of about 400 people. I say equivalent because lots of people are part-time and we have tried to put a good handle on this. This is the best we can come up with.

Mr. JARMAN. That is both the scientific and the non-scientific personnel?

Mr. TERRY. Yes, sir. Well, I am speaking only of the engineering and research part of it, not the inspection, the plant control and all that.

Mr. JARMAN. About 400 in the engineering and research section?

Mr. TERRY. Yes, sir.

Mr. JARMAN. Thank you.

Mr. ROGERS?

Mr. ROGERS. What is the breakdown? How many are actually in research would you say?

Mr. TERRY. We have a hard time separating research from what we call our engineering office.

Mr. ROGERS. You do not have a research budget as such?

Mr. TERRY. We have a research division, a research section, but they work on some things that I would not call really research that

are quite direct, and they work on other things that I would call research.

Mr. ROGERS. Do you have a research budget?

Mr. TERRY. Yes, sir.

Mr. ROGERS. What is your research budget?

Mr. TERRY. I think—research is not under me and I would prefer to give the answer to that to the committee later, because I do not think I really have the authority.

Mr. ROGERS. You do not know what it is?

Mr. TERRY. No; I do not. We could give it to you.

Mr. ROGERS. You may submit it. That will be all right.

(The following information was received for the record:)

The air pollution work is moving at such a rapid pace that today's research is tomorrow's development, and possibly the day after tomorrow's research again. As a result, we follow the practice of grouping our air pollution projects by subject, rather than by the group within our organization that is working on them at any particular time. Therefore, the breakdown between research and development is meaningless.

Mr. ROGERS. How many people are employed by your company altogether?

Mr. TERRY. 215,000 on a worldwide basis.

Mr. ROGERS. And how many do you have assigned to air pollution control problems specifically?

Mr. TERRY. About 400.

Mr. ROGERS. That is the 400?

Mr. TERRY. Yes, sir.

Mr. ROGERS. Do the 400 do anything else?

Mr. TERRY. It is in equivalent people, Mr. Rogers.

Mr. ROGERS. How many bodies are actually working?

Mr. TERRY. I would say we would have as many as 1,200 or 1,500 that work at one time or another on air pollution problems, problems related to air pollution.

Mr. ROGERS. On research and engineering how many actual bodies are on—are at work on this, not man-years.

Mr. TERRY. If you said bodies that work only on that I would not be able to give you an answer.

Mr. ROGERS. You would not?

Mr. TERRY. Because if a man who is working on a carburetor, which is probably the most important ingredient in controlling air pollution of a standard engine, is he working 100 percent on air pollution or is he working on carburetors?

Mr. ROGERS. What I was trying to distinguish is ones that are devoting their full time only to air pollution problems.

Mr. TERRY. Well—I do not know how to answer, I am sorry, because as I say, our people are all working, virtually all of them, almost all of them are working on specific hardware, and the effect of changes in that hardware on air pollution is probably the most important single factor that they have to concern themselves with when they are working on the hardware. We have no one as far as I know that is working only on the effect of different kinds of pollutants in air, such as in smog chambers or things of that kind.

In other words, it is all related. The work our people are doing is all directly related to what the automobile does.

Mr. ROGERS. I see, so you do not have a particular person working on a specific air pollution problem necessarily?

Mr. TERRY. I think the answer to that would be yes. We do not.

Mr. ROGERS. Have you increased the number of people generally working on air pollution problems?

Mr. TERRY. A great deal.

Mr. ROGERS. Over the last three to five years?

Mr. TERRY. Yes, sir, a great deal.

Mr. ROGERS. Would you let us know for the record what that has been?

Mr. TERRY. Yes, we will submit a statement on that.

(The following information was received for the record:)

The increase in personnel assigned to research and development efforts on pollution since 1964 has been from 200 to 400 in equivalent people.

Mr. ROGERS. And how much is your budget for air pollution? I guess you gave that, didn't you, \$5 to \$10 million?

Mr. TERRY. Yes, sir.

Mr. ROGERS. What is your total research dollar? What does that amount to, your total research funds?

Mr. TERRY. We will also give you an answer to that for the record. I indicated that I did not know exactly what that was.

(The following information was received for the record:)

Approximately ten percent of our research and development budget is assigned to air pollution work. Our on roll personnel in this area is 4,224 and as indicated above, we have about 400 working on various air pollution assignments.

Mr. ROGERS. What is the gross of the corporation from its sales, approximately?

Mr. TERRY. About \$7 billion.

Mr. ROGERS. \$7 billion. How do you arrive at the amount you spend for air control devices or for your research?

Mr. TERRY. We budget on the basis of need and of priorities. We try to give the best possible product to the public, to fulfill all the various functions that the product needs to perform.

Mr. ROGERS. What devices have you placed on your automobiles to control air pollution?

Mr. TERRY. As I indicated in the prepared text, and we could elaborate on that. I think about as much as you would like to do so, we have tried to take the approach at Chrysler that the best way to reduce air pollution is to make the engine operate more efficiently. The things that we are trying to—

Mr. ROGERS. Not going into different types of propulsion systems so much but rather to perfect what you presently have?

Mr. TERRY. Not adding components to put on, which add cost and complication and maintenance problems, but rather to make the engine do a better job of burning the fuel in the engine proper, and doing this will decrease the amount of unburned hydrocarbons, which is just really gasoline that has not burned, and also carbon monoxide which just means that the carbon monoxide has not been completely burned, so we have worked from the beginning on the basis of trying to make the engine work efficient.

Thus we actually get other side benefits like improved fuel economy and so on. While it may be more expensive than just a plain engine,

as it was a standard engine because we have to keep doing things that make it burn even more efficiently, still we end up with the package that gives more to the customer in terms of cleaner air and the rest of this.

Mr. ROGERS. What is the level of emissions now that you are down to?

Mr. TERRY. We are down well below their requirements, the Federal requirements, and the California requirements also.

Mr. ROGERS. In all of your cars or just those to California?

Mr. TERRY. Oh, no. We are below in all of our cars. We are well below.

Mr. ROGERS. You have met the California standards in your complete production?

Mr. TERRY. The California requirements this year in 1970 call for evaporative controls, and this is a lot of extra hardware that requires in effect that we seal the fuel system so that you do not have evaporation through a direct vent into the atmosphere, which involves a lot of hardware. We have put this on for California cars and have met their standards for 1970 thereby.

We have not put this package on cars for the rest of the country. We will do so next year.

Mr. ROGERS. What is that additional cost for the California car?

Mr. TERRY. I believe it is in the neighborhood of \$50.

Mr. HEINEN. \$35 for the evaporation controls alone.

Mr. TERRY. Mr. Heinen tells me it is \$35, I guess that is the price to the customer in California.

Mr. HEINEN. The price to the customer in California.

Mr. ROGERS. What are all the devices that you have to put on in California, what do they amount to over and above the regular?

Mr. HEINEN. We had a charge of \$18 to \$25 for the original device as contrasted to about \$50 for the other devices, and since then we have not listed a price, but it is estimated by us and by the Federal Government incidentally, in a report that I was just reading, that it is about twice that, so you can estimate perhaps \$40, something of that order, plus about \$12 to \$15 for the crankcase device which also is not separately priced, so this is about where we stand on cost.

Mr. ROGERS. What percentage of profits are in these figures would you think?

Mr. TERRY. I am afraid we would not be able to answer that question.

Mr. ROGERS. You could not? Well, you could supply that for the record.

Mr. TERRY. We can investigate that.

(The following information was received for the record:)

Separating out the profit on any one part of a production vehicle is an extremely difficult procedure. Perhaps the best way to answer this question is to say that when the devices have been carried as separate items our prices have been equal to or slightly lower than those of our competition. The costs to the customer discussed at the hearing were developed on the basis of average prices listed whenever the devices were listed separately such as has been the case when they were required by California but not the rest of the country.

Mr. ROGERS. I was concerned that the gist of your statement seemed to indicate that you really were not in agreement that air pollution from automobiles is much of a problem?

Mr. TERRY. Well, no. I would like to explain that. I hope that—I do not think that is the way, that is not the way we would like to have the statement interpreted, but we are saying this. That we think that it is extremely important that the atmospheric needs in terms of pollution be defined.

In other words, what is clean air. Now, this is not a new thought, but just one thing that shook me up the first time I heard it was that the unburned hydrocarbons level in a pine forest is higher than it is on most city streets, and this scientific fact illustrates that there is a lot we do not know about what clean air really is or what it should be.

Now, the problem as far as we are concerned as engineers is we are trying to decide how much relative importance to attach to eliminating unburned hydrocarbons or reducing them versus reducing carbon monoxide versus reducing oxides of nitrogen, which is a new entry in the field, and unfortunately the things that we do to get more efficient burning, while they reduce unburned hydrocarbons and they reduce carbon monoxide, they increase oxides of nitrogen.

As we said in our prepared text, there is still some controversy about what reducing oxides of nitrogen will actually do in terms of the atmosphere, and nobody knows the answer to that question as far as we are able to determine. We do know that if we meet the 1972 California requirements for oxides of nitrogen, that we will have less efficient engines that will not run as well, and they will use more fuel, will not develop as much power. It is the wrong way to go as far as the automobile is concerned, and yet we do not feel that we have any clearly defined standards that anybody can back up with any scientific proof as to what we are aiming at.

Now, really the air pollution problem as we see it from the overall standpoint is that the American people, and people all over the world as far as that goes, are using a lot of fossil fuel energy.

This is about the only kind of energy we have available. We are using it in our homes to heat our homes. We are using it in stationary power plants to make electricity for us. And we are using it in automobiles, and wherever fossile fuels are burned, we have unburned hydrocarbons and carbon monoxide and oxides of nitrogen coming out of the stack, whatever kind of stack it is.

Now, as we get to be more and more people involved, and we are using more and more energy per person, we are going to have to define what kind of air we are going to aim at, if we are going to continue to use energy, which I suspect we will, and so this is the kind of direction that we feel we in the automobile industry need before we really can go about clearing up our exhausts in our cars or our air pollution problem.

Mr. ROGERS. Of course, the Clean Air Act has quality standards set, to be set, as you know, and they are to be met by the air regions or the air sheds or the States or whatever it may be. There is still a lot I am sure we do not know, but they are at least making an effort to do this.

I was somewhat concerned about the implication of the Marquette University study saying there are no untoward effects on healthy non-smokers as a result of exposures up to 100 parts per million of carbon monoxide.

Do you know when that study was made?

Mr. TERRY. I will let Mr. Heinen discuss that question.

Mr. HEINEN. Yes, that study has just been completed, and it was really to check up on some of the other studies, notably Beard's study, and Shulte's study. Beard's study had indicated an effect prior to that level. In all fairness to Shulte I have got to say that he stated that the effects do not really amount to anything before you reach 5 per cent carboxi-hemoglobin. This would be of the general order of what the Marquette Study found. Five percent carboxi-hemoglobin would be assured from exposures of the order of 50 to 100 parts per million for several hours.

This was the purpose of the Marquette study. It was very thoroughly done. Of course, the reason it was done on non-smokers is because if you try to do it on smokers the smoking effect is so great that it masks the total atmospheric effect that it is hardly worth talking about.

Mr. ROGERS. Do you know what the date was?

Mr. HEINEN. No, I cannot tell you.

Mr. ROGERS. Within a month?

Mr. HEINEN. Within the last two weeks or so.

Mr. ROGERS. Two months, two weeks.

Mr. HEINEN. We can give you a copy of it.

Mr. ROGERS. Yes, I think it would be helpful for the committee to have that.

Mr. HEINEN. I may have a copy of it in my briefcase.

Mr. ROGERS. Who conducted that?

Mr. HEINEN. Dr. Steward, University of Marquette.

Mr. ROGERS. Who paid for the study?

Mr. HEINEN. CRC which is jointly financed by the automobile industry, the API and the U.S. Government.

Mr. ROGERS. And what was the cost of the study do you know?

Mr. HEINEN. This was part of an on-going study and I believe it was \$150,000 for the first year.

Mr. ROGERS. Do you know how many people were involved in the study?

Mr. HEINEN. Let me see, there were five or six technical men. I am trying to remember. I went over there in the early portion of the study. And of course the necessary volunteers, about five or six people in the chamber. The study is continuing now to study the non-healthy people, but this much of it has been released.

Mr. ROGERS. Are you aware of the study that was done by the National Academy of Sciences?

Mr. HEINEN. I am very much aware of it.

Mr. ROGERS. Which has been released?

Mr. HEINEN. Yes, that particular study merely says that we should do the type of research that was done. That also was financed by this same group.

Mr. ROGERS. Yes.

Mr. HEINEN. And all that study says is "There may be some problems we have got to look at." This was the first of those problems. You see, we had a chance—maybe I should explain the Coordinating Research Council and my role in it and my interest in it. I happen to be Vice Chairman of the so-called Air Pollution Research Group of the Co-ordinating Research Council.

That group controls about a \$14 million program now, whose purpose it is to try to solve some of these unresolved questions that we have touched on today, atmospheric chemistry, health, and engineering questions.

We had an early indication from the Academy as a result of their earlier studies that one of the things that needed to be studied is effects at this level of 100 parts per million CO and lower. So we went back and started a project through the Coordinating Research Council at Marquette, and the outcome of that project is what you have just heard. It indicates that fortunately some of our fears for what happens at the very low levels at least do not seem to be justified on the basis of observable effects, and this is good I think.

Mr. TERRY. I might say this parenthetically, Mr. Rogers. That this CRC research is being financed in the large part by the automotive industry because we know that we have need of this kind of information.

Mr. ROGERS. Yes.

Mr. TERRY. But we are doing it that way rather than trying to set up to do it ourselves, because it is completely out of our normal line of work.

Mr. ROGERS. I understand. Fresh air as the Academy of Sciences defines it contains less than one-tenth of one part carbon monoxide per million parts of air. Now the average city air contains 100 times that.

For example, the streets of Chicago have been found to have carbon monoxide levels of 12 parts per million, 120 times more than rural air. This was a comparison they made. And the Academy also said "If there is a threshold where carbon monoxide begins to become a health hazard, the Academy suggests it lies somewhere around 10 parts per million parts of air."

I presume too you saw the study that is being done on the deaths in Chicago, 11 in Chicago, nine of them infants, which would tie into the 7-day period when they had an increase there of air pollution. I do not think this has finally been determined either, but there is some tie.

Mr. HEINEN. This is one of those many inferential studies which need to be explored. You will note that the main conclusion of the Academy is essentially the same conclusion that Mr. Terry presented, namely that we need hard facts in this area very badly.

Mr. ROGERS. I am not sure that—yes, I agree we do need that.

Mr. HEINEN. That is what the report said.

Mr. ROGERS. But I am not sure that I would agree that 100 parts per million would be a threshold.

Mr. HEINEN. No, this is not what is suggested there. If you will remember what was said here, it is what Marquette said, healthy nonsmokers no effect, and pointed out that certainly there is no implication that that is the threshold level, but that is new information.

Mr. ROGERS. Yes.

Mr. HEINEN. At a higher level by considerably than had previously been assumed to be the case. As a matter of fact, this is the level that most of the industrial health people concluded in 1956 was a perfectly safe level. Since then the stated level has been going down and now apparently the evidence justifies the people back in 1956.

Mr. ROGERS. I am not sure that one study would be conclusive.

Mr. HEINEN. No, it is not.

Mr. TERRY. All we are really trying to establish here, Mr. Rogers, if it is anything, is that there is disagreement among the experts as to the level, that is all.

Mr. ROGERS. Yes, but I would think there is enough agreement among the experts that pollution is not healthy.

Mr. TERRY. No, pollution is not healthy.

Mr. ROGERS. That we would want to do something about it.

Mr. TERRY. Right.

Mr. ROGERS. No matter what the level.

Mr. TERRY. Right.

Mr. HEINEN. Mr. Rogers, I think you will find that we at Chrysler have been leaders in the field all the way along.

Mr. ROGERS. Yes.

Mr. HEINEN. This is because we are committed to the general thesis. All we want is facts, and if we can get that, why this will be our objective.

Mr. ROGERS. We of course will go into some of these studies and have some of the experts up. What have you done with the oil companies, to discuss with them lead-free fuel and so forth?

Mr. TERRY. Yes, sir. We have a cooperative agreement with Esso Corp., which is the research corporation of Standard Oil of New Jersey which we have been operating under now for I guess a couple of years at least. We have a number of programs, joint programs in which we are engaged with them, and we have made reports to HEW and also to California authorities, and are keeping them advised of what we are finding out in the course of this program.

Mr. ROGERS. What is your feeling about HEW or the Government checking into production line emissions off the production line as compared to the prototype?

Mr. TERRY. Well, we feel that that certainly would be a prerogative.

Mr. ROGERS. You would have no objection?

Mr. TERRY. No. As a matter of fact we have sent reports of our production line checks in detail, detailed tapes to California, and we have sent summaries of the same information to HEW.

Mr. ROGERS. And I noticed in the study HEW did that I think Chrysler had a violation of two standards in only 19 percent of your cars, which was better I think than any other that I see in the study. This is not a wide study.

Mr. TERRY. No.

Mr. HEINEN. We came up lucky on that, sir, as it happens. However, I think this is a point that needs to be cleared up, there has been a lot of talk about the fact that the standards are not being met. These studies in California, which incidentally are corroborated by our own laboratory studies, and we maintain a laboratory out in California to survey cars, show that we start out of our production line approximately at 225 ppm, which is well below the standard, that by 4,000 miles where the major deterioration occurs, we are at about 245 ppm. By the time this is extrapolated out to 50,000 miles, and this is all the figures that anybody has are really extrapolations with very few points at 50,000 miles—we would be at something like 285 ppm as opposed to the 275 ppm. Considering that we start at 900 and considering that the accuracy of measurement is something like 20 parts per million, this is right in there.

On CO, we are at 1.3 at 50,000 miles. This is on the average of production. Incidentally, this is the way the law is written, that the cars shall be built similar to the prototypes, and the implication is that in the field they shall operate in such a manner as to achieve these levels. Now I know there has been a lot of talk about this, but these are the numbers. We will be glad to produce our own corporation numbers or the California numbers or any other numbers. We feel we are meeting the standards.

Mr. ROGERS. I think this would be good for the record.
(The following information was received for the record:)

The attached letter and graph, which was sent to H.E.W., shows our production line test results. As indicated we are preparing to supply them with the detailed information on the more than 10,000 vehicles a year which we test.

CHRYSLER CORP.,
February 9, 1970.

Mr. ROBERT L. HARRIS, Jr.,
National Air Pollution Control Administration, Department of Health, Education,
and Welfare, Public Health Service, Durham, N.C.

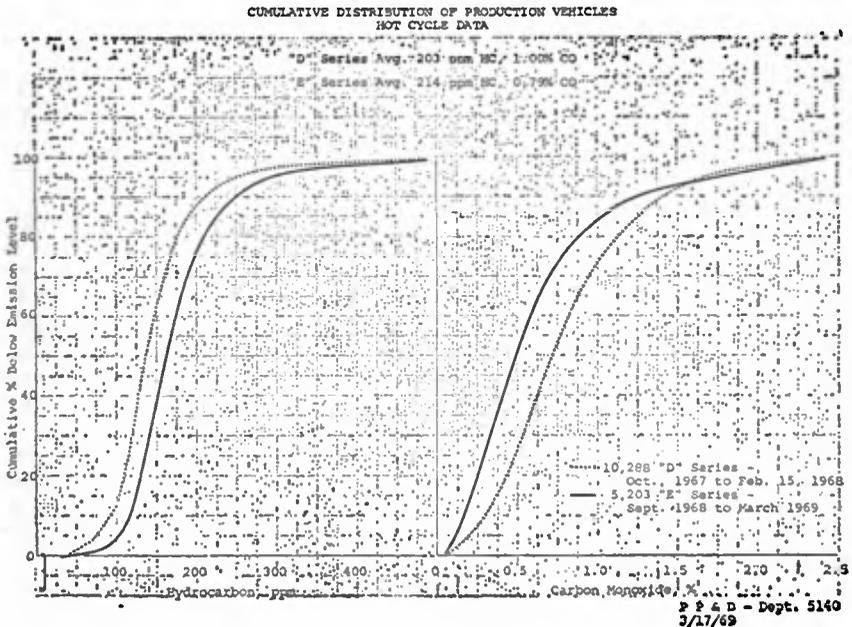
DEAR MR. HARRIS: Chrysler Corporation will provide copies of the assembly line emission data reports at the time of submission to the State of California as requested in your letter of January 28, 1970. The copies will be sent to Mr. Kenneth D. Mills, Division of Motor Vehicle Pollution Control at Willow Run when they are prepared.

As to your request for testing of such vehicles apart from the California program, attached is a graph showing cumulative distribution of hot cycle emissions of 1969 production vehicles "as received" directly from those assembly lines equipped with analytical equipment. These data include values from more than 10,000 1968 models and 5,000 1969 vehicles.

Comparable data is being developed for the 1970 model year vehicles and will be submitted to you at a later date.

Very truly yours,

C. M. HEINEN,
Chief Engineer,
Emissions Control and Chemical Development.



Mr. ROGERS. What about diesel engines? Do you produce them?

Mr. TERRY. We do not produce diesel engines.

Mr. ROGERS. And as I understand it, you are not going into different types of engine other than the combustion?

Mr. TERRY. We have not announced any plans other than this kind of engines.

Mr. ROGERS. Are you working on any?

Mr. TERRY. I think it is well known we are working on gas turbines.

Mr. ROGERS. Gas turbines?

Mr. TERRY. Yes, sir.

Mr. ROGERS. Do you use natural gas in any of your engines?

Mr. TERRY. Natural gas? You mean like propane? No; we do not. We have supplied in the past special installations for industrial users who want it.

Mr. ROGERS (presiding). Thank you very much.

Dr. Carter?

Mr. CARTER. Thank you, Mr. Chairman.

Again I certainly want to congratulate you gentlemen on the results of the tests, the tests that were run by HEW yesterday, because you ranked at the top of the list by a wide margin.

Again I want to congratulate you on the frankness of your statement here. I certainly appreciate your meeting this head-on without purpose of evasion or stating that you are accomplishing a great deal more than you really are, and that actually it is a great problem as we know, and knowledge of it is in its infancy. Standards have not been established except nationally for two things, one being hydrocarbons and the other particulate matter as I understand it.

On the subject of why England does not regard carbon monoxide as having such untoward effect that it could be controlled, I want to register a little disagreement, not that—on carbon monoxide rather, not that itself is so irritating to the lungs. We know that it does combine with the blood and prevents the transportation of oxygen from the lungs to the tissue, but there are other pollutants which may be hurting England, because they have a lung cancer rate twice as high as that in the United States, and their use of the vicious weed is less than in the United States, so it might well be due to some form of pollution I would think.

Mr. TERRY. If I may comment on that.

Mr. CARTER. Yes, sir.

Mr. TERRY. I guess England has been known for years for its air pollution, ever since the industrial revolution. I mean they had a lot of coal smoke and soot over there and they had fog, and this is where the word "smog" started. Today it officially means something entirely different, but they have a kind of atmosphere that holds particulates, and any kind of particulate emission of any kind is particularly objectionable there because of their atmospheric conditions, and they have always been a highly concentrated and industrialized country so they have got a lot of things working against them in this area.

But automobiles, stuff from automobiles is an entirely different thing. As you well know, doctor, carbon monoxide is colorless, odorless and tasteless. You do not know it is there. And so the kinds of things we normally think of for England are completely different, and of course that is not the kind of things that automobiles put out.

Mr. HEINEN. I think you illustrate very strikingly, Dr. Carter, just the point we are trying to make here. As you know, the lung cancer rate in Los Angeles is about as low as we find in this country, and yet there we have particularly the oxidant problem. Really what we are trying to say, and this is all we are trying to say, and believe me we are sincere as can be about it, is that we need to sort out these things. We need to avoid, as people are very prone to do as you know on this whole question of ecology, jumping into a solution only to find that it might be the wrong solution.

We certainly are well aware of the fact that air pollution has been rightly indicted for many things.

Mr. CARTER. Yes, sir. Well, of course we know that hydrocarbons too have been proven to be quite dangerous. The National Institute of Health has made studies of production of lung cancer in experimental animals, it would be interesting to see what they show with respect to the oxides of nitrogen. Of course I do not know if such experiments have been done, but if we are familiar with the oxides of nitrogen, we know that they are quite irritating, extremely irritating not only to the eye but also to the lung, and are component parts of an extremely pungent acid.

Mr. TERRY. I guess oxides of nitrogen in big enough concentration is poison.

Mr. CARTER. Sir?

Mr. TERRY. I understand oxides of nitrogen in big enough concentration is poison.

Mr. CARTER. Extremely irritating.

Mr. TERRY. But then it is the concentration, that is the thing that counts.

Mr. CARTER. If you have synthesized it in the laboratory you know—

Mr. HEINEN. Dr. Carter, you may be interested in another study that is going on in the Hazleton Laboratories not too far away from here which again is being financed by the Government, AMA and API. They are exposing, in fact, have already exposed rats and mice to concentrations at about five parts per million as I recall it of oxides of nitrogen. Now they are exposing monkeys. At that level all by itself they have found no effects so far. Now, the next step, of course, is the synergistic effect. I know you would just love to see this because it is the most fascinating laboratory. These monkeys are literally computerized, and they get just millions of different readings.

If you ever get a chance to go over there, if you are interested in oxides of nitrogen, I certainly urge you to do it.

Mr. CARTER. I would certainly be happy to do that, but we may have right here, this element might even be more dangerous than the other two which we are limiting it to at the present time.

Thank you, Mr. Chairman.

Mr. PREYER (presiding). Thank you, Dr. Carter.

Mr. Skubitz?

Mr. SKUBITZ. I have no questions.

Mr. PREYER. I have just one question, Mr. Terry. You mentioned on page 7 that the owners of Chrysler vehicles have spent about \$1.5 million to date, on pollution control devices, and that you feel they are

getting their money's worth from that in cleaner air. And then you mentioned over on page 9 that to meet the 1974 proposed standards that the cost will triple to about \$3 billion, and the implication I get from your comments on that is that you are not so sure that they would be getting their money's worth from that expenditure.

Mr. TERRY. That is right, sir. Yes, sir.

Mr. PREYER. Is that about right?

Mr. TERRY. In fact, that is the whole question. We are scared to death without knowing any more than we do about the whole thing, but we are scared that actually if we reduce oxides of nitrogen in California appreciably, that we might possibly get worse smog, even though we are bringing hydrocarbons down all the time, because it is a matter of relative concentration, and as we also have in this testimony, one of the experts just has recently come out in an article, where he suggests that this might happen from some tests he has done. So what we are saying is that we are very reluctant to go in to accept let us say objectives for oxides of nitrogen that do not have any more scientific backing showing that it would actually do a better job or make the atmosphere cleaner than we actually have.

Mr. PREYER. So the 1974 standards that you refer to are California standards?

Mr. TERRY. Yes, sir.

Mr. PREYER. Relating to oxides?

Mr. TERRY. Oxides of nitrogen primarily. They also have lowered hydrocarbons a lot. It is just a kind of an overall lower everything.

Mr. PREYER. Are you objecting to the hydrocarbon side of the 1974 standards, or is your real objection that we just do not know what will happen when we reduce oxides?

Mr. TERRY. I think that is the primary concern, but even with unburned hydrocarbons, we are concerned about the economics of whether or not it is wise to lower them further, because if we have to reduce, not even excluding oxides of nitrogen, when you get to a certain point with requirements for reducing unburned hydrocarbons, we sooner or later are no longer going to be able to do the job inside the engine as it is, which is the efficient way of doing it, and when that happens, we will have to resort to some kind of a reactor and put in more fuel into the engine than we would like to put in, so that it runs inefficiently, in order to have more fuel left over in the exhaust so that we can burn up the rest in the exhaust reactor, and that is an inefficient way of doing business.

We are just saying that we feel that further reductions in unburned hydrocarbons beyond the 72 levels do not seem to be justified, because as we point out, we already are going to, the levels are going down right today and they will continue to go down for several years on the basis of what we have already done, and emissions from automobiles will be down below the 1940 level by 1980.

Mr. PREYER. Is the state of the art such that it is possible to meet the 1974 proposed standards relating to oxides and lower hydrocarbons assuming that it was shown that you should meet those?

Mr. TERRY. Well, we have not given up but we do not know how to meet them in production.

Mr. PREYER. You cannot meet them?

Mr. TERRY. No sir, we would not know how to do it today. We are working on it very hard. I mean we do not know how to meet them in a production situation that we can put in cars by 1974. We do not know how to do it.

Mr. PREYER. And I take it you would agree with the rest of the testimony here that the alternative modes of propulsion cannot be developed by 1974, if ever.

Mr. TERRY. That would even take longer.

Mr. PREYER. Thank you very much, gentlemen. We appreciate your being here. It has been very helpful and very interesting testimony.

Mr. TERRY. Thank you.

Mr. PREYER. Our next witnesses represent American Motors Corporation, Mr. Elmer W. Bernitt and Mr. Carl Burke.

STATEMENT OF ELMER W. BERNITT, VICE PRESIDENT, SAFETY AND QUALITY ASSURANCE, AMERICAN MOTORS CORPORATION; ACCOMPANIED BY CARL BURKE, ASSISTANT CHIEF ENGINEER, ADVANCE ENGINEERING AND RESEARCH

Mr. BERNITT. Mr. Chairman and members of the House Interstate and Foreign Commerce Committee:

My name is Elmer W. Bernitt. I am Vice-President of Safety and Quality Assurance, American Motors Corporation.

We appreciate this opportunity to present American Motors' research and engineering progress in reducing exhaust emissions from its automobiles, as well as related experimentation into alternate means of vehicle propulsion.

Let me state at the outset that we have been actively engaged in reducing exhaust emissions for some 17 years, and the progress we have made to date has helped to effectively control exhaust emissions into the atmosphere.

Considering the complexity of the problem, the total man-hours expended on research and development, in addition to large monetary expenditures, the results seem quite encouraging and rewarding.

I would like to cite briefly some of the historical background concerning the air pollution problem as it has been related to automobile exhaust emissions.

The theory involving the formation of photo-chemical "smog" was not evolved until the early 1950s. The automobile industry was not involved technically in the problem of definition until 1953.

The initial means of measuring the problem, namely instrumentation, was available in a crude form in the late 1950s, but not until 1961 did adequate instrumentation exist to measure research and development results. Also, the basic survey data necessary to establish a reference point for vehicle emission levels was not completed until 1958.

Once proper identification of the problem was made and meaningful instrumentation was established, immediate steps were taken to reduce exhaust emissions.

Beginning with American Motors' 1961 models for the State of California, Positive Crankcase Ventilation systems—commonly re-

ferred to as PCV—were installed to eliminate most of the vapors previously vented from the crankcase into the atmosphere. Crankcase vapors represented 20 per cent of the hydrocarbons emitted from a vehicle. In 1963, this system was installed on all of our cars.

All American Motors' automobiles, beginning with the 1968 model year, were equipped with Closed PCV systems. This system prevented 100 per cent of the crankcases vapors from escaping into the atmosphere.

Beginning with 1966 models for California and with 1968 models nationwide, the first generation of exhaust emission control systems were installed. These systems reduced the emission of hydrocarbons and carbon monoxide to meet levels of 275 parts per million and $1\frac{1}{2}$ per cent, respectively, from average pre-control levels of 900 PPM and $3\frac{1}{2}$ percent.

The 1970 model cars are required to meet still more stringent Federal and California standards, and in 1971, when the evaporative control systems required in California in 1970 are applied nationwide, reduction from pre-control cars of 80 per cent in hydrocarbons and 65 per cent in carbon monoxide will be accomplished. These evaporative control systems virtually eliminate the hydrocarbons which previously escaped into the atmosphere from fuel tank and fuel ventilating systems.

It must be recognized that improved atmospheric conditions are affected by the lag resulting from the slow rate of scrappage of older cars and the increased number of vehicles in use.

For example, if we assume the average life of an automobile to be 10 years, then the introduction of a "perfect" emission control system would require five years to achieve a 50 per cent improvement in atmospheric pollution. However, this premise also assumes that the car population would remain constant during the hypothetical 5-year period.

That, in brief, is where American Motors stands today.

Recognizing the more stringent standards existing in California effective in 1972 and 1974 and our desire to further reduce emissions, American Motors is engaged in the design and development of an exhaust reactor, better known as an afterburner. The principle of operation of the reactors is well known, however, major durability problems exist. That is materials required to withstand the operating temperatures do not exist today at a reasonable cost. Further, the means to control oxides of nitrogen with this reactor system have not been resolved.

Since the program is in the preliminary phase, I cannot document precisely what the ultimate results will be. However, I can assure you that our efforts now, as in the past, will continue to be directed toward more effective reduction in emissions.

While we have greatly reduced emissions from the present internal combustion engines, we have also conducted research programs on other engines.

During a three-year period, 1963 to 1966, we worked on the development of a rotary engine. Our goal was to develop a passenger car engine of reduced emissions, size, weight and cost.

In the course of our research, certain inherent basic problems became evident in the rotary engine. Its performance at low speeds

was poor; its oil consumption was high; its fuel economy was not comparable to our piston engines, and its exhaust emissions were high.

In the light of our findings, the program has been suspended.

Another area of exploration into alternate methods of vehicle propulsion examined by American Motors was the electric car field.

Ten years ago, in April 1959, American Motors and Sonotol Corporation, an Elmsford, N.Y., electronics firm, entered in a joint development project to explore the possibilities of an electric car.

This powerplant was a hybrid design employing a small gasoline fueled internal combustion engine and a battery powered electric motor. The electric motor was used for acceleration and the gasoline engine for constant speed highway operation recharging the batteries during this mode of operation.

The "heart" of the vehicle project was a sintered-plate, nickel-cadmium battery, similar to those used in missiles and jet aircraft.

The project was discontinued due to lack of a practical control system and battery development did not meet expectations.

In another attempt to determine the feasibility of electric cars, American Motors joined Gulton Industries, a Metuchen, New Jersey, electronics firm, in December, 1967, in a venture to develop an electronic automobile.

American Motors designed a prototype three-passenger commuter car called the "Amitron," an advanced styling model to show what electronic cars of tomorrow might look like.

The electronic car had an overall length of 85 inches, width of 69½ inches and a height of 46 inches. It had a wheelbase of 60 inches, and eight-inch wheels.

The vehicle was to be powered by Gulton's new lithium battery system. The system had two lithium units, each weighing 75 pounds.

It was anticipated that the new battery system would give a small car a range of 150 miles without recharging, and a cruising speed of up to 50 miles per hour.

However, experimental work on this project showed again that the lack of battery capacity still limits the possibility of producing a suitable electric car for present-day motoring requirements.

In another area of vehicle propulsion, American Motors has worked cooperatively with firms investigating the use of steam as a possible power source.

We have provided automobiles and worked with Mr. William Lear, the noted inventor, in his effort to develop a workable steam car.

As you may know, Mr. Lear has abandoned his efforts in the steam car field, and now intends to devote his resources to the development of a gas turbine car.

American Motors proposes to cooperate with him in this research project.

At the present time, American Motors is cooperating with the University of California, San Diego, in a steam car research project which will utilize a 1970 Javelin.

Professor Rodney L. Burton and Stanley L. Miller of UCSD's engineering and chemistry department, said they would attempt to demonstrate that a modern, low-emission steam car can be constructed as an answer to the smog problem.

Designed by Francis R. Salemme, a UCSD graduate student in chemistry, the steam-powered engine will use a three-speed conventional transmission.

We believe the university's approach is unique and interesting, and we are glad to cooperate in this project which supports our continuing efforts to explore all possible alternate sources of automotive propulsion.

We are currently supporting a dual-mode transit system for Metropolitan Milwaukee which has been proposed by Wisconsin Congressman Henry S. Reuss.

The dual-mode system would be a network of guideways along existing freeways on which vehicles can be guided automatically and at controlled speeds to and from several different points. The same vehicles can be operated manually off the guideways for travel on conventional roads.

The proposed system would utilize vehicles now being produced by the automotive industry. They would be rubber-tired, equipped with electric motors and retractable sidearms to operate on the guideways, and use conventional internal combustion engines to operate off the guideways.

Power, guidance, and other control signals would come from a "third rail" fence along the highway. The advantage of the "third rail" is that it can be installed with relative ease on existing or future highways and transitways.

The system, proposed by Prof. Dwight Baumann of the Massachusetts Institute of Technology, is presently in the preliminary design stages.

American Motors and Allis-Chalmers, working with Professor Baumann, will be responsible for designing and producing the major components of the proposed system—the vehicle, the electrical propulsion components of the vehicles, and the guideway and control system.

To further demonstrate American Motors' concern and interest in environmental quality, the company last spring inaugurated with the University of Wisconsin, Parkside, a study of environmental quality in southeastern Wisconsin.

By sponsorship of this study, we hope to contribute to a more knowledgeable approach to one of the most urgent problems facing our entire Nation—the need to maintain a healthy, humane, and natural environment while we are achieving essential economic growth.

We believe there is need for greater wisdom in ecological planning. We believe this requires application of a total systems approach, which brings together knowledge of all of the elements that shape the kind of environment in which we live and work—that of the biochemist, the engineer, the soil and water specialist, the economist, the political scientist.

The University of Wisconsin is eminently qualified to carry out such an approach to environmental studies and has already accumulated a great store of knowledge. The university's stated mission is to help generate and disseminate new knowledge relating to modern industrial society—with problems of environment being central to that mission. We at American Motors are pleased to encourage it and to become a part of it.

For the past 15 years, American Motors has actively been supporting the conservation of America's natural resources.

Each year, American Motors presents awards to 20 individuals and several nonprofit organizations for outstanding contributions to conservation which otherwise might go unrecognized.

Under its Conservation Awards program, 10 awards, each consisting of \$500 and an engraved bronze plaque, are made to professional conservationists employed by nonprofit organizations for outstanding conservation achievement.

This program reflects our corporate endeavor to preserve the Nation's natural resources and to maintain a healthy environment that can be enjoyed by future generations.

Gentlemen, I would like to state at this time that American Motors supports the extension of the Clean Air Act for the fiscal years 1971 through 1973.

Specifically, we support the principal bill, H.R. 12934, which would authorize \$100 million for National Air Pollution Control Administration in fiscal 1971, \$125 million in 1972, and \$150 million in 1973. We also support the \$25 million, \$35 million and \$50 million which would be authorized for the three years under Section 104 for research relating to fuels and vehicles.

In summary, let me reiterate that American Motors is constantly exploring all avenues that will help to alleviate the air pollution problems faced by some sectors of our Nation.

We are continuing to improve our exhaust emission controls, devoting our best engineering talent in developing the best system that is technically feasible.

We are investigating alternate propulsion systems for our vehicles.

We are concerned about environmental problems, and pledge our continued efforts toward a rapid solution.

Thank you.

Mr. PREYER. Thank you very much, Mr. Bernitt.

Mr. Skubitz?

Mr. SKUBITZ. I have no questions.

Mr. PREYER. For the record, could you give us, Mr. Bernitt, the approximate budget of American Motors as it relates to pollution control? I think we have been getting that in the record from others.

Mr. BERNITT. Yes. I think we find ourselves—you are Mr. Preyer, are you, sir?

Mr. PREYER. Yes.

Mr. BERNITT. Mr. Preyer, I think we find ourselves in a similar position to what Chrysler was a few moments ago. We are a smaller company and we do not break ourselves down into specific areas like that. General Motors and Ford I believe have large divisions that they can separate out and break out, but our people who are working on engines are working on engines and they are wearing many hats at the same time and we just cannot break out a figure that is devoted alone to exhaust emissions.

Mr. PREYER. The Chrysler people apparently felt that they would have great difficulty in meeting the 1974 California standards. Do you through the use of your afterburner and your other systems feel you will be able to meet those standards?

Mr. BERNITT. No, sir, we do not. We do not know how to do it today. We are working on the problem, but even if the problem, if you knew what to do today, this is practically 1970, to run it through all the laboratory tests, production, tooling and everything like that would be a monumental task, and as of today as far as we know, nobody knows how to meet 1974.

We are working hard on it. We are working on afterburners, and we said here, a similar concept to what you saw in the Ford engine outside. We are working diligently on it, but we do not know how to do it today. It is not successful, and to say we will be successful by 1974 is just a big questionmark.

Personally I do not think we will hit that date. But we will not give up trying.

Mr. PREYER. I certainly commend you for giving it the old college try and exploring every avenue of solution to this problem.

Mr. BERNITT. We certainly have been diligently working.

Mr. PREYER. You are pretty brave when you start out by saying the results seem "quite encouraging and rewarding," and then you list four or five different engines which have not worked out, the rotary engine, for example. How much money, say, would your company have spent on trying to develop a rotary engine before you had to abandon it?

Mr. BERNITT. I do not know those figures offhand, sir.

Mr. PREYER. And then you have had the same problem with the steam engine, although I gather that some new research on that is looking interesting.

Mr. BERNITT. Well, it is interesting. I do not feel very optimistic about it, very frankly, but we think every avenue ought to be explored. We should not turn our back on it, but in talking this over with Mr. Lear he stated that he spent five and a half million dollars of his own money working on the development of the steam engine, and as he said to me, "I have five and a half million reasons now why it will not work."

Mr. PREYER. So he has abandoned that and gone to the gas turbine?

Mr. BERNITT. He has gone to the gas turbine.

Mr. PREYER. And you are working with him on that?

Mr. BERNITT. Yes, sir.

Mr. PREYER. And also working with him on the dual-mode transportation system?

Mr. BERNITT. Yes, that is strictly in the idea stage but ourselves, Allis-Chalmers and a professor from Massachusetts are going to give that one the college try.

Mr. PREYER. We are in the age of the consumer revolt. If you read the papers, sometimes you would think that corporations such as American Motors are out to do nothing but gouge the consumer, but I think some of the information in here might surprise some of these consumer revolt people.

Mr. BERNITT. A lot of times I do not think we realize how many long, dedicated hours the people work to try to accomplish these things.

Mr. PREYER. It does seem that you have worked very hard at it.

Thank you, Mr. Bernitt.

Mr. Rogers?

Mr. ROGERS. You put on a device, didn't you, on controlling emissions that sold for about \$35?

Mr. BERNITT. It was around \$50.

Mr. ROGERS. Was it \$50?

Mr. BERNITT. We took a dual approach to the problem. We tried the clean air efficient engine approach, and were successful in some of our engines. And then on some of the other engines we were not successful, and we went to the use of air injection by the exhaust, so at the start of this we were going down both roads.

As of today, we have worked out all our problems for current day emissions via the efficient engine or clean air engine approach, with the exception of one of our vehicles, and that is our V-8 engines with the standard transmission. We still use, to meet the standard requirements, we use the air compressor on that.

Mr. ROGERS. What changes have you made in your emission controls since your original? Have you made improvements?

Mr. BERNITT. Yes, we have made improvements right along. We have spelled some of these out in the text, in our PC valve, the clean air efficient engine approach.

Mr. ROGERS. So you presently meet the standards?

Mr. BERNITT. Yes, sir, we presently meet the standards.

Mr. ROGERS. You will in 1971?

Mr. BERNITT. Yes, sir.

Mr. ROGERS. But you are concerned about 1974?

Mr. BERNITT. That is correct.

Mr. ROGERS. What about California?

Mr. BERNITT. In 1971? Well, we will meet their standards, and of course we will in 1971 put our evaporative emissions control on all of our vehicles. We also monitor our current production.

This question has been asked by the other companies. But we check every day off the production line between 1 and 2 per cent of our vehicles on a continuing quality control basis so that we meet problems as they arise, and have a constant control on them.

Mr. ROGERS. Do you find you have to make changes?

Mr. BERNITT. We find that things drift off all the time, yes, sir.

Mr. ROGERS. So it is wise to have this type program?

Mr. BERNITT. I could not operate without it. We do that on other things. Good quality control requires a constant vigilance.

Mr. ROGERS. Do you make any of these findings available to the government?

Mr. BERNITT. We have not.

Mr. ROGERS. Would you have any objection to do so?

Mr. BERNITT. No, sir.

Mr. BURKE. We did supply the State of California a copy of our audit.

Mr. ROGERS. Do you have any objection to the government coming in and making a spot check?

Mr. BERNITT. In fact, we think that is the correct way to do it.

Mr. ROGERS. Yes.

Mr. BERNITT. We really think it would be less costly to the government, to ourselves and everybody else if the government, with competent personnel, at reasonable hours and so forth would

come into the plant and actually see and monitor what is being done. We think that is absolutely the correct way to do it.

Mr. ROGERS. How many people are hired by American Motors?

Mr. BERNITT. It shows our small size. We are about 17,000.

Mr. ROGERS. About 17,000 and your gross income is about what?

Mr. BERNITT. Our sales are around \$700 million.

Mr. ROGERS. \$700 million. And about what is your budget devoted to research and engineering?

Mr. BERNITT. The total research and engineering?

Mr. ROGERS. Yes.

Mr. BERNITT. Our exhaust emission?

Mr. ROGERS. Exhaust emission if you have it.

Mr. BERNITT. As I told Mr. Preyer, our men wear several hats.

Mr. ROGERS. All right, your total budget then?

Mr. BERNITT. I do not have those figures right at my hand.

Mr. ROGERS. Could you furnish those for the record?

Mr. BERNITT. I can furnish them for the record.

(The following information was received for the record.)

RESEARCH AND ENGINEERING BUDGET FIGURES

The American Motors Corporation's total research and engineering budget for the current year is approximately Fifteen Million Dollars (\$15,000,000.00). Since our research and engineering efforts on air pollution control devices are integrated with our total research and engineering efforts, we are unable to furnish a specific amount relating only to these devices.

Mr. ROGERS. What do you think needs to be done, what is the best approach to try to bring about control of air pollution from automobiles?

Mr. BERNITT. Again we need facts, as was demonstrated before. There is a lot of unknowns and speculation on it. The other thing that we need is lead time. If we can have time to work on the problems, if it is reasonable—of course the impossible is impossible, but within reason you find the solution. We talk about 1974. We cannot make 1974. That does not mean we cannot make 1978, you see, but we need the time, and the sooner we could have reasonable goals to know where they are, and unchanging goals, we can then throw our full efforts into it, and I think that would be the biggest help to us to know where we are going.

Mr. ROGERS. Do you feel you really are making progress on the dual mode system?

Mr. BERNITT. You mean the Milwaukee—

Mr. ROGERS. Yes.

Mr. BERNITT. No, that is at the idea stage. We are working. It is just starting. It is just brand-new. We only announced our agreement on that I think it is less than thirty days ago. It is just a brand-new idea. We had a meeting over in Milwaukee last Friday on it, and we are going to start putting some lines down on a piece of paper. That is a long range program. It has other salutary effects other than just exhaust emission, because it might mean a very beneficial effect on the rapid transit program.

Mr. ROGERS. Yes, surely. Is there any other thing you think this committee ought to know about this problem?

Mr. BERNITT. Mr. Burke is our assistant chief engineer. I will ask him if there is anything.

Mr. BURKE. No. The point we wish to make, what should be done next, we feel we have come to a point of 80 percent and 65 percent reduction, which I believe is substantial. From this point forward we see the cost of control of say hydrocarbon per dollar rising sharply, so I believe it is very important at this time to re-examine once more the need, to put it in a nutshell, not that we do not believe or I do not believe that our goals should be an emission-free engine, but I do believe that there is a time at this point to reassess atmospheric chemistry, health effects as pointed out by Mr. Heinen, lest we run too far before we clearly define the problem.

This is our concern, that we overplay our hand, so to speak here, until we really know. Yet no one could hardly deny the need for air pollution control. It is inevitable and it must be accomplished. It is an expanding population. We will not be living here if we do not.

Mr. ROGERS (presiding). Thank you. May I say that we will now adjourn this committee hearing subject to the call of The Chair, and it is anticipated that we will continue hearings on this bill probably after the first of the year. I doubt if we are going to have time to do any more. We anticipate we will call in the oil industry and others involved in the problem.

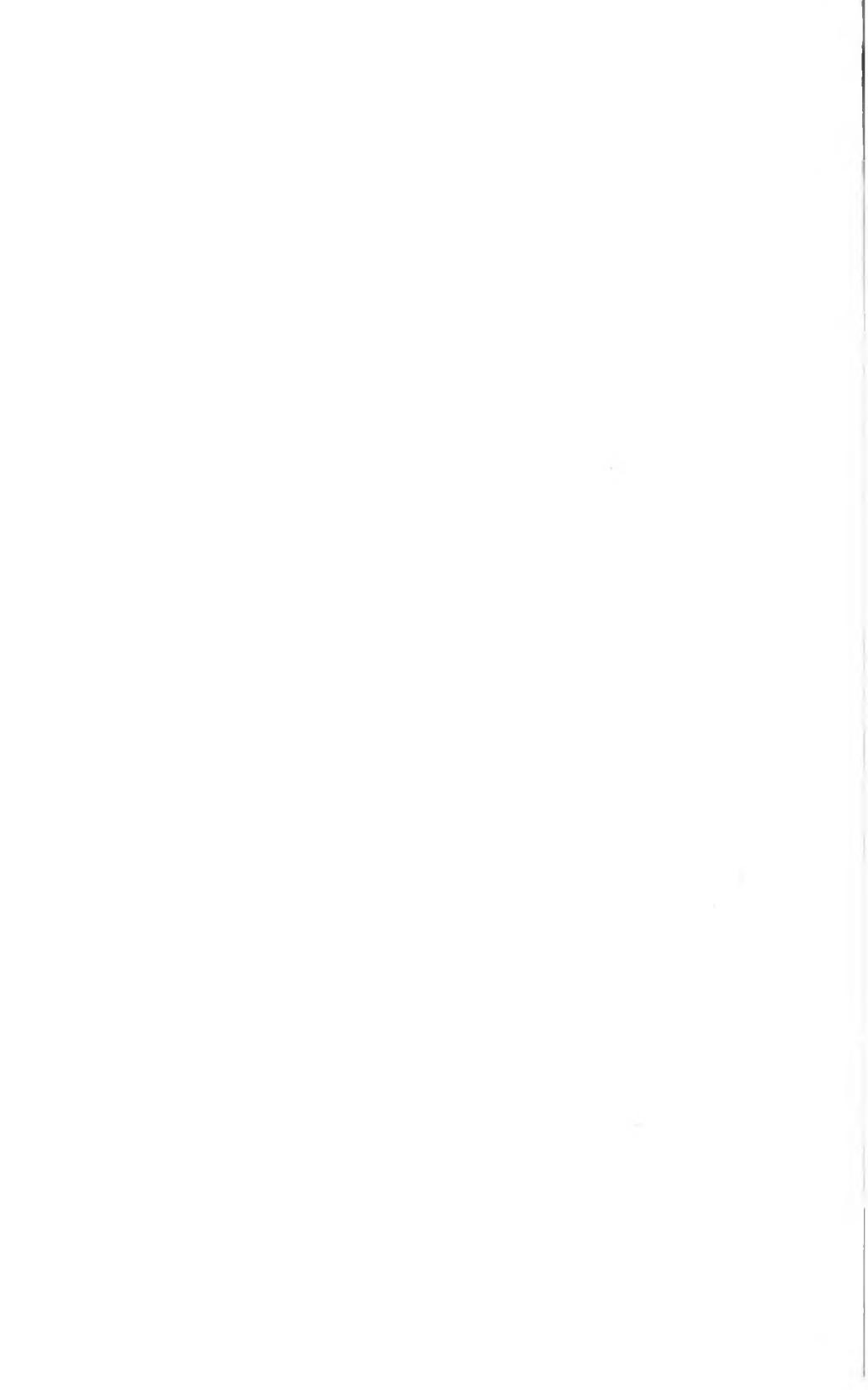
I do want to say that I was impressed by the fact that all of the members of the auto industry endorse the provisions of the Clean Air Act, and support it, and I think to this committee that is encouraging, and that a great deal of work is going on, although we need to move faster, whereas much money is going into the automobile industry and so small amounts are being given to research. This ought to be looked at by all companies immediately, because much can be done I think to speed up the work that we are doing, if we will really devote the effort and time.

I think it can be done, and you have shown what could be done even on budgets of \$30 and \$40 million a year out of grosses of \$20 and \$14 billion, and we need to put some of this in proper perspective.

Thank you for being here. It has been most helpful.

The committee will stand adjourned subject to the call of the Chair.

(Whereupon, at 3:35 p.m. the Committee adjourned, to reconvene subject to the call of the Chair.)



AIR POLLUTION CONTROL AND SOLID WASTES RECYCLING

THURSDAY, MARCH 5, 1970

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON PUBLIC HEALTH AND WELFARE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in Room 2123, Rayburn House Office Building, Hon. Paul G. Rogers presiding (Hon. John Jarman, Chairman).

Mr. ROGERS. The subcommittee will come to order, please.

This morning the subcommittee on Public Health and Welfare, is continuing hearings on legislation to extend the Clean Air Act. These hearings actually began on December 8 and 9 this past year.

At that time there were pending before the subcommittee, H.R. 12934, introduced by Mr. Rogers of Florida, and H.R. 14960 introduced by Mr. Springer of Illinois. Both bills provided for a three-year extension of the authorizations for appropriations contained in Section 104 and Section 309 of the Clean Air Act.

At those hearings, the subcommittee heard from Dr. Steinfeld, who, at that time, was the acting Surgeon General of the Public Health Service, Mr. O'Mahoney, the Commissioner of Transportation and Communications Service, General Services Administration, and from representatives of the four automobile manufacturers who testified on the anti-pollution research efforts of their companies.

Several important developments have taken place in these last three months. In the first place, now pending before the subcommittee there are additional bills dealing with environmental controls, including particularly H.R. 15848, introduced by the Chairman of the full committee, Mr. Staggers, and the Ranking Minority Leader, Mr. Springer, and H.R. 15847, likewise introduced by Mr. Staggers and Mr. Springer.

(The text of H.R. 15847 and H.R. 15848, and departmental reports thereon follow:)

H.R. 15847, 91st Cong. 2d Sess., introduced by Mr. Staggers (for himself and Mr. Springer) on February 10, 1970;

H.R. 15985, 91st Cong., 2d sess., introduced by Mr. Brotzman on February 18, 1970;

H.R. 16019, 91st Cong., 2d sess., introduced by Mr. Bush (for himself, Mr. Buchanan, Mr. Steiger, of Wisconsin, Mr. Sebelius, Mr. Vander Jagt, Mr. Goodling, Mr. Miller of Ohio, Mr. Don H. Clausen, and Mr. Pirnie) on February 18, 1970;

- H.R. 16025, 91st Cong., 2d sess., introduced by Mr. Collier (for himself, Mr. Bray, Mr. Quillen, Mr. McKneally, Mr. Zwach, Mr. Conable, Mr. Conte, Mr. Brotzman, Mr. Wylie, Mr. Chamberlain, Mr. Hastings, Mr. Carter, Mr. Widnall, Mr. Burton of Utah, Mr. Wiggins, Mr. MacGregor, Mr. Berry, Mr. Fish, Mr. Robison, Mr. Adair, Mr. Betts, Mr. Biester, Mr. Mosher, Mr. Stafford, and Mr. Minshall) on February 18, 1970;
- H.R. 16032, 91st Cong., 2d sess., introduced by Mr. Gerald R. Ford (for himself, Mr. Arends, Mr. Anderson of Illinois, Mr. Poff, Mr. Taft, Mr. Bob Wilson, Mr. Smith of California, Mr. Rhodes, Mr. Morton, Mr. McCulloch, Mr. Mayne, Mr. Byrnes of Wisconsin, Mr. Halpern, Mr. Wyatt, Mr. Price of Texas, Mr. Pelly, Mr. Eshleman, Mr. Thomson of Wisconsin, Mr. Talcott, Mr. Hosmer, Mr. Cunningham, Mr. Kuykendall, and Mr. Derwinski) on February 18, 1970;
- H.R. 16039, 91st Cong., 2d sess., introduced by Mr. Hansen of Idaho (for himself, Mr. Meskill, Mr. Camp, Mr. Esch, Mrs. May, Mr. Blackburn, Mr. Erlenborn, Mr. Button, Mr. Schneebeli, Mr. Gubser, Mr. Sandman, Mr. Steiger of Arizona, Mr. Hutchinson, Mr. Kyl, Mr. Broomfield, Mr. Findley, Mr. Bow, Mr. Latta, Mr. Bell of California, Mr. Watson, Mr. Pollock, Mr. Shriver, Mr. Kleppe, Mr. Burke of Florida, and Mr. Wydler) on February 18, 1970;
- H.R. 16046, 91st Cong., 2d sess., introduced by Mr. McDonald of Michigan (for himself, Mr. Scott, Mr. Lujan, Mr. McClory, Mr. Frey, Mr. Pettis, Mr. Crane, Mr. Keith, Mrs. Reid of Illinois, Mr. Wampler, Mr. Corbett, Mr. Beall of Maryland, Mr. McClure, Mr. Lloyd, Mr. Cederberg, Mr. Goldwater, Mr. King, Mr. Duncan, Mr. Denney, Mr. Teague of California, Mr. Edwards of Alabama, Mr. Landgrebe, Mr. Hogan, Mr. Schwengel, and Mr. Smith of New York) on February 18, 1970;
- H.R. 16053, 91st Cong., 2d sess., introduced by Mr. Mathias (for himself, Mr. Schadeberg, Mr. Devine, Mr. Hunt, Mr. Quie, Mr. Cowger, Mr. Harvey, Mrs. Dwyer, Mr. Frelinghuysen, Mr. Mailliard, Mr. Wold, Mr. Horton, Mr. Michel, Mr. Weicker, Mr. Winn, Mr. Coughlin, Mr. Langen, Mr. Stanton, Mr. Whalen, Mr. Railsback, Mr. Lukens, and Mr. Williams) on February 18, 1970;
- H.R. 16110, 91st Cong., 2d sess., introduced by Mr. Brown of Ohio (for himself and Mr. Myers) on February 19, 1970;
- H.R. 16238, 91st Cong., 2d sess., introduced by Mr. Broyhill of Virginia on March 3, 1970;
- H.R. 16348, 91st Cong., 2d sess., introduced by Mr. Helstoski on March 9, 1970;
- H.R. 16362, 91st Cong., 2d sess., introduced by Mr. Wyatt on March 9, 1970;
- H.R. 16451, 91st Cong., 2d sess., introduced by Mr. McDade on March 12, 1970; and
- H.R. 16866, 91st Cong., 2d sess., introduced by Mr. Clancy on April 9, 1970, are identical as follows:

A BILL To authorize the Council on Environmental Quality to conduct studies and make recommendations respecting the reclamation and recycling of material from solid wastes, to extend the provisions of the Solid Waste Disposal Act, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Wastes Reclamation and Recycling Act of 1970".

FINDINGS AND PURPOSES

SEC. 2. (a) The Congress finds that—

(1) increasing production, increasing population, and technological advances in the United States have resulted in an increased volume of industrial, commercial, and domestic waste material which is polluting air, water, and land, and this pollution can be ameliorated only by greater use of reclamation and recycling of material from solid wastes such as metals, plastics, ceramics and glass, paper products, and the like;

(2) the failure to reclaim and recycle materials from solid wastes for further economic uses contributes to wasteful depletion of primary natural resources;

(3) such damage to the environment and wasteful depletion of natural resources is due to the fact that the reclamation of materials from wastes is not competitive with the use of primary resources as a cost factor in the production of goods; and

(4) particularly serious in this continuing and worsening situation is the fact that the demand for motor vehicle scrap metal is not sufficient to enable

scrap processors to pay enough to final users and wreckers for discarded motor vehicle hulks to induce them to bring the discarded hulks to scrap processors for processing into scrap metal for reuse.

(b) Accordingly, the purposes of this Act are:

(1) to provide for investigations, studies, surveys, and research into development of methods of encouraging greater use of reclamation and recycling of materials from solid wastes; and

(2) to give special consideration to the problem of motor vehicle hulks, including studies and recommended action for encouraging greater reclamation and recycling of these hulks.

STUDY OF INCENTIVES TO REUSE OF MATERIALS FROM SOLID WASTES

SEC. 3. (a) The Council of Environmental Quality shall coordinate Federal activities with respect to, and take other appropriate action designed to provide maximum Federal efforts in and attention to, development of programs for encouraging greater use of reclamation and recycling of materials from solid wastes through incentive and regulatory measures.

(b) The Council on Environmental Quality, in compliance with its mandate to enhance the quality of renewable resources and approach the maximum attainable reclamation or recycling of depletable resources, shall—

(1) conduct a study of the relative effectiveness of various types of incentives, including financial or tax incentives, and regulatory measures to accelerate the reclamation or recycling of materials from solid wastes which are not presently in competition with primary resources in the productive process, with special emphasis on reuse of motor vehicle hulks; and

(2) report annually to the President, and at such other times as may be appropriate, the results of its research, studies, and surveys, with recommendations for legislative proposals or executive action, through incentives or regulatory measures, to encourage greater reclamation and recycling of materials from solid wastes.

(c) The Council may appoint, as necessary, advisory committees composed of persons expert in the technological aspects of reclaiming and recycling of materials from any category of solid wastes to advise in developing or evaluating proposals with respect to the efficient and economic reclamation and reuse of such materials. Members of any such advisory committee, who are not in the regular full-time employ of the United States, while attending meetings of the committee or otherwise serving on business of the committee, shall be entitled to receive compensation at rates fixed by the Secretary, but not exceeding the maximum rate specified at the time of such service, for grade GS-18 in section 5332 of title V, United States Code, including traveltime, and while away from their homes or regular places of business they may also be allowed travel expenses, including per diem in lieu of subsistence, as authorized by law (5 U.S.C. 5703 (b)) for person in the Government service employed intermittently.

(d) The Council is also authorized to hold public hearings on proposals being considered to assist it in assessing the feasibility and effectiveness of the proposals.

EXTENSION OF DURATION OF SOLID WASTE DISPOSAL ACT

SEC. 4. (a) Subsection (a) of section 210 of the Solid Waste Disposal Act (42 U.S.C. 3259(a)) is amended by striking out "and" before "not to exceed \$19,750,000", and by inserting before the period at the end thereof "and such sums as may be necessary for each of the next three fiscal years".

(b) Subsection (b) of such section is amended by striking out "and" before "not to exceed \$12,250,000", and by inserting before the period at the end thereof "and such sums as may be necessary for each of the next three fiscal years".

(The following bills are related to H.R. 15847: H.R. 642 (Mr. Ryan); H.R. 1203 (Mr. Long of Maryland); H.R. 10916 (Mr. Tierman); H.R. 11833 (Mr. Rogers of Florida); H.R. 12456 (Mr. Dingell); H.R. 14495 (Mr. Dingell); and H.R. 16372 (Mr. Corman)).

H.R. 15848, 91st Cong., 2d sess., introduced by Mr. Staggers (for himself and Mr. Springer) on February 10, 1970;

H.R. 15871, 91st Cong., 2d sess., introduced by Mr. Bennett on February 16, 1970;

H.R. 15986, 91st Cong., 2d sess., introduced by Mr. Brotzman on February 18, 1970;

- H.R. 16026, 91st Cong., 2d sess., introduced by Mr. Collier (for himself, Mr. Bray, Mr. Quillen, Mr. McKneally, Mr. Zwach, Mr. Conable, Mr. Conte, Mr. Brotzman, Mr. Wylie, Mr. Chamberlain, Mr. Hastings, Mr. Carter, Mr. Widnall, Mr. Burton of Utah, Mr. Wiggins, Mr. MacGregor, Mr. Berry, Mr. Fish, Mr. Robison, Mr. Adair, Mr. Betts, Mr. Biester, Mr. Mosher, Mr. Stafford, and Mr. Minshall) on February 18, 1970;
- H.R. 16033, 91st Cong., 2d sess., introduced by Mr. Gerald R. Ford (for himself, Mr. Arends, Mr. Anderson of Illinois, Mr. Poff, Mr. Taft, Mr. Bob Wilson, Mr. Smith of California, Mr. Rhodes, Mr. Morton, Mr. McCulloch, Mr. Mayne, Mr. Byrnes of Wisconsin, Mr. Halpern, Mr. Wyatt, Mr. Price of Texas, Mr. Pelly, Mr. Eshleman, Mr. Thomson of Wisconsin, Mr. Talcott, Mr. Hosmer, Mr. Cunningham, Mr. Kuykendall, and Mr. Derwinski) on February 18, 1970;
- H.R. 16040, 91st Cong., 2d sess., introduced by Mr. Hansen of Idaho (for himself, Mr. Meskill, Mr. Camp, Mr. Esch, Mrs. May, Mr. Blackburn, Mr. Erlenborn, Mr. Button, Mr. Schreebels, Mr. Gubser, Mr. Sandman, Mr. Steiger of Arizona, Mr. Hutchinson, Mr. Kyl, Mr. Broomfield, Mr. Findley, Mr. Bow, Mr. Latta, Mr. Bell of California, Mr. Watson, Mr. Pollock, Mr. Shriver, Mr. Kleppe, Mr. Burke of Florida, and Mr. Wyder) on February 18, 1970;
- H.R. 16047, 91st Cong., 2d sess., introduced by Mr. McDonald of Michigan (for himself, Mr. Scott, Mr. Lujan, Mr. McClory, Mr. Frey, Mr. Pettis, Mr. Crane, Mr. Keith, Mrs. Reid of Illinois, Mr. Wampler, Mr. Corbett, Mr. Beall of Maryland, Mr. McClure, Mr. Lloyd, Mr. Cederberg, Mr. Goldwater, Mr. King, Mr. Duncan, Mr. Denney, Mr. Teague of California, Mr. Edwards of Alabama, Mr. Landgrebe, Mr. Hogan, Mr. Schwengel, and Mr. Smith of New York) on February 18, 1970;
- H.R. 16054, 91st Cong., 2d sess., introduced by Mr. Mathias (for himself, Mr. Schadeberg, Mr. Devine, Mr. Hunt, Mr. Quie, Mr. Cowger, Mr. Harvey, Mrs. Dwyer, Mr. Frelinghuysen, Mr. Mailliard, Mr. Wold, Mr. Horton, Mr. Michel, Mr. Weicker, Mr. Winn, Mr. Coughlin, Mr. Langen, Mr. Stanton, Mr. Whalen, Mr. Railsback, Mr. Lukens, and Mr. Williams) on February 18, 1970;
- H.R. 16059, 91st Cong., 2d sess., introduced by Mr. Riegle (for himself, Mr. McCloskey, Mr. Vander Jagt, Mr. Sebelius, Mr. Goodling, Mr. Miller of Ohio, Mr. Steiger of Wisconsin, Mr. Don H. Clausen, and Mr. Pirnie) on February 18, 1970;
- H.R. 16111, 91st Cong., 2d sess., introduced by Mr. Brown of Ohio (for himself and Mr. Myers) on February 19, 1970;
- H.R. 16239, 91st Cong., 2d sess., introduced by Mr. Broyhill of Virginia on March 3, 1970;
- H.R. 16347, 91st Cong., 2d sess., introduced by Mr. Helstoski on March 9, 1970;
- H.R. 16452, 91st Cong., 2d sess., introduced by Mr. McDade on March 12, 1970;
- H.R. 16865, 91st Cong., 2d sess., introduced by Mr. Clancy on April 9, 1970;
- H.R. 16946, 91st Cong., 2d sess., introduced by Mr. Murphy of New York on April 13, 1970; and
- S. 3072, 91st Cong., 2d sess., referred to the Committee on Interstate and Foreign Commerce on March 31, 1970,

are identical as follows:

A BILL To amend the Clean Air Act so as to extend its duration, provide for national standards of ambient air quality, expedite enforcement of air pollution control standards, authorize regulation of fuels and fuel additives, provide for improved controls over motor vehicle emissions, establish standards applicable to dangerous emissions from stationary sources, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Clean Air Act Amendments of 1970".

EXTENSION OF DURATION

SEC. 2. (a) The first sentence of section 104(c) of the Clean Air Act (42 U.S.C. 1857b-1(c)) is amended by striking out "and" before "for the fiscal year ending June 30, 1970," and by inserting before the period at the end thereof ", and such sums as may be necessary for the fiscal year ending June 30, 1971, and for each of the next two fiscal years".

(b) Section 309 of the Clean Air Act (42 U.S.C. 18571) is amended by striking out "and", and inserting before the period at the end thereof ", and such sums as may be necessary for the fiscal year ending June 30, 1971, and for each of the next two fiscal years".

TESTING OF MOTOR VEHICLES AND ENGINES

Sec. 3. (a) Subsection (a) of section 206 of such Act (42 U.S.C. 1857f-5) is amended by striking out in the first sentence thereof "Upon application of the manufacturer, the" and inserting in lieu thereof "The"; by striking out "such manufacturer" and inserting in lieu thereof "the manufacturer"; and by inserting after "not less than one year" in the second sentence thereof "(except as provided under subsection (c))".

(b) Subsection (b) of such section is amended by inserting before the period at the end of the sentence " , except as provided in subsection (c)".

(c) Such section 206 is further amended by adding after subsection (b) the following new subsections:

"(c)(1) In order to determine whether new motor vehicles or new motor vehicle engines being manufactured by a manufacturer are in fact constructed in all material respects substantially the same as the test vehicle or engine, the Secretary is authorized to test such vehicles or engines. Such tests may be conducted by the Secretary directly or, in accordance with conditions specified by the Secretary, by the manufacturer.

"(2) If, based on such tests conducted on a representative sample of such vehicles or engines, the Secretary determines that such vehicles or engines do not conform with the regulations in effect on the date the certificate of conformity was issued, he may revoke such certificate and so notify the manufacturer. Such revocation shall apply in the case of any new motor vehicles or new motor vehicle engines manufactured after the date of such notification and until such time as the Secretary finds that vehicles and engines being manufactured by the manufacturer do conform to such regulations.

"(d) For purposes of enforcement of this section, officers or employees duly designated by the Secretary, upon presenting appropriate credentials and a written notice to the manufacturer, are authorized (A) to enter, at reasonable times, any factory, or other business or establishment, for the purpose of conducting tests of vehicles or engines coming off the production line, or (B) to inspect, at reasonable times, records, files, papers, processes, controls, and facilities used by such manufacturer in conducting tests under regulations of the Secretary. A separate notice shall be given for each such inspection, but a notice shall not be required for each entry made during the period covered by the inspection. Each such inspection shall be commenced and completed with reasonable promptness."

(d) The heading of such section 206 is amended to read:

"COMPLIANCE TESTING AND CERTIFICATION".

(e) Paragraph (1) of subsection (a) of section 203 of such Act (42 U.S.C. 1857f-2) is amended by striking out "it is in conformity with" and inserting in lieu thereof "such manufacture is covered by a certificate of conformity issued (and in effect) under".

(f) The amendments made by this section shall apply in the case of motor vehicles and motor vehicle engines manufactured after the month in which this Act is enacted.

IMPORTATION OF VEHICLES AND ENGINES

Sec. 4. (a) Paragraph (1) of subsection (a) of section 203 of such Act (42 U.S.C. 1857f-2) is amended by inserting "(in the case of any person, except as provided by regulation of the Secretary)," after "commerce, or"; and by striking out "United States for sale or resale" and inserting in lieu thereof "United States".

(b) The first sentence of paragraph (2) of subsection (b) of such section is amended by striking out "by a manufacturer" and inserting in lieu thereof "or imported by any person".

(c) Paragraph (3) of section 212 of such Act (42 U.S.C. 1857f-7) is amended by striking out "The" and inserting in lieu thereof "Except with respect to vehicles or engines imported or offered for importation, the"; and by adding before the period at the end thereof "; and with respect to imported vehicles or engines, such terms mean a motor vehicle and engine, respectively, manufactured after the effective date of the regulations issued under section 202".

(d) The amendments made by this section shall apply in the case of motor vehicles and motor vehicle engines imported into the United States on or after the sixtieth day following the date of enactment of this Act.

REGISTRATION AND REGULATION OF FUELS AND FUEL ADDITIVES

SEC. 5. (a) Subsection (a) of section 210 of such Act (42 U.S.C. 1857f-6c) is amended to read as follows:

"(a) The Secretary may by regulation designate any fuel (which, for purposes of this section, means only fuel intended for use in the transportation of any person or thing) or fuel additive, and after such date or dates as may be prescribed by him, no manufacturer or processor of any such fuel and fuel additive may sell or deliver it unless the manufacturer of such fuel or fuel additive has provided the Secretary with the information required under subsection (c) of this section and unless such fuel or fuel additive has been registered with the Secretary in accordance with subsection (c) of this section."

(b) Section 210 of such Act is amended by redesignating subsections (b), (c), (d), and (e) as subsections (c), (d), (e), and (f), respectively, and by adding after subsection (a) the following new subsection:

"(b) The Secretary may, on the basis of information obtained under subsection (c) of this section or any other information available to him, establish standards respecting the composition or the chemical or physical properties of any fuel or fuel additive to assure that such fuel or fuel additive will not cause or contribute to emissions which would endanger the public health or welfare, or impair the performance of any emission control device or system which is in general use or likely to be in general use (on any motor vehicle or motor vehicle engine subject to this title) for the purpose of preventing or controlling motor vehicle emissions from such vehicle or engine. For the purpose of carrying out such standards the Secretary may prescribe regulations—

"(A) prohibiting the manufacture for sale, the sale, the offering for sale, or the delivery of any fuel or fuel additive; or

"(B) limiting the composition or chemical or physical properties, or imposing any conditions applicable to the use of, such fuel or fuel additive (including the maximum quantity of any fuel component or fuel additive that may be used or the manner of such use).

(c) The subsection of section 210 herein redesignated as subsection (c) is amended by striking out "For purposes of this section, the Secretary shall" and inserting in lieu thereof "For the purpose of establishing standards under subsection (b), the Secretary may require the manufacturer of any fuel or fuel additive to furnish such information as is reasonable and necessary to determine the emissions resulting from the use of the fuel or fuel additive or the effect of such use on the performance of any emission control device or system which is in general use or likely to be in general use (on any motor vehicle or motor vehicle engine subject to this Act) for the purpose of preventing or controlling motor vehicle emissions from such vehicle or engine. If the information so submitted establishes that toxic emissions or emissions of unknown or uncertain toxicity result from the use of the fuel or fuel additive, the Secretary may require the submission within a reasonable time of such scientific data as the Secretary may reasonably prescribe to enable him to determine the extent to which such emissions will adversely affect the public health or welfare. To the extent reasonably consistent with the purposes of this section, such requirements for submission of information with respect to any fuel additive shall not be imposed on the manufacturer of any such additive intended solely for use in a fuel only by the manufacturer thereof. Among other types of information, the Secretary shall"; by inserting in clause (2) "the description of any analytical technique that can be used to detect and measure such additive in fuel," after "above"; by striking out in such clause "to the extent such information is available or becomes available,"; by striking out "clauses (1) and (2)" in the second sentence and inserting in lieu thereof "the provisions of this subsection"; and by striking out "such fuel additive" in such sentence and inserting in lieu thereof "such fuel or fuel additive".

(d) The subsection of section 210 herein redesignated as subsection (d) is amended by inserting between the first and second sentences the following new sentence: "The Secretary may disseminate any information obtained from reports or otherwise, which is not covered by section 1905 of title 18 of the United States Code and which will contribute to scientific or public understanding of the relationship between the chemical or physical properties of fuels or fuel additives and their contribution to the problem of air pollution." The first sentence of such subsection is amended by striking out "subsection (b)" and inserting in lieu thereof "subsection (c)".

(e) The subsection of section 210 herein redesignated as subsection (e) is amended (1) by adding "or subsection (b)" after "subsection (a)"; and (2) by striking out "\$1,000" and inserting in lieu thereof "\$10,000".

(f) The amendment made by subsection (e) (2) of this section shall be effective with respect to any fuel or fuel additive to which a regulation issued under subsection (a) of section 210 of such Act or a standard established under subsection (b) of such section, as amended by this Act, applies.

NATIONAL AIR QUALITY STANDARDS

SEC. 6. Section 107 of such Act (42 U.S.C. 1857c-2) is amended to read as follows:

"NATIONAL AIR QUALITY STANDARDS

"SEC. 107. (a) As soon as practicable after enactment of the Clean Air Act Amendments of 1970, but in no event later than the close of the sixth calendar month after the month in which such enactment occurs, the Secretary shall, after consultation with appropriate advisory committees and Federal departments and agencies, publish in the Federal Register proposed regulations establishing nationally applicable standards of ambient air quality for any pollutant or combination of pollutants which he determines endanger or may endanger the public health or welfare, and allow a reasonable time for comment thereon by interested parties. After considering such comments and other relevant information, the Secretary shall promulgate such regulations with such modifications as he deems appropriate. He may from time to time thereafter, by regulation similarly prescribed, extend such standards to other pollutants or otherwise revise such standards.

"(b) As soon as possible after establishing or revising standards under subsection (a), the Secretary shall, after consultation with appropriate advisory committees and Federal departments and agencies, issue to appropriate air pollution control agencies information on those recommended pollution control techniques the application of which is necessary to achieve such standards of air quality at the earliest practicable time. Such information shall include data relating to technology and costs of emission control. The recommendations shall also include such data as are available on the latest available technology and economic feasibility of alternative methods of prevention and control of air pollution. Such issuance shall be announced in the Federal Register and copies shall be made available to the general public."

AIR QUALITY STANDARDS AND ABATEMENT OF AIR POLLUTION

SEC. 7. (a) Paragraphs (1), (2), and (3) of subsection (c) of section 108 of such Act (42 U.S.C. 1857d) are amended to read as follows:

"(c) (1) If, after the date on which the Secretary has, pursuant to section 107, established standards of ambient air quality and issued recommended control techniques therefor—

"(A) any State or any interstate air pollution control agency, within ninety days after such date, files with the Secretary a letter of intent that it will adopt a plan (meeting the requirements of subparagraph (B)) within the time specified, a description of how it will proceed to develop the plan (meeting such requirements) for the various areas within its jurisdiction, and the time within which the plan will be applied to each such area giving due regard, in setting this order of application of the plan, to the relative requirements of each area; and

"(B) such State or interstate agency adopts a plan for the implementation, maintenance, and enforcement of such standards of air quality, which adoption occurs within one hundred and eighty days after the filing of such letter of intent and other material pursuant to subparagraph (A) and after public hearings held not less than thirty days following publication of a proposed plan for implementation, maintenance, and enforcement of such standards; and

"(C) the Secretary determines that such plan—

"(i) includes emission standards, or equivalent measures, and such other measures as may be necessary to assure achieving or preserving such standards of ambient air quality within a reasonable time in all areas within the jurisdiction of such State or interstate agency;

"(ii) contains adequate provisions for intergovernmental cooperation, including, in the case of any area covering part or all of more than one State and designated by the Secretary, appropriate provision for dealing with interstate pollution problems;

"(ii) provides adequate means of enforcement, including authority comparable to that in subsection (k) of this section to prevent or deal with air pollution presenting an imminent and significant endangerment to the public health; and

"(iv) provides for revision from time to time as may be necessary to take account of revisions of such ambient air quality standards or improved or more expeditious methods of achieving such standards;

such plan (except with respect to any area for which an extension is granted pursuant to the last two sentences of this paragraph) shall be approved by the Secretary. Any revisions of such a plan which are similarly adopted and otherwise meet the requirements of the preceding sentence shall also be approved by the Secretary. For good cause shown, the Secretary may extend, for such period as he finds necessary and appropriate, the one hundred and eighty day period referred to in subparagraph (B) with respect to any area or areas under the jurisdiction of the State or interstate agency. No such extension may exceed ninety days unless the request therefor accompanies the material filed pursuant to subparagraph (A) and is in turn accompanied by satisfactory assurances that the portions of the plan relating to the areas most in need of air pollution abatement action will receive priority in the development and submission of the plan.

"(2) If a State or interstate agency does not file a letter of intent and the other material described in paragraph (1) or adopt a plan in accordance with paragraph (1) with respect to any State or portion thereof, the Secretary shall prepare regulations establishing such a plan for such State or portion. Prior to promulgating such regulations, the Secretary shall call a public hearing for the purpose of receiving testimony from State and local pollution control agencies and other interested parties affected by the regulations, to be held in or near one or more of the places where the plan will be applicable. At least thirty days prior to the date of such hearing, notice thereof shall be published in the Federal Register. If, prior to the date the Secretary publishes such regulations, the State or interstate agency has not adopted such a plan, the Secretary shall promulgate such regulations.

(b) Paragraph (4) of such subsection (c) is amended to read as follows:

"(4)(A) Whenever, on the basis of surveys, studies, or reports the Secretary finds that the ambient air quality in any State or the area under the jurisdiction of any interstate air pollution control agency fails to meet the air quality standards established pursuant to section 107, and he determines, on the basis of facts thus ascertained, that such failure results from the failure of a State or interstate agency to carry out its plan (or the plan provided for it by the Secretary) under section 108(c), the Secretary shall notify the State or the interstate agency, and the persons contributing to the lowering of the air quality or to the alleged violations, of such findings.

"(B) If such State or interstate agency has not taken appropriate remedial action within ninety days of such notification, the Secretary may request the Attorney General to bring suit on behalf of the United States in the appropriate United States district court to enjoin violation of applicable standards or regulations by any person within that State or the area under the jurisdiction of any interstate air pollution control agency."

(c) (1) Paragraph (1) of subsection (d) of such section is amended by striking out subparagraphs (A), (B), (C), and by striking out "(D)" and inserting in lieu thereof "(d) (1)".

(2) The second sentence of paragraph (1) of subsection (f) of such section is amended by striking out "and each State claiming to be adversely affected by such pollution".

(3) The first sentence of paragraph (2) of such subsection is amended by striking out "pollution referred to in subsection (a)" and inserting in lieu thereof "any pollution".

(d) Subsection (g) of such section is amended to read as follows:

"(g) If action reasonably calculated to secure abatement of the pollution within the time specified in the notice following the public hearing is not taken, the Secretary may request the Attorney General to bring a suit on behalf of the United States in the appropriate United States district court to secure abatement of the pollution."

(e) The first sentence of subsection (j)(1) of such section is amended by striking out "based on existing data," and inserting before the period at the end thereof "or any other information which may reasonably be required to assist the Secretary in evaluating the emission of pollutants caused by such person".

(f) Section 108 of such Act is further amended by striking out subsection (b).

(g) The amendments made by subsections (a), (b), and (c) of this section shall become effective on the date on which the Secretary of Health, Education, and Welfare prescribes regulations pursuant to section 107 of the Clean Air Act as amended by this Act. The amendments made by subsections (d) and (f) of this section shall also be effective on such date, except that they shall not apply with respect to any proceeding begun under subsection (d) of section 198 of the Clean Air Act prior to such date on which such regulations are prescribed.

SEC. 8. Title I of the Clean Air Act is amended by adding after section 111 the following new sections:

"STATIONARY SOURCE EMISSION STANDARDS

"SEC. 112. (a) The Secretary shall from time to time by regulation, giving appropriate consideration to 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 or welfare, and (2) can be prevented or substantially reduced. Such standards may be established only after reasonable notice and opportunity for interested parties to present their views at a public hearing. Any regulations hereunder, and amendments thereof, shall become effective on a date specified therein, which date shall be determined by the Secretary after consideration of the period reasonably necessary for compliance. The Secretary may 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.

"(b) Such regulations shall provide that—

"(1) if such emissions are extremely hazardous to health,

"(A) no new source of such emissions shall be constructed or operated, except where (and subject to such conditions as he deems necessary and appropriate) the Secretary makes a specific exemption with respect to such construction or operation;

"(B) any existing source of such emissions shall install and maintain any control measures necessary and appropriate to meet the standards prescribed under this section;

"(2) in other cases to which subsection (a) applies, any new source of such emissions shall be designed and equipped to prevent and control such emissions to the fullest extent compatible with the available technology as determined by the Secretary.

"(c) (1) If, within such period as may be prescribed by the Secretary, any State or interstate air pollution control agency, adopts a plan for enforcement of the standards promulgated by the Secretary under this section, such plan shall, if the Secretary determines it provides adequately for the enforcement of such standards, be applicable within such State or other area.

"(2) If a State does not adopt a plan in accordance with paragraph (1) of this subsection, the Secretary shall, after reasonable notice and a conference of representatives of appropriate Federal departments and agencies and State agencies, prepare regulations establishing a plan for such State which shall meet the criteria for enforcement plans required under section 108. If, prior to the date the Secretary publishes such regulations the State has not adopted such plan, the Secretary shall promulgate such regulations.

"(d) If at any time the Secretary determines that emissions from any stationary sources are in excess of the standards established by him pursuant to this section and that this results from the failure of a State or interstate agency to carry out its State plan adopted as provided in paragraph (1) or established as provided in paragraph (2) of subsection (c) he shall notify the affected State or the interstate agency, the person contributing to the pollution, and other interested parties and specify a time within which such failure must cease. If such failure does not cease within such time, the Secretary may request the Attorney General to bring suit on behalf of the United States in the appropriate United States district court to secure abatement of the pollution.

"(e) Prior to establishing standards under subsection (a), the Secretary shall consult with appropriate Federal departments and agencies having responsibilities related to any stationery sources to which such standards will be applicable."

"FEDERAL ENFORCEMENT

"SEC. 113. (a) If the Secretary, after reasonable notice and opportunity for a hearing, determines (1)(A) that the ambient air quality of any area fails to meet the air quality standards established pursuant to section 107, or (B) that any person is violating any standards established pursuant to section 112, and (2) that such failure or violation results from the failure of a State or interstate agency to carry out its plan meeting the requirements of section 108 or 112, as the case may be, or the plan of the Secretary established thereunder, he shall so 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 and the time, not less than sixty days, within which such persons must take such action.

"(b) If such action is not taken within such time, the Secretary may request the Attorney General to bring a suit on behalf of the United States in the appropriate United States district court to enjoin continued failure to take the necessary remedial action. In any such suit, the court shall receive into evidence a transcript of the hearing held by the Secretary and a copy of the findings prepared by the Secretary as a result thereof. The court may also receive such additional evidence as it deems necessary. The court, giving due consideration to the practicability and to the physical feasibility of taking the necessary remedial action, shall have jurisdiction to enter such judgment and orders enforcing such judgment as the public interest and the equities of the case may require. The court may also assess a penalty of up to \$10,000 for each day after the end of the period specified by the Secretary pursuant to subsection (a) for the taking of the necessary remedial action except that, in determining the amount of such penalty, the court shall take into account the efforts of the defendant to abate the pollution involved."

CONFORMING AMENDMENTS

SEC. 9. Section 106 of such Act (42 U.S.C. 1857c-1) is hereby repealed.

EFFECTIVENESS OF NEW PROVISIONS

SEC. 10. Section 108(c) of the Clean Air Act as in effect prior to enactment of this Act and ambient air quality standards and implementation and enforcement plans promulgated or approved, prior to enactment of this Act, under such section shall not be considered invalid by reason of such enactment until (1) the Secretary of Health, Education, and Welfare establishes ambient air quality standards pursuant to such section as amended by this Act; and (2) either the State adopts an implementation and enforcement plan which is approved by the Secretary pursuant to such section as so amended or the Secretary provides such a plan pursuant thereto.

(The following bills are related to H.R. 15847: H.R. 640 (Mr. Ryan); H.R. 13225 (Mr. Farbstein); H.R. 14484 (Mr. Mikva); H.R. 14534 Mr. Foley (for himself, Mr. McCloskey, Mr. Anderson of California, Mr. Barrett, Mr. Conte, Mr. Conyers, Mr. Dellenback, Mr. Frelinghuysen, Mr. Green of Pennsylvania, Mr. Harrington, Mrs. Heckler of Massachusetts, Mr. Karth, Mr. Matsunaga, Mr. Meeds, Mr. Morse, Mr. Ottinger, Mr. Podell, Mr. Rees, Mr. Reid of New York, Mr. St Germain, Mr. Saylor, Mr. Waldie, and Mr. White); H.R. 14535 Mr. Foley (for himself, Mr. McCloskey Mr. Adams, Mr. Bell of California, Mr. McCarthy, Mr. Burton of California, Mr. Corman, Mr. Daddario, Mr. Edwards of California, Mr. Farbstein, Mr. Gude, Mr. Hechler of West Virginia, Mr. Hosmer, Mr. Koch, Mr. Lowenstein, Mr. Mikva, Mrs. Mink, Mr. Moss, Mr. Pollock, Mr. Ryan, Mr. Scheuer, Mr. Symington, Mr. Tunney, Mr. Udall, and Mr. Yates));

(H.R. 14577 (Mr. Brown of California); H.R. 14578 (Mr. Brown of California); H.R. 14579 (Mr. Brown of California); H.R. 14761 (Mr. Foley (for himself, Mr. McCloskey, Mr. Pettis, Mr. Coughlin, Mr. Pelly, Mr. Weicker, and Mr. Tiernan)); H.R. 14867 (Mr. Mikva (for himself, Mr. Anderson of California, Mr. Annunzio, Mr. Bingham, Mr. Brown of California, Mr. Byrne of Pennsylvania, Mr. Conyers, Mr. Farbstein, Mr. Halpern, Mr. Koch, Mr. Lowenstein, Mr. Macdonald of Massachusetts, Mr. Matsunaga, Mrs. Mink, Mr. Pike, Mr. Podell, Mr. Rees, Mr. Scheuer, Mr. Symington, and Mr. Wright)); H.R. 15009 (Mr. Mikva (for himself and Mr. Morse)); H.R. 15070 (Mr. Mikva (for himself and Mr. Eckhardt)); H.R. 15230 (Mr. Tiernan (for himself, Mr. Caffery, Mr. Hammerschmidt, Mr. Passman, Mr. Pryor of Arkansas, Mr. St Germain, and Mr. Waggonner)); H.R. 15335 (Mr. Boggs); H.R. 15393 (Mr. Tiernan (for himself and Mr. Edwards of Louisiana)); H.R. 15577 (Mr. Dingell); H.R. 15613 (Mr. Brown of California); H.R. 15749 (Mr. Hanna); H.R. 15753 (Mr. Koch);

(H.R. 15807 (Mr. Addabbo); H.R. 16012 (Mr. Mikva); H.R. 16013 (Mr. Mikva); H.R. 16088 (Mr. St Germain); H.R. 16135 (Mr. Gibbons); H.R. 16136 (Mr. Gibbons); H.R. 16371 (Mr. Corman); H.R. 16489 (Mr. Yates); H.R. 16713 (Mr. Yates (for himself, Mr. Anderson of California, Mr. Brademas, Mr. Brown of California, Mr. Button, Mr. Conyers, Mr. Daddario, Mr. Dellenback, Mr. Farbstein, Mr. Hansen of Idaho, Mr. Helstoski, Mr. Karth, Mr. Lukens, Mr. Mikva, Mrs. Mink, Mr. Ottinger, Mr. Rees, Mr. Scheuer, and Mr. Symington)); and H.R. 16913 (Mr. Yates (for himself, Mr. Hungate, Mr. McKneally, and Mr. Pollock)).)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., April 17, 1970.

HON. HARLEY O. STAGGERS,
Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This is in reply to your letter of February 13, 1970, in which you requested a report on H.R. 15847, the "Wastes Reclamation and Recycling Act of 1970."

H.R. 15847 carries out the President's recommendations with respect to problems of solid waste disposal that were set forth in his Message on Environmental Quality of February 10, 1970. Accordingly, we urge the early and favorable consideration by the Congress of H.R. 15847, enactment of which would be in accord with the program of the President.

Sincerely,

WILFRED H. ROMMEL,
Assistant Director for Legislative Reference.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., April 13, 1970.

HON. HARLEY O. STAGGERS,
Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This is in reply to your letter of February 13, 1970, in which you requested a report on H.R. 15848, the "Clean Air Act Amendments of 1970."

This bill, transmitted to the Congress by the Department of Health, Education, and Welfare, would carry out the President's legislative recommendations with respect to air pollution contained in his February 10, 1970 Message on Environmental Quality.

The Bureau of the Budget recommends that early and favorable consideration be given to H.R. 15848, enactment of which would be in accord with the President's program.

Sincerely,

WILFRED H. ROMMEL,
Assistant Director for Legislative Reference.

EXECUTIVE OFFICE OF THE PRESIDENT,
COUNCIL ON ENVIRONMENTAL QUALITY,
Washington, D.C., April 9, 1970.

HON. HARLEY STAGGERS,
*Chairman, House Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.*

DEAR CHAIRMAN STAGGERS: The staff of your Committee has indicated that you would be interested in having the views of the Council on H.R. 15847 the Administration sponsored bill entitled "Wastes Reclamation and Recycling Act of 1970."

The Council supports this legislation. In the view of the Council the coordination of Federal activities to encourage greater reclamation and recycling of materials from solid wastes, related study and reports and possible use of advisory committees is compatible with the provisions of the National Environmental Policy Act of 1969 (P.L. 91-190).

The Bureau of the Budget advises that the enactment of H.R. 15847 is in accord with the program of the President.

Sincerely,

RUSSELL E. TRAIN,
Chairman.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., March 19, 1970.

HON. HARLEY O. STAGGERS,
*Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in response to your request for the views of this Department on H.R. 15847, a bill to authorize the Council on Environmental Quality to conduct studies and make recommendations respecting the reclamation and recycling of material from solid wastes, to extend the provisions of the Solid Waste Disposal Act, and for other purposes.

We recommend that the bill be enacted.

The bill which would be cited as the "Waste Reclamation and Recycling Act of 1970" was proposed by the Administration to carry out certain of the recommendations the President made in his February 10, 1970 message on the Environment. The bill contains findings that increasing production, population and technological advances have resulted in increased waste material which pollutes air, water and land; that this pollution can be ameliorated through reclamation and recycling of such material; that such reclamation and recycling will help avoid wasteful depletion of resources; that these adverse effects on the environment and natural resources result from the fact that reclamation of waste material is not competitive economically with use of primary resources; and that this problem is particularly acute with respect to motor vehicle scrap metal because demand for such scrap metal is insufficient to induce reclamation and reuse. Therefore the purpose of the bill is to provide for study and research into methods of encouraging increased reclamation and reuse of solid waste materials, with special consideration to the problem of motor vehicle hulks. The Council on Environmental Quality is directed to coordinate Federal activities with respect to development of programs to encourage reclamation and recycling of solid waste materials. The Council also is directed to conduct a study of incentives and regulatory measures to accelerate reclamation or recycling of solid waste materials and particularly motor vehicle hulks, and to report to the President the results of its research and studies, with

recommendations for action. The Council is authorized to appoint advisory committees and to hold public hearings. The bill also would extend the provisions of the Solid Waste Disposal Act for three fiscal years with an appropriation authorization of such sums as may be necessary for that period.

As a key department in the Federal effort to protect the quality of the environment and conserve natural resources, we have a strong and continuing interest in the problems of solid waste disposal and in the reclamation of waste for recycling back into the economy of the nation. In this regard, we have always considered as valuable potential resources the waste products and scrap generated by the minerals and metals industries and the consuming public. For many years the Bureau of Mines of the Department, under authority in the Bureau's Organic Act, has been engaged in research to develop methods to utilize waste products and thereby alleviate disposal problems.

With the passage of the 1965 Solid Waste Disposal Act, the Bureau of Mines' responsibility for utilization or disposal of mineral wastes was greatly expanded. The Act gave the Secretary of the Interior certain responsibilities in the area of solid waste disposal. In order to carry out these responsibilities which include the return to the industrial base of metal scrap and mineral resources however generated, the Bureau of Mines' research program in solid waste disposal has been expanded to cover the major categories of urban refuse, automotive scrap, and mining and industrial wastes and residues.

The Nation's water pollution control program, administered by the Federal Water Pollution Control Administration of the Department is related closely to solid waste management. The major thrust of this program is prevention of water pollution, including that which results from solid waste. Cleaning up wastes often includes keeping solids out of water, but some of the alternatives for handling such wastes might, for example, increase air pollution. Therefore, waste disposal efforts, if they are to protect the quality of the total environment, must be considered as an integrated system of water and air pollution control and solid waste management.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely yours,

HOLLIS M. DOLE,
Assistant Secretary of the Interior.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., March 19, 1970.

HON. HARLEY O. STAGGERS,
*Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in response to your request for the views of this Department on H.R. 15848, a bill to amend the Clean Air Act so as to extend its duration, provide for national standards of ambient air quality, expedite enforcement of air pollution control standards, authorize regulation of fuels and fuel additives, provide for improved controls over motor vehicle emissions, establish standards applicable to dangerous emissions from stationary sources, and for other purposes.

We recommend that the bill be enacted.

The bill, which was proposed by the Administration to implement certain of the recommendations in the President's Message on the Environment of February 10, 1970, would extend for an additional three years (fiscal years 1971-1973) the provisions of the Clean Air Act providing general authorization for appropriations, as well as the provision for a special appropriation authorization for research related to fuels and vehicles. In addition, the bill would provide for national standards of ambient air quality, expedite enforcement of air pollution control standards, authorize regulation of fuels and fuel additives, provide for improved controls over motor vehicle emissions and establish standards applicable to dangerous emissions from stationary sources.

As a principal Department in the Federal effort to protect the environment and prevent pollution, we are very interested in the air pollution program, its progress and the interfaces between it and the water pollution and mines and minerals research programs we conduct.

Because of recognized expertise in fuels combustion as related to the abatement of air pollution, the Bureau of Mines of the Department is engaged in a comprehensive research program on vehicular air pollution at its Bartlesville Petroleum Research Center and sulfur oxides pollution at its Pittsburgh Coal Research Center and Morgantown Coal Research Center. In addition, both the Bureau of Mines and the Office of Coal Research, also of the Department, are conducting in-house and sponsoring industrial research on the conversion of coal to liquid and gaseous fuels, which is related to the abatement of air pollution in providing fuels that will produce lower contents of sulfur oxides when burned.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely yours,

HOLLIS M. DOLE,
Assistant Secretary of the Interior.

DEPARTMENT OF JUSTICE,
OFFICE OF THE DEPUTY ATTORNEY GENERAL,
Washington, D.C., March 30, 1970.

HON. HARLEY O. STAGGERS,
*Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in response to your request for the views of the Department of Justice on H.R. 15848, a bill to amend the Clean Air Act so as to extend its duration, provide for national standards of ambient air quality, expedite enforcement of air pollution control standards, authorize regulation of fuels and fuel additives, provide for improved controls over motor vehicle emissions, establish standards applicable to dangerous emissions from stationary sources, and for other purposes.

This bill was submitted to Congress by the Department of Health, Education, and Welfare in support of the President's Environmental Message of February 10, 1970. Accordingly, the Department of Justice defers to that Department on the merits. The Department of Justice has no objection to the provisions contained in the legislation (p. 15, 1. 1-8; p. 15, 1. 22-p. 16, 1.2; p. 19, 1. 10-14; and p. 20, 1. 11-p. 21, 1. 4) involving it in enforcement litigation.

The Bureau of the Budget has advised that there is no objection to the submission of this report from the standpoint of the Administration's program.

Sincerely,

RICHARD G. KLEINDIENST,
Deputy Attorney General.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
Washington, D.C., February 18, 1970.

HON. HARLEY O. STAGGERS,
*Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: This will acknowledge your letter of February 13, 1970, in which you request comments from the National Aeronautics and Space Administration on the bill H.R. 15848 to amend the Clean Air Act so as to extend its duration, provide for national standards of ambient air quality, expedite enforcement of air pollution control standards, authorize regulation of fuels and fuel additives, provide for improved controls over motor vehicle emissions, establish standards applicable to dangerous emissions from stationary sources, and for other purposes.

A study of the bill has been initiated. A report will be sent to you as soon as possible.

Sincerely yours,

ROBERT F. ALNUTT,
Assistant Administrator for Legislative Affairs.

Mr. ROGERS. These two bills were introduced at the request of President Nixon to carry out the administration's environmental control program.

H.R. 15848 would extend and amend the Clean Air Act in several respects.

H.R. 15847 would extend the Solid Waste Disposal Act and authorizes studies with respect to the reclamation and recycling of solid waste material.

The subcommittee will conduct hearings on numerous provisions of these two bills at a later date, probably during the week of March 17.

The hearings scheduled for today, and which had been scheduled for yesterday, were called to deal mainly with one particular subject in mind, although the administration may give us the administration's position on the other bills, as I understand it.

It was called mainly to acquaint the members of the subcommittee and the public with the programs formed at the present, aimed at reducing automobile pollution in the future.

These programs involve very particularly the availability and utilization of lead free gasoline, and, of course, the engine modification that would be required.

It can be said without exaggeration that these programs constitute one of the most important developments in the field of automotive pollution control. The programs involved have an intricate dovetailing of activities by different industries such as automobile manufacturers, petroleum companies, and additive manufacturers, as well as the dovetailing of the responsibility of different Federal agencies and State governments.

I am happy to note for the record that while this committee is conducting hearings on this important subject, Governor Reagan of California has called an important conference of automobile manufacturers, petroleum companies and others, which was slated to begin at the same time these hearings were, which was yesterday, and he called the automobile manufacturers, petroleum companies and others, in order to assure development of programs and to reduce automobile air pollution in his State of California.

I want to congratulate the Governor on taking the initiative and moving forward in this important field in his State.

The struggle to improve our environment is not a partisan struggle, and it must not be permitted to become one. The problem before us is to bring about adequate coordination between the Congress, the Executive Branch, State governments, industry leaders, scientific experts and others concerned with these programs.

In addition, the problem is to acquaint the American people with the alternatives that may exist in achieving significant long-range improvements in our environment.

We have some of our colleagues with us this morning to present their statements for the record on the legislation we have pending before us. Our first witness is the Honorable Harold R. Collier of Illinois. Proceed as you see fit, sir.

STATEMENT OF HON. HAROLD R. COLLIER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. COLLIER. Mr. Chairman, I appreciate having this opportunity to appear before the Subcommittee on Public Health and Welfare in behalf of two bills which I have sponsored.

As a former member of the Committee on Interstate and Foreign Commerce, I am very much aware of its tremendous responsibilities in the fields of transportation, communication, public health, public power, securities and exchanges, and the environment. The subject that I am going to discuss this morning comes under several of these broad headings. Pollution involves the environment, the public health, and transportation, so it is indeed a broad subject.

Both of the measures which I have introduced would, if enacted into law, become potent weapons in the all-out war against pollution. This war must be waged on several fronts, because pollution makes its presence felt everywhere—on the land, in the water, and in the air. Large areas of our countryside are littered with trash and junk, our lakes and streams are contaminated with waste, and our air is polluted with smoke and other noxious fumes.

Our increasing population, now in excess of 200,000,000 and expected to increase to 300,000,000 during the remaining thirty-one years of the present century, is only part of the problem. The scientific and inventive genius that has made our nation the most technologically advanced in the world has been accompanied by an equally unsurpassed prosperity that has enabled almost all of us to become consumers of the resulting products of business and industry.

The result has been an ever-increasing volume of waste that emanates from the plants that manufacture the products, from the homes where many of them are used, and from the products themselves. Just as one example, millions of automobiles and trucks vomit their deadly fumes into the air during their years of usefulness, after which their hulks are scattered over the countryside, sometimes as forlorn derelicts and more often as part of a mountain of junked vehicles. Similar stories can be told about wastepaper, glass and metal containers, and garbage.

Compounding the problem is the fact that, while much of this waste could be avoided by reusing the discarded materials, the expense of reclaiming it would more than offset the financial gains that could be realized.

My first bill, H.R. 16025, the Wastes Reclamation and Recycling Act of 1970, would encourage the reuse of solid wastes, with special attention being directed to the problem of abandoned cars and trucks. The Council on Environmental Quality would, among other things, study the comparative effectiveness of financial or tax incentives and regulatory measures to speed up the reclamation of solid wastes.

My other bill, H.R. 16026, the Clean Air Act Amendments of 1970, would provide for the control of pollution from both motor vehicles and stationary sources. Under the present Act, the Secretary of Health, Education, and Welfare sets national standards regarding motor vehicle pollution control and issues certificates of conformity based on testing of prototype models. My bill authorizes the Department of Health, Education, and Welfare to either test vehicles as they come off assembly lines or require manufacturers to conduct such tests. If the tests show that vehicles are not in compliance with applicable standards, the certificates would be revoked.

If this measure becomes law, the Secretary would issue national air quality standards as part of the effort to control atmospheric pollution from stationary sources. The states would have six months

to adopt implementation plans, including stationary source emission standards and other necessary measures, for all areas. Areas where air pollution is most serious would receive priority. The Department would be empowered to establish emission standards for pollutants which are extremely hazardous to health, as well as for new sources of pollutants which contribute substantially to endangerment of public health or welfare. Penalties are provided for noncompliance.

Mr. Chairman, I hope that the Subcommittee will give careful consideration to these two items of legislation, as I believe their enactment into law is necessary if we are going to be able to combat pollution successfully. Thank you again for your courtesy.

Mr. ROGERS. Thank you, Mr. Collier.

Next, also from the State of Illinois, the Honorable Edward J. Derwinski. Welcome, sir. We are pleased to hear from you.

STATEMENT OF HON. EDWARD J. DERWINSKI, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. DERWINSKI. Mr. Chairman, as a co-sponsor of the Clean Air Act Amendments of 1970 and the Wastes Reclamation and Re-cycling Act of 1970, I am pleased to have this opportunity to express my support for enactment of this most important legislation, which is part of the 37 point program submitted to the Congress by President Nixon to begin the task of cleaning up our polluted air and water.

The problems posed by air and water pollution and disposal of solid wastes have become a matter of national concern. The need for programs to protect the nation's human resources and the natural environment is urgent.

In addition, Mr. Chairman, I have long advocated an incentive tax credit for industrial plants for a part of the cost of constructing or otherwise providing facilities for the control of water or air pollution.

Motor vehicles account for a large part of the Nation's air pollution. It is most important that the Department of Health, Education, and Welfare be given the authority needed to enforce motor vehicle pollution standards. The Clean Air Act would accomplish this objective by giving the Department authority to test assembly line vehicles or require the manufacturer to do so. It would also authorize revocation of certificates if such tests show vehicles not in compliance with applicable standards. In addition, the registration of motor vehicle fuels would be required with the Department setting standards on composition or chemical or physical properties of fuels and additives and issuing regulations to enforce the standards. The increase in the number of motor vehicles on our highways makes it imperative that standards of his type be adopted.

In addition to motor vehicles, industries, power plants, and incinerators are another major source of air pollution. National air quality standards and strict enforcement regulations are most essential to guarantee elimination of air pollutants, which are clear health hazards.

Greater emphasis is needed on techniques for re-cycling materials and the development and use of packing and other materials which are easily disposable. Solid wastes such as metals, plastics, ceramics

and glass and paper products which litter the landscape can be eliminated by developing incentives and regulations for reducing the volume of waste by encouraging development of products that can be re-cycled or easily disposed of. The Wastes Reclamation and Re-cycling Act would be a major step in that direction.

The fight against pollution will be a costly one. The extension of the Clean Air Act and the authorization of funds provided in H.R. 12934 are needed to continue programs already in motion for attacking pollution on a regional basis.

I believe that pollution control should have maximum priority among our domestic programs, and urge that the Subcommittee approve this legislation as a major step toward restoring our environment and preserving it for future generations.

Mr. ROGERS. Thank you, Mr. Derwinski, for a very concise statement.

Mr. DERWINSKI. Thank you, Mr. Chairman.

Mr. ROGERS. Our next witness is the Honorable Vernon W. Thomson of Wisconsin. Proceed as you see fit, sir.

STATEMENT OF HON. VERNON W. THOMSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WISCONSIN

Mr. THOMSON. Mr. Chairman, I make this statement in support of two bills which I take pride in having co-sponsored, H.R. 16032 and H.R. 16033.

There is no need to recite the large numbers of pollution statistics or recount the Armageddon promised us by environmental scientists. Pollution, whether it be air, water, soil or any other type, is only too appallingly self-evident. We badly require immediate effective action to counter the growing filth and sterility of our environment.

H.R. 16033 would be a great step toward the rejuvenation of our air. Since it has been estimated that 60% of air pollution is caused by emissions from the internal combustion engine, any legislation failing to place and enforce restrictions on these engines and their fuel must be considered partial or inadequate. Current law requires the Secretary of Health, Education, and Welfare to set national standards for motor vehicle pollution and issue certificates of conformity based on testing of prototype models. Imported cars are now exempt from standards if they are "not new" or not for sale or resale. Fuel additives are registered, but not regulated; no provision is made for fuels per se.

H.R. 16033 approaches the inadequacies in current law realistically. It would authorize the Secretary of HEW to make tests of vehicles coming off the assembly line or require manufacturers to make such tests. Prototype vehicles, those now tested, are scarcely numerous enough to cause pollution and very doubtfully are typical of vehicles coming off the line. As a result, for the first time the actual pollution source would be tested and not just a model of that source.

Equally important, the bill provides that if these tests show vehicles not in compliance with applicable standards, certificates of conformity are to be revoked until standards are met. Such tests and enforcement policies would ensure that ordinary vehicles available to the public are in compliance with set standards.

"Not new" imported cars do not cause a critical portion of the vehicle emission problem, nevertheless sixty days after enactment the bill rightfully would require imports of all types to meet regulations.

One of the most constructive provisions of H.R. 16033 is the registration and regulation of fuel and fuel additives. Under the bill, the Secretary would be empowered to set standards on the physical and chemical composition or properties of fuel and fuel additives. In this manner such non-necessary and highly pollutant materials as sulfur and lead would undoubtedly be removed from fuels. Only a registered fuel or fuel additive could be sold or delivered.

Air pollution from stationary sources is, after vehicles, the most important offender. Needless to say, State boundaries do not impede the interstate flow of emissions from stationary sources. As a result, this is a Federal problem and must be attacked by Federal regulation.

Under H.R. 16033, the Secretary of HEW issues national air quality standards—States have six months to adopt implementation plans with priorities being given to areas where the worst problem exists. In areas designated as interstate by HEW, State plans must provide for intergovernmental cooperation. If a State fails to create a plan, the Federal Government can issue one.

Enforcement powers are effective yet provide the alleged polluter recourse. After reasonable notice and opportunity for a hearing, HEW can specify remedial action. If such action is not taken, the Attorney General may bring suit. Significantly this procedure applies to interstate and intrastate cases.

From the preceding it should be evident that H.R. 16033 firmly attacks the problem of air pollution. It is effective, reasonable, and enforceable.

The second area of pollution to which I wish to address myself is that of solid waste disposal. Ridding ourselves of garbage and junk is no longer adequate. Resources are not inexhaustible and every attempt must be made to reuse them in some constructive manner after they have been once used.

There are two aspects to this problem, technological and economic. H.R. 16032 focuses primarily on the economic. Under the bill, the Council on Environmental Quality is empowered to conduct studies and make recommendations for the reclamation and recycling of material from solid wastes. It is empowered to conduct studies on the effectiveness of incentives, including tax and other financial incentives, and regulatory measures. Special attention will be paid to ungainly looking and terribly wasteful use of motor vehicle hulks. Funds are provided for this research.

More than technological innovation is necessary to reclaim and recycle solid wastes. It is also necessary to make the process economically feasible. If technological innovation cannot be made economically feasible, then economic restructuring is required. H.R. 16032 is intended to provide the means to discover what type of restructuring is desirable.

Let me take the opportunity in conclusion to encourage the subcommittee and the Congress to act swiftly on this legislation. Time is essential.

Mr. ROGERS. Thank you, Mr. Thomson.

Next we shall hear from our colleague from Tennessee, the Honorable James H. Quillen. Welcome, sir.

STATEMENT OF HON. JAMES H. QUILLEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TENNESSEE

Mr. QUILLEN. Mr. Chairman, it is a pleasure for me to appear before this distinguished subcommittee on behalf of H.R. 16025 and H.R. 16026. As you are well aware, these two bills are included in the seven administration bills which I cosponsor.

It was my privilege to participate in the introduction of these bills which I feel will materially enhance the quality of our environment and hence the quality of our lives.

Briefly, I would like to discuss H.R. 16025 and 16026.

H.R. 16025 is concerned with the burgeoning pollution problem.

This bill recognizes that a pollutant might reasonably be considered as a resource out of place; indeed, the bill states clearly that the pollution of air, water and land can be ameliorated only by greater use of reclamation and recycling of material from solid wastes such as metals, plastics, ceramics and glass, paper products, and the like.

Failure to reclaim and recycle materials not only causes pollution of all kinds but also contributes to the wasteful depletion of primary natural resources—squandering our heritage, so to speak. The reason for this failure is that we don't know how to make the reclamation of materials economically advantageous as compared with using up primary resources. The problem is especially serious in regard to scrap automobiles.

H.R. 16026 zeroes in on air pollution. This bill amends the Clean Air Act so as to extend its duration, provide for national standards of ambient air quality, expedite enforcement of air pollution control standards, authorize regulation of fuels and fuel additives, provide for improved controls over motor vehicle emissions, and to establish standards applicable to dangerous emissions from stationary sources.

Briefly, this bill streamlines the implementation required to secure clean and healthful air.

In conclusion, I want to thank this subcommittee for allowing me the opportunity to speak on behalf of these bills. I would recommend the legislation be given favorable consideration in order that they will soon be sent to the floor of the House for a vote.

Mr. ROGERS. Thank you, Mr. Quillen, for a fine statement.

Mr. QUILLEN. Thank you, Mr. Chairman.

Mr. ROGERS. The Honorable R. Lawrence Coughlin of Pennsylvania is to be our final congressional witness this morning. Welcome, Mr. Coughlin, proceed as you see fit.

STATEMENT OF HON. R. LAWRENCE COUGHLIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Mr. COUGHLIN. Mr. Chairman, I am pleased to offer this testimony about the environment crisis our Nation is facing and to underscore the importance of two bills which are before you to help alleviate this crisis.

The bills deal with air pollution and the problem of solid waste disposal. H.R. 15848, H.R. 16054, and identical measures would extend the Clean Air Act, establish strict new regulations governing automobile emissions, and set national standards for air quality, with provisions for enforcement. H.R. 15847, H.R. 16053, and identical bills would promote new methods of solid waste disposal and extend the Solid Waste Disposal Act of 1965.

The urgency of the environmental crisis cannot be overstated. Pollution is a monster which has been creeping up on us ever since the industrial revolution. It has caught up with us, and it will bring us down if we do not collect our wits and overpower it.

Twenty years ago, air pollution meant dirty shirts and dirty curtains. We knew little about hydrocarbons, photochemical smog, sulfur and nitrogen oxides, and their effects on living organisms. People just knew that soot wasn't attractive, and that smoke was a nuisance and bad for tourism. Smoke control efforts were beautification efforts.

Now we know that air pollution is a complex chemical problem that is not only ugly, but dangerous. It makes people sick; sometimes it kills. Emphysema is the fastest-growing cause of death in the country today, and the mortality rate for this disease is twice as high in the cities as in rural areas. The incidence of chronic bronchitis, asthma, pneumonia, the common cold, and lung cancer is higher in polluted areas, and the mortality rate for cancer is directly proportional to city size.

Air pollution harms or kills vegetation, threatening food resources and reducing the sunlight essential for the production of oxygen in our atmosphere.

Besides, air pollution is expensive, costing the nation over \$12 billion annually in losses. Pollution abrades, corrodes, tarnishes, erodes, cracks, weakens, discolors, soils. It makes necessary the use of expensive pollutant-resistant building materials and machine parts instead of their cheaper counterparts which would be satisfactory in clean air. Maintenance, replacement, and cleaning costs are exorbitant.

In spite of the high price we pay for air pollution, less than \$1 billion per year is currently spent by both government and industry combined toward solution of the problem. Gentlemen, the Clean Air Act, in providing financial and advisory assistance to states and localities, is making an important contribution in the fight against air pollution. It is imperative that it be continued.

Clearly, too, the automobile is Enemy No. 1. The Clean Air Act constitutes the first step toward elimination of the conventionally-powered motor vehicle. Key provisions set stringent regulations on auto emissions, gasoline composition and additives, and initiate development of a low-pollution automobile within 5 years. It sets national standards for pollutants hazardous to health. Under a significant enforcement procedure, violators would be subject to court-imposed fines of up to \$10,000 per day.

The bills on solid waste disposal extend the Solid Waste Disposal Act of 1965 and authorize the Council on Environmental Quality to conduct studies and make recommendations on reclamation and recycling of material from solid wastes.

Every American generates an average of 5.3 pounds of waste—trash, garbage, etc.,—daily. By 1980, per capita wastes may reach 8 pounds per day. The grand total solid waste load in the United States, from all sources, is 3.5 billion tons.

The legislation I hope to see adopted would extend provisions of the Solid Waste Disposal Act of 1965. The measure would develop techniques for recycling materials and produce packaging materials that are easily degradable.

The first vital steps in meeting the growing problem of junk cars are provided for in this bill. The Council on Environmental Quality would be instructed to develop a bounty payment or similar system to insure prompt scrapping and recycling of junk automobiles. The Council would also be empowered to work with industry to find better disposal methods for bottles, cans, and other potential litter. The bill would continue the assistance to states and localities provided by the 1965 Solid Waste Disposal Act.

Finally, the Council on Environmental Quality essentially would be directed to study the relative effectiveness of incentives, including financial and tax provisions, and regulatory measures to speed up reclamation and recycling of materials. In this regard, the Council would report annually to the President the results of its reports and studies, and would make recommendations for legislative and executive action.

In summary, problems like those I have just described are nationwide in scope. The health and safety of all Americans is at stake.

Mankind, and Americans in particular, have successfully subdued many of the destructive forces which threaten us. We have organized ourselves and have subdued flood, drought, erosion, disease. Neither the height of the mountains nor the depth of the oceans nor the vast reaches of space have been unconquerable. And now, this technology which has helped make our civilization possible must not be permitted to destroy us. It is our own creation and we must be master of it.

I have faith that we as a nation will meet this crisis. The public is demanding action, and they are demanding it immediately. If we in the Congress do not respond, we shall have betrayed our constituents and our own good sense, and history will not judge us kindly.

Mr. ROGERS. Thank you, Mr. Coughlin, for a fine statement.

Mr. COUGHLIN. It has been a pleasure, Mr. Chairman.

Mr. ROGERS. Our next witness is Mr. Charles C. Johnson, Jr., who is the Administrator of the Environmental Health Service, accompanied by Dr. John T. Middleton, who is the Commissioner, National Air Pollution Control Administration.

Mr. Johnson and Dr. Middleton, I welcome you to the committee, and if you have others who accompany you, I would be pleased to have you introduce them on the record.

The committee will now receive your statement.

STATEMENT OF CHARLES C. JOHNSON, JR., ADMINISTRATOR, ENVIRONMENTAL HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE; ACCOMPANIED BY DR. JOHN T. MIDDLETON, COMMISSIONER, NATIONAL AIR POLLUTION CONTROL ADMINISTRATION, ENVIRONMENTAL HEALTH SERVICE; AND IRWIN L. AUERBACH, SPECIAL ASSISTANT FOR LEGISLATIVE AFFAIRS, NATIONAL AIR POLLUTION CONTROL ADMINISTRATION

Mr. JOHNSON. Thank you, Mr. Chairman. I would like to identify for the record, Mr. Irwin L. Auerbach, who is the Special Assistant for Legislative Affairs in the National Air Pollution Control Administration.

Mr. ROGERS. We welcome you, Mr. Auerbach.

Mr. JOHNSON. Mr. Chairman and members of the Subcommittee, I appreciate this opportunity to participate once again in your hearings on the Nation's efforts to deal with the problem of air pollution. In our testimony on December 8, we reported on the status of the full range of air pollution research and control activities which the Department of Health, Education, and Welfare is conducting under the existing provisions of the Clean Air Act. In his recent message to the Congress on environmental problems, the President proposed that the Act be modified in several respects to strengthen and speed up the Nation's attack on air pollution. H.R. 15848, which is before the Subcommittee, would implement the President's proposals.

This morning, in accordance with your invitation, my testimony will be focused on one very important part of our activities under the Clean Air Act—our efforts to bring the problem of motor vehicle pollution under control. I also will touch on those provisions of H.R. 15848 that deal with our motor vehicle pollution control activities.

I recognize, of course, that this Subcommittee is deeply interested in all aspects of the Department's air pollution research and control activities and in all the proposed amendments to the Clean Air Act. As your hearings continue, we will be pleased to appear again to discuss those items of interest to you that are not covered in today's testimony.

There can be no doubt that motor vehicle pollution is a very serious threat to public health and welfare and to the quality of people's lives across this entire Nation. This has been demonstrated and documented a great many times. A very high priority obviously must be placed on finding solutions to this urgent national problem.

It is a problem that must be attacked simultaneously from many directions. Attention must be given not only to the motor vehicle engine but also to the fuel it uses, not only to the design and construction of motor vehicles but also to the design and location of highways, and not only to ways of moving motor vehicles more efficiently but

also to ways of building a transportation system that moves people and goods without damaging the environment.

Obviously, such a wide-ranging attack on the problem will require a concerted effort on the part of several Federal departments, and agencies, State and local governments, and many groups in the private sector, including the motor vehicle manufacturers and fuel producers and any other groups that have a capability of contributing to the development of a pollution-free transportation system.

The Federal Government clearly must play a major role in this effort. President Nixon has pledged his Administration to do just that. In his State of the Union message, he said: "We shall intensify our research, set increasingly strict standards, and strengthen our enforcement procedures—and we shall do it now."

The task of redeeming that pledge is already well underway. Under the current provisions of the Clean Air Act, the Department of Health, Education, and Welfare is conducting a national regulatory program for the control of air pollution from new motor vehicles and is conducting and supporting research and development relating to engines, fuels, emission control devices, and other aspects of motor vehicle pollution control. This research and development effort includes projects conducted for us by other Federal departments and agencies and by many organizations in the private sector.

National standards for exhaust emissions of carbon monoxide and hydrocarbons have been in effect for new passenger cars and light trucks since the 1968 model year. These types of vehicles account for most of the Nation's motor vehicle pollution problem. Tighter standards are now in effect for 1970 models, and we have set standards for the control of evaporative losses beginning with 1971 models. We also have set a limit on the density of smoke that may be discharged by new diesel trucks and buses.

In conjunction with the President's environmental message to the Congress, Secretary Finch has announced his intention of tightening the carbon monoxide and hydrocarbon exhaust standards still further and of establishing standards for nitrogen oxides and particulate emissions, as well. These standards will take full advantage of emerging technological advances. Attached to my statement is a table which compares the proposed new standards to the current situation; as you will see, the new standards call for a very substantial reduction in motor vehicle emissions (see p. 196.).

To meet our planned 1975 standards, automobile manufacturers have indicated that they may need to use devices called catalytic converters, whose use is not practical when there are lead additives in gasoline. As one way of dealing with this problem, two automobile companies have indicated that they are prepared to market, in the 1971 model year, cars that can run on unleaded, lower octane fuel. This would permit removal of lead from gasoline without the necessity of making extensive changes in refining processes in order to maintain high octane levels. In response, several petroleum companies have indicated that they may be able to produce lead-free gasoline as soon as there is a sufficient demand for it.

Naturally, we welcome such expressions of willingness to take a constructive step toward improved control of motor pollution. Our principal concern at this point is that the automobile and fuels industries both seem to be waiting on each other. There appears to be a

need for a third party to take the initiative in working out a solution. Toward this end, the Department of Health, Education, and Welfare is discussing ways of resolving this problem with the automobile manufacturers and fuel producers.

While we are on the subject of fuel additives, I want to note that provisions to authorize Federal registration and regulation of fuels and fuel additives used in transportation are included in H.R. 15848. There is great potential for improving the Nation's air quality through modification of motor vehicle fuels, particularly gasoline. Elimination of lead from gasoline is just one example of this approach. Through other changes in the use of additives and through changes in the chemical composition of gasoline, it is possible to make significant progress in reducing motor vehicle emissions. The proposed new authority will facilitate such progress.

There are two other provisions of H.R. 15848 which relate to control of motor vehicle pollution. One would authorize assembly line testing of new motor vehicles and revocation of certificates of conformity when such testing shows that non-conforming vehicles are being produced. The other would prohibit importation of motor vehicles which are not equipped to comply with our national standards. Both of these provisions would fill significant gaps in our authority to insure that new automobiles will be in compliance at the time of their original sale.

While the new national standards we have planned for application in the 1975 model year will keep the trend of motor vehicle pollution moving downward for several more years, they will not do so indefinitely. If this problem is not to begin worsening again, there will have to be a requirement for production of essentially pollution-free automobiles in the 1980's.

Whether such a goal can be attained without introducing new engine systems or new fuels remains an open question. Accordingly, it is far too soon for either government or industry to relax its research and development activities. As the President indicated in his environmental message, the Department of Health, Education and Welfare will significantly increase its activities in this field.

While we will continue to work on emission control techniques applicable to the internal combustion engine, the major thrust of our research and development efforts will be directed toward the development of alternative, low-emission engine systems. In fiscal 1971, our total investment in research and development on the motor vehicle pollution problem will be substantially increased—from about \$4 million to \$12.9 million. Of the \$12.9 million, some \$9 million will be devoted to stimulating and supporting the development of low-emission engines.

Now and for some years to come, we will also be trying to stimulate non-governmental efforts to develop low-pollution motor vehicles. In fact, a substantial portion of the funds earmarked for motor vehicle research and development will be set aside to implement a program under which promising low-pollution motor vehicles will be purchased for evaluation. Vehicles which meet low-emission requirements and which are satisfactory in other respects will be subjected to extensive fleet testing. It is anticipated that as many as 300 to 500 of each of several types of low-pollution vehicles might ultimately be involved in the fleet testing program.

To the extent that this program stimulates non-governmental efforts, our own research and development activities could be reduced. But if the private sector does not show definite signs of accomplishment in the development of low-pollution vehicles, our own efforts will of necessity be further intensified.

No doubt, the likelihood that the private sector will move in this area would be significantly increased by a Federal commitment to purchase low-pollution vehicles, when they are available. I am referring here to procurement, rather than purchases of limited numbers of vehicles for testing.

Though it may be several years before low-pollution motor vehicles will be available for Federal procurement, a commitment to undertake such procurement may well serve to shorten the time. Accordingly, we are supporting enactment of legislation which would authorize such procurement and permit payment of a premium price for low-pollution vehicles.

That completes my report on the status of our work in the area of motor vehicle pollution control. As you undoubtedly have noted, we have taken several significant steps since my appearance before this subcommittee 3 months ago. New and more stringent emission standards have been proposed. The budget for motor vehicle research and development has been increased substantially. A program intended to stimulate private sector efforts to develop low-pollution vehicles has been formulated.

I am pleased to be able to report such progress. I believe that we now have a blueprint for success in controlling motor vehicle pollution. You may be sure, however, that if this plan of action does not succeed, we will take any additional steps that may be necessary.

In closing, I just want to note once again that my statement this morning has been focused entirely on our motor vehicle pollution control activities. In accordance with your invitation, I have reserved discussion of other air pollution research and control activities for future sessions of these hearings.

(The following table was attached to Mr. Johnson's statement:)

LIGHT-DUTY VEHICLE EMISSIONS

[In grams per vehicle mile]

| | No control | 1968 standards | 1970 standards | 1973 proposed | 1975 proposed |
|------------------------------|------------|----------------|----------------|---------------|---------------|
| Exhaust: | | | | | |
| Hydrocarbons..... | 5.7 | 3.3 | 2.2 | 2.2 | 0.5 |
| Carbon monoxide..... | 87.2 | 34.0 | 23.0 | 23.0 | 11.0 |
| Nitrogen oxides..... | 6.0 | | | 3.0 | .9 |
| Particulates..... | .3 | | | | .1 |
| Crankcase: Hydrocarbons..... | 3.2 | 0 | 0 | 0 | 0 |

Mr. ROGERS. Thank you, Mr. Johnson. Did Dr.^s Middleton have any statement at this time?

Dr. MIDDLETON. No, I do not.

Mr. ROGERS. Mr. Satterfield?

Mr. SATTERFIELD. Mr. Johnson, I want to welcome you here this morning. I agree with that part of your statement that air pollution is indeed a serious threat to the public and I personally believe that

exhaust pollution is a part of that threat. I agree with you that it is a problem which has to be attacked simultaneously from several directions.

I take it that the last statement which appears in your prepared statement is directed to the specific question of pollution emissions from the exhaust of internal combustion engines, is that correct?

Mr. JOHNSON. Yes, and no, Mr. Satterfield. We believe that in the research efforts that have to be applied to pollution vehicles of any type we should have a concerted effort of many people in this area.

Mr. SATTERFIELD. There are many factors that really contribute to those things which are emitted from the exhaust; are there not?

Mr. JOHNSON. That is correct.

Mr. SATTERFIELD. And fuel is only one of the factors?

Mr. JOHNSON. Certainly it is one of the factors, the configuration of the engine, itself, and other items. I am sure Dr. Middleton could speak more specifically to this. I think your assumption is correct.

Mr. SATTERFIELD. It is my understanding, I may be in error, so I would appreciate it if you would correct me, that you get emissions from gasoline engines in several places. There is your fuel system, where the volatility of your fuel might create emissions, you have them in your internal parts of your engine, in the crank case, and then you have them in the exhaust. I understand this can be affected not only by the contents of the fuel itself, but more importantly the parameters of the engine and what occurs within an individual engine; is this correct?

Dr. MIDDLETON. Yes, it is very true, the nature of the combustion chamber, the additives used in fuels, their impact upon the collection of debris in the engine and the oil to facilitate the valves operating properly and let us not overlook the way in which people drive their cars and particularly the way garages maintain, or not, their cars.

I think a good bit of the failure in control systems in owner-use is due in large part to the kinds of fuel used, the way the cars are maintained and the driving factors.

I think also, Mr. Satterfield, you noticed in Mr. Johnson's testimony we talked about the design of highways. We need to be concerned about the traffic flow, if one increases the average rate of speed the pollution will go down.

Mr. SATTERFIELD. This is always going to be true of an engine and its fuel. Do we have to gear things to what the average would be? What you are talking about is where we could improve the average benefit but that doesn't really get to the question of what is harmful in the engines, but rather it gets to the amounts of harm.

Mr. JOHNSON. As to what is harmful in the engines this can be easily spoken to. But the fact that there are ways to make very significant and drastic reduction in motor vehicle emission, the fact we can do that very shortly, we need to do that today. We need to be sure the technology available is able to be practiced and sometimes the use of fuels precludes, does not permit, the use of some of that technology.

Leaded gasoline is one example, in addition to nickel. This precludes, prohibits, prevents the use of these controlled systems. So even an internal combustion engine can be considerably cleaned up through better design, better carburetion, as well as the improved use beyond the system.

Mr. SATTERFIELD. We have a several-pronged thrust, one of which deals with the construction of the engine and whatever devices might be incorporated to clean up the emissions from the exhaust of the engine.

Mr. JOHNSON. You are precisely correct, and the fact that we need to have such a drastic reduction in pollution from motor vehicles means these prongs should be used collectively.

Mr. SATTERFIELD. There has been an awful lot of publicity recently about only one facet of this question and I am referring to lead in gasoline. I am a little disturbed that if we concentrate on this one small facet of this whole problem we might divert research and attention from where it really ought to be. Do you feel there is any danger of this?

Dr. MIDDLETON. I think if we were to direct attention solely on the removal of lead from fuel, I would share your same state of discouragement about going forward, but fortunately, people are now understanding that changes in fuels, whether they be in additives or composition, are a thrust that must be undertaken.

Mr. SATTERFIELD. To get this in more proper perspective, I would like to know just what materials we find in the exhaust of an internal combustion engine? Can it be broken down to coincide with the table attached to your statement? Does this break down into the things that are emitted from the internal combustion engine?

Dr. MIDDLETON. Yes, it gives you the principal categories, rather than the specific compounds. You are primarily concerned with carbon monoxide because of its lethal properties, itself.

Mr. SATTERFIELD. That occurs in burning any gasoline, does it not?

Dr. MIDDLETON. And it is not limited to just the motor vehicle, but since the motor vehicle accounts for three-quarters of the total tonnage in the country today, we are focusing on it at this time.

A petroleum refinery is one example of another source of carbon monoxide, and some other companies that use organic compounds, the steel industry uses that which is often a waste product as a fuel for additional heat and that is a very good way of conserving the waste product, carbon monoxide.

In this case, there has to be a change in the nature of the combustion system. In the case of hydrocarbons, we know it contributes significantly to smog.

Mr. SATTERFIELD. Are these particles left after the burning of the fuel?

Dr. MIDDLETON. The hydrocarbons result from the incomplete burning, that is to say, not all the gasoline put into the engine is completely burned so you get some of the gasoline, itself, coming through unchanged.

Mr. SATTERFIELD. Does this include the oxides like your sulphur oxides and what not?

Dr. MIDDLETON. The sulphur oxides coming from the internal combustion engine are extremely low; the sulphur oxides as a constituent are not very important in the motor vehicle.

Mr. SATTERFIELD. As far as diesel fuel is concerned I understand the amount of sulphur oxide can vary.

Dr. MIDDLETON. On diesel that is another problem.

Mr. SATTERFIELD. Does this come from partial burning of the fuel?

Dr. MIDDLETON. The sulphur oxides from diesel fuel come through the oxidation of the fuel and the sulphur present to produce sulphur oxides. Sulphur oxides are not in diesel fuel as a part of the fuel.

Mr. SATTERFIELD. This comes about by interaction in between the combustion chamber and the exhaust system?

Dr. MIDDLETON. Precisely and the reactive hydrocarbons that are coming from the gasoline fuel are likewise made in the combustion process.

Mr. SATTERFIELD. Nitrogen oxides are they the result of the fuel or the combustion or partial combustion?

Dr. MIDDLETON. As you perhaps know Mr. Satterfield they are the direct result of using air with oxygen in it to support combustion and whenever you have a hot combustion system nitrogen being present, depending upon the temperature, you get more and more nitrogen oxides.

Mr. SATTERFIELD. As I understand the thrust of this argument it is that one of the chief objections to lead as an additive is the effect it might have on one specific system that might be used to clean up some of these exhaust substances, is that a correct statement?

Dr. MIDDLETON. That is a part of the statement. There is concern about lead itself, not only the impact of lead in fuels upon combustion but the fact that the lead burden in people, the amount of lead in your body and mine, depends upon where we live. We know the amount of lead in persons who live in urban areas is higher than in those who live in rural areas, unless there are particular foodstuffs or water in those areas that contribute more to the air.

Mr. SATTERFIELD. You are talking about lead that is actually emitted into the air from exhaust?

Dr. MIDDLETON. I am talking about lead added to gasoline used in the internal combustion engine coming out of the exhaust pipe comprising about 80 percent, perhaps, of the lead compounds emitted into the air, the fact that a high percentage of those particles are very small in size and stay airborne for long periods of time and because they do stay airborne they go many places and because they are airborne means they are small; therefore they are inhalable, so they can be absorbed into the body system.

Mr. SATTERFIELD. Don't you think it is possible that a device could be perfected with the proper research so as to trap this in the exhaust so it would not be emitted?

Dr. MIDDLETON. Not only is it possible there are today such systems under tests by two of the principal lead manufacturers. This is an added piece of paraphernalia which could be put on a car. Its survival rate would have to be tested and whether it is an economically feasible way as a trade-off would have to be considered.

Mr. SATTERFIELD. I understood from the statement delivered this morning, and I don't know whether you care to answer this or not, that one of the main reasons for the thrust against lead emanates with the suggestion that the catalytic device to remove some of these harmful pollutants from the exhaust won't work with leaded gasoline; is that an accurate statement?

Dr. MIDDLETON. That is an accurate statement, and it has a considerable history behind it. I think those of you who have been able to follow the State of California's interest in these systems back in the early 1960's realize the catalyst system at that time did not survive in the presence of leaded fuels.

Mr. SATTERFIELD. Is the catalytic system the only system that we can possibly develop to accomplish this objective?

Dr. MIDDLETON. It certainly is not the only system we could use. It is a very appropriate question you are raising, it is a very important point to be made, and I think people should understand very, very clearly that motor vehicle emissions can be reduced with leaded fuels; but let us look at the problem further, Mr. Satterfield, and that is whereas we have not been able to show direct adverse health effects to man from the lead in the atmosphere, we have been showing that lead emitted from motor vehicles into the atmosphere now shows up in many, many places and of real concern is the impact of lead upon the environment and living things in it.

There may be some very subtle effects of lead upon man, and these are under study. When the Department of HEW publishes its criteria on lead next year, it will be enunciated very clearly. Let me call your particular attention to the fact that there is clear evidence that lead appears in the soils where the rivers dump their burden into the sea, and there is very clear evidence that commercial fish are found with higher lead levels than they had formerly.

So, one has to look at what one adds to fuels not only from standpoint of the pollution problem that may be the direct result of the automobile and the internal combustion engine system but, also the impact of those additives, in turn, upon other facets of the environment. I would urge you to give consideration to the fact that lead is now world wide in its distribution; it has gone to many places where it normally is not found.

Mr. SATTERFIELD. We are talking about only one of the things we have to control.

Mr. JOHNSON. We are talking precisely about the fact that the President's message on the subject of the total environment is something of moment today.

Mr. SATTERFIELD. It was my feeling, my understanding, maybe I am wrong, that the catalytic device we are talking about was not designed to remove lead particles from the exhaust but to remove the other harmful pollutants from the exhaust; is that correct, or am I wrong?

Dr. MIDDLETON. That is correct. The presence of metals, and may I add again, it is not just lead, we are concerned with these kinds of materials as a class as they adversely effect the catalytic system. They just make it inoperative in a very short period of time.

Mr. SATTERFIELD. If you had to get rid of the lead in order to improve the catalytic device, isn't it a fact that you are going to have to put something else back in your gasoline to get the octane up to where the vehicle would function?

Dr. MIDDLETON. This would be true for the kinds of automobiles we are manufacturing today.

Mr. SATTERFIELD. Is any study in prospect to determine whether or not by the addition of these aromatics we might be creating more harmful effects in terms of other pollutants than we have in the existing fuel?

Dr. MIDDLETON. I am very happy to say that this has been a problem that has been thought of for some years, and our organization, with the help of the Bureau of Mines of the Department of the Interior has been looking at the kinds of materials that might replace lead, but more importantly, at the impact these kinds of replacement compounds would have on the nature of exhaust and the quality of exhaust. Normally, one would expect the substitution, let's change it not to replacement of lead but to have a high octane in the absence of fuel additives, one would turn to a variety of aromatic compounds. Many of these aromatic compounds are reactive, and there is evidence to show that by adding certain aromatics one could expect a smog problem from the chemical reaction to increase, based on the experimental results.

Mr. SATTERFIELD. We really don't have the answer on that at the moment?

Dr. MIDDLETON. Yes, we do. When Mr. Johnson mentioned the Secretary having more stringent standards published in the Federal Register on February 10 of this year, it was also mentioned in that same publication that we would change the nature of the test system and use a different measuring system for the hydrocarbons; that is to say, we would be looking at their reactivity, so that any change in the fuels that are used, substitution of aromatics, as you are suggesting, for removal of lead, would have to consist of the kinds of aromatic compounds that would not increase the hydrocarbon emissions, and further, let me point out that the catalytic systems that might be employed are particularly susceptible to knocking out these reactive compounds.

So, while you can demonstrate the addition of certain aromatics does increase the reactivity for smog potential, at the same time the very systems for which you are taking lead out assure the removal of those reactive compounds prior to emission into the air.

Mr. SATTERFIELD. Aren't there other solutions that could also achieve the same result as these catalytic devices would achieve?

Mr. JOHNSON. Some of those thermal reactors are effective.

Mr. SATTERFIELD. We could experiment with them and perhaps develop satisfactory devices?

Dr. MIDDLETON. The duPont Co., as you know, has had a very active program in developing a thermal reactor. It is a very effective system. I have seen it and some of its results. We are so enthusiastic about the prospect of a thermal reactor that, through a transfer of funds to NASA, we have asked them if they would look into the kinds of heat resistant materials that could be used to allow us to use cheap materials in these thermal reactors. What we find is that the leaded fuel is very often erosive, so even though the thermal reactor can be used with the leaded fuel, so far as getting out the hydrocarbons is concerned, we have the technical problem of erosion because of materials in the fuel.

Mr. SATTERFIELD. One thing that bothers me and maybe the answer to this question might clarify some of it, we are talking now about possibly going to non-leaded gasoline and in this respect, we are, really talking about favoring, for the present, at least in the interim period, a catalytic device. I wonder whether or not your Department or any Department in HEW has attempted to gather any information with respect to the economic impact on industry and on the public because I think the Government is going to have to help carry the load of the immense cost of this thing, between going to non-leaded gas right now and developing a catalytic device right now as opposed to perhaps developing some other device that would accomplish the same result. Do we have any studies showing the relative costs of the two?

Dr. MIDDLETON. Yes, we do, but because we do not have all this expertise within the National Air Pollution Control Administration, we have asked the Department of Commerce if, through its Technical Advisory Board, it would look into the social-economic impact of a fuel additive change.

Mr. SATTERFIELD. Have they made a report?

Mr. JOHNSON. They are in the process of gathering information. I understand members of the Board are in California yesterday and today. At the meeting, the Chairman spoke of, with Governor Reagan and we are in the process of having a very animated activity in our organization seeking the answers to questions you have raised.

Mr. SATTERFIELD. It would seem to me these answers would be most helpful to this committee if we are going to proceed to implement legislation which is going to deliver into the hands of your Department the discussion as to what fuel will be permitted.

Dr. MIDDLETON. We agree this information is needed.

Mr. SATTERFIELD. The reason I raise the question, is because in the past week it was estimated that it would cost the fuel industry over \$6 billion just to convert to the production of lead-free gasoline. That is a tremendous amount of money.

Dr. MIDDLETON. But the other side of the coin may be the fact that the removal of lead will have a number of other cost benefits, and the real cost to the consumer may be a very, very small figure because of the savings in motor vehicle maintenance, spark plugs, a whole variety of things; so whereas it is a very sizable figure for the conversion of a capital investment to take lead out of gasoline, the real cost, the cost we people pay, may be very small.

Mr. SATTERFIELD. That is why I think we would be interested in this information. I hope it will be developed before these hearings are over.

Mr. Chairman, I do have other questions, but I will ask them later.

Mr. JOHNSON. I would like to amplify for Mr. Satterfield's benefit one aspect of the cost benefit problem. I think Dr. Middleton pointed out quite ably that while we are concerned with lead in terms of its effect on control devices which might be placed on automobiles we have an overwhelming interest also in lead as a pervasive agent in the environment, and we are not as much concerned about whether or not they have a device that will contain the lead in the car or whether we take the lead out of the gasoline but the fact is very apparent we have to take the lead out of the environment.

We certainly would welcome any research or any device that could do this, recognizing that the ultimate objective is to cleanse the environment, whether we are talking about hydrocarbons or nitrogen oxides coming out of the exhaust, but whether we are talking about just lead as an agent in the environment.

Mr. SATTERFIELD. This is precisely what I was getting at when I expressed the fear that if we concentrate on one aspect of this problem, taking the lead out of the fuel, we might ignore the other part which, I think, probably in the long run, would be the most effective.

Mr. JOHNSON. I don't think we have quite the long run that some people might consider, and there are things that we can do now. I think, as Dr. Middleton has said, if we balance the sheet in terms of all the effects, that perhaps we should not wait until that last vestige of research information is available as to which is the better. I think that we need to move now in order to reduce the air pollution in all of its aspects with the current technology.

Mr. ROGERS. Mr. Nelsen?

Mr. NELSEN. Thank you, Mr. Chairman. Has there been any thought given to the vehicles on the street that are worn out and are pumping oil and exhaust fumes? Has there been any thought given to a program which would provide for examination of automobiles that are in bad mechanical condition?

Mr. JOHNSON. Yes, that has been thought of. The current legislation we operate under applies essentially to new vehicles. We have had discussions with some States that are considering inspection programs, and perhaps again Dr. Middleton might want to amplify this kind of thing.

Mr. NELSEN. I notice it has been suggested that in view of the large supply of agricultural products that alcohol from corn could be mixed with fuel for motor vehicles. Has there been any experimentation in that direction, to your knowledge?

Dr. MIDDLETON. Yes, there has been experimentation with this, in fact, alcohol is sold today during the winter months, particularly, to take the water out of gasoline. That is the precise difficulty of adding alcohol to gasoline, that it allows water to mix with gasoline. Adding it to improve gasoline has been long thought of, and using alcohol only as a fuel has been considered, but because of this technical difficulty, not much serious attention has been given, apart from the difficulty of cost structure.

Mr. NELSEN. The cost would be quite high, would it not?

Dr. MIDDLETON. That is the present speculation.

Mr. NELSEN. Concerning these after-burners that were demonstrated here, I inquired as to their mechanical operation. As I understood it, the carburetor mixture had to be turned to a richer mixture in order to permit enough exhaust fumes carrying the burnable exhaust to ignite and keep the after-burner burning. I asked whether this would cause the mileage of the automobile to be reduced materially, and they said that it would. It would seem to me if the mileage that you get out of that motor is reduced materially there would be difficulty in getting the people to use it.

Has there been any thought given to that?

Dr. MIDDLETON. Yes, there has, and that is one of the disadvantages of running a fuel rich system which, as you so well point out, is a

requirement of a thermal reactor. The trend among motor vehicle manufacturers is away from rich carburetion to lean carburetion and, perhaps, even away from the use of carburetors so you can manipulate fuel air ratios in a much more critical way.

Mr. ROGERS. Mr. Hastings?

Mr. HASTINGS. Thank you, Mr. Chairman.

As a general question, do you consider the environmental problems of the country in a crisis proportion at this point in time?

Mr. JOHNSON. I have said in many speeches, Mr. Hastings, that I think the environmental problem as a crisis, its time has come. I don't take the same viewpoint that some may that we have 35 to 100 years before we can expect the extinction of man, if we don't do something.

I think we are at a critical point where we are beginning just to talk about a time and maybe not a specific time within which we have to really make some very definite decisions. I do think we are at a point of crisis as far as the environment is concerned, certainly in terms of very highly industrialized urban complexes that 70 percent of our citizens live in.

Mr. HASTINGS. Is it your opinion the consideration of this committee and the action as to your Department should be viewed in light of the fact that we are in a crisis in our environment in this country?

Mr. JOHNSON. Very definitely so.

Mr. HASTINGS. In 1975, is there any combination of circumstances, money, legislation, or encouragement by the industry that you feel could allow those standards to be had at an earlier date?

Mr. JOHNSON. We went to the 1975 date, Mr. Hastings, on a very calculated and considered path in that we thought that this would give the industry opportunity, both to react, it would give them an opportunity to act on a predetermined standard without a year-to-year change of direction, which was the original basis on which we approached automobile control emission.

We believe this can be done within the technology that does exist or can exist by that time. We think this is the most reasonable date we ought to look to.

Mr. HASTINGS. There is no set of circumstances, money or development in private industry that would allow it to come sooner?

Mr. JOHNSON. Certainly, I believe that anybody can put a man on the moon in 10 years, as we did in this country, that there are a set of circumstances in which we could do this earlier.

Mr. HASTINGS. I understand, of course, the difficulties and I am not critical of your people or the industry.

Mr. JOHNSON. Whether or not it is practical is a different thing.

Mr. HASTINGS. Now, on the question of leaded gasoline, I would like to be nontechnical in an explanation of the relationship between leaded gasoline and octane ratings and the horsepower of engines.

Mr. JOHNSON. I will ask Dr. Middleton to respond to that.

Dr. MIDDLETON. The compression ratio of engines having gone up to produce more highly powered engines has required that the octane of fuels be high. In order to jack up the octane of gasoline, the easiest way to do this is by adding lead. You can take a fuel and add lead and get better ignition, higher octane effectiveness out of it. The problem, then, if one is to take lead out of gasoline for environmental and air

pollution control reasons, how does one substitute octane? One has to substitute it through the aromatic changes, and that can be done, but you only need to do that for existing engines, because the automobile industry says it is prepared and will manufacture lower compression engines. That means we will not have the need or demand for high octane gasolines other than for the old cars, so there should be a phase-out program which would allow the owner of the old high compression car to alter his car or use a substitute fuel for a period of time.

Mr. HASTINGS. The lower the horsepower the lower the combustion ratio and that partially solves the problem.

Dr. MIDDLETON. Yes, it may be lower horsepower, but their effectiveness may not be changed. Let's not be trapped in the question of whether we are giving up power by changing the present ratio; we may merely be changing the rate at which we achieve certain speeds.

Mr. HASTINGS. You are satisfied the companies will be able to produce this kind of engine?

Dr. MIDDLETON. I have no questions and no doubt at all that this can be done, and I also think with the interest Mr. Johnson expressed of the public looking at the environment crisis issue, the public is prepared to use such vehicles.

Mr. HASTINGS. On page eight, you referred to the research development and also mentioned stimulating non-Governmental effort. Is there any suggestion that there might be a way that Congress could encourage a broader use of the private sector in this research and development at the present time and is there any method we can encourage the broader use of research at the private level?

Mr. JOHNSON. Certainly, through an incentive plan of R. & D. we can encourage the private sector to involve themselves in this kind of a problem. I think, by and large, even an expression of the will on the part of the people through the Congress, and I think industry by and large responds to the will of people, this will have a salutary effect in terms of generating the kinds of responses needed.

Certainly, in terms of the bill that is now before the Senate, I believe it is the Magnuson bill on incentives for government purchase, this will have, I think, some effect. Whatever we can do to stimulate independent research by other than the so-called big four of the automobile industry, and to hasten the application of such technology as might be generated through this channel, I think, would have a good effect as far as getting private industry involved in this type activity.

Mr. HASTINGS. Thank you. No more questions.

Mr. ROGERS. Mr. Johnson, I notice you say certain oil companies have indicated they would be glad to work on a program of taking lead out of gasoline with the automobile companies and that the Department is doing something to get them together. What has been done for the Department? Have you actually called them together for a conference and had them meet together?

Mr. JOHNSON. We are investigating the possibility of doing that at this time, Mr. Chairman. As you will recall, we have had a communication from you and even before that communication, we were discussing the possibilities of calling both oil and automobile industries together within the Department so we could discuss these common problems, and we believe that something will materialize out of this.

Mr. ROGERS. Are the anti-trust laws the reason this has not been done?

Mr. JOHNSON. Certainly, we would have to discuss this with the Department of Justice before we did it so we could see how we could do it and still be legal, with respect to the anti-trust laws.

Mr. ROGERS. I would have thought this would have been done by now and this would have been checked out with the Attorney General because if necessary, we would have to put it in the provisions in the law so this could be done.

Mr. JOHNSON. We believe we will be able to achieve this without any violation.

Mr. ROGERS. When do you plan these conferences? I think I wired some three weeks ago.

Mr. JOHNSON. The Secretary has been out of town on quite a number of the times. Just as soon as we can have our conference with the Secretary, we do have proposals in his office, and I would expect that we will have an answer on this in the not too distant future.

Mr. ROGERS. It looks to me like Mr. Finch is letting his fellow Californian, Mr. Reagan, get ahead of him. Mr. Reagan has already found time to do it. Can't Mr. Finch keep up with Mr. Reagan?

Mr. JOHNSON. I believe, sir, that my boss, the Secretary, has been very much out in the forefront on this. We have had conversations with the industries separately. Certainly, we have some indication at this point in time, as I indicated in my testimony, of the plans of part of the industry on both sides of the coin and we believe that we will be successful.

Mr. ROGERS. I have not been impressed with the Secretary's efforts in this regard. I have not even heard from the telegram I sent as I recall, some three weeks ago. I would have thought he would have called the industry together and tried to do something. I realize that is not in your prerogative, that is his. But I would hope the Secretary, with the emphasis the President has put on this problem, would begin to move on it in his own schedule.

Mr. JOHNSON. I can assure you that we will move, sir.

Mr. ROGERS. I would like to have some assurances in writing and with some schedule of meetings, if we could.

(The following press release was received for the record:)

[Press release Tuesday, March 24, 1970]

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
OFFICE OF THE SECRETARY,
Washington, D.C.

HEW Secretary Robert H. Finch confirmed today he has urged the chief executives of the Nation's petroleum companies to work toward production of a lead-free gasoline for motor vehicles.

In letters to the executives mailed earlier this week, Secretary Finch said:

"The interstate nature of automobile use and fuel marketing demand a consistent national strategy for dealing with motor vehicle fuels in terms of reducing air pollution.

"In the administration's proposed amendments to the Clean Air Act, currently pending before Congress, we have requested that the Secretary of HEW be authorized to regulate the use of additives in motor vehicle fuels.

"I am hopeful, however, that progress can be made in advance of legislation."

Secretary Finch stressed that his objective is to provide motor vehicles with fuels which will help to ensure the greatest and most rapid reduction in air pollution at the lowest cost to the public.

The Secretary also asked for comments on a suggestion which would involve the marketing of low-lead "regular" gasoline from July 1, 1971 to July 1, 1974, and after that, an unleaded "regular" gasoline.

A leaded premium would continue to be marketed for cars which require high octane gasolines. Automobile manufacturers plan to market vehicles with low octane requirements in the near future.

Secretary Finch noted that a number of the petroleum companies have recognized the need to move toward unleaded fuels and many have recognized the need for Federal leadership in this area.

Copies of the Secretary's letter were also sent to automobile manufacturers and to the heads of companies producing lead additives.

* * *

A copy of the letter is attached.

THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE,
Washington, D.C.

As the President noted in his recent Message to Congress on the Environment, automobile manufacturers are preparing to market cars in the near future that are capable of using low-octane, unleaded fuels.

These manufacturers have stated that to meet the emission standards I intend to prescribe for the 1975 models they must have unleaded fuel. They have also stated that to meet interim Federal and California standards for nitrogen oxides, they must have at least a low-lead fuel.

A number of the petroleum companies have recognized the need to move toward unleaded fuels. Some have already announced plans or a willingness to make unleaded fuels available.

The interstate nature of automobile use and fuel marketing demands a consistent National strategy for dealing with motor vehicle fuel in terms of reducing air pollution. Many firms in the petroleum industry have recognized the need for Federal leadership. In the Administration's proposed amendments to the Clean Air Act, currently pending before the Congress, we have requested that the Secretary of HEW be authorized to regulate the use of additives in motor vehicle fuels.

I am hopeful, however, that progress can be made in advance of legislation. As the Cabinet official responsible for the Federal clean air program, I am writing to solicit your views on some of the unresolved questions—such as the timing of lead removal and the number and types of fuels to be marketed. In addition, I would welcome information on your present plans, resources, and problems.

In particular, I invite your comments on one suggested course of action that has been made:

(1) After July 1, 1971, gasoline marketed in the United States would contain no more than 0.5 grams per gallon of lead unless its octane rating were at least 97;

(2) After July 1, 1974, gasoline marketed in the United States would contain no lead unless its octane rating were at least 97;

(3) Gasoline of 97 or greater octane levels would contain up to four grams per gallon of lead so long as the demand for such gasoline existed.

Such a course of action would encourage the marketing of low-lead and then unleaded "regular" grade gasoline which could meet the needs of approximately 60 percent of existing vehicles and an increasing percentage of vehicles as older cars are replaced by new ones with lower octane requirements.

I look forward to receiving your comments on the issues raised in this letter and any alternative proposals consistent with the objective of providing motor vehicles with fuels which will help to ensure the greatest and most rapid reduction in air pollution at the lowest possible cost to the public. I would appreciate a response by April 10.

Sincerely,

ROBERT H. FINCH,
Secretary.

Mr. ROGERS. Now, I notice you said they seem to be waiting on one another, the oil industry and the automobile industry. Now, I have received a statement that was made public by the Ford Motor Company. This is a statement from Henry Ford, II, Chairman of the Board, made on March 3rd. He said we have accelerated our energy

and research work to speed the day when all Ford Motor Company gasoline engines can accommodate unleaded fuel. The progress to date on this work is sufficient that we can now state that about 90 percent of our engines will be ready to operate effectively with non-leaded gasoline at the start of the 1971 model season or the fall of 1970 and the remaining models will be adapted to the use of such fuel within the 1971 model year.

Now, also, General Motors, February 15th, said, all 1971 GM cars will be able to operate satisfactorily on fuel at about 91 research octane number. These vehicles will be able to utilize this fuel by modified engine design. Now, also, yesterday, Chrysler announced that their plan for their 1971 models and American Motors, I understand also, though I do not have before me the statement of Chrysler nor of American Motors.

But here, now, the automobile industry has said we are taking the necessary steps to modify the engines to receive this gas. Now, I know there will be a conversion problem and a significant problem for the oil industry and everyone wants to be reasonable but I do think it is time for us to get some specifics as to when things can be done.

Now, also, I have understood that there is some question as to the figure of conversion, of costly conversion for the oil industry. It is my understanding that one estimate is about \$2 billion, based on the actual conversion figures figured out for California and if this were projected nationwide, this would be a figure somewhere in the region of \$2 billion and not \$6 billion.

I wondered if you have done any research on that.

Dr. MIDDLETON. The studies we have, Mr. Chairman, are those that relate to the materials presented to us by Universal Oil Products, as well as studies in which we participated with the American Petroleum Institute, one being a lower price than the other.

The catalyst system suggested by UOP is said to have cost less than the estimates provided with the API, through the contract they had.

Mr. ROGERS. Now, let me ask you also on the time element. Has the oil industry indicated to you any time element? You have not had a chance to meet with them, I presume.

Dr. MIDDLETON. Mr. Chairman, we have met with individual oil companies, we have not been idle in our work. We have also met with the motor vehicle companies, as you may well surmise, and while there are differences in the capabilities of petroleum companies to meet the octane requirements without lead, I expect no resistance to that being achieved. My answer to you is some companies will be in a better position to move forward than others.

Mr. ROGERS. I am sure that is true, someone would be in a position to move far more quickly.

There is one company presently, I believe, that has on the market non-leaded gasoline; is there not?

Dr. MIDDLETON. That is true.

Mr. ROGERS. But I understand it is only marketed in about 25 states.

Dr. MIDDLETON. But with the prospect of a market for non-leaded fuels, I think you will see many other companies offering non-leaded fuels very shortly.

Mr. ROGERS. You also mentioned that you had consulted the Department of Commerce on some of these factors. Are you waiting for them to give a reply to you?

Dr. MIDDLETON. We have asked the Assistant Secretary of Commerce, Myron Tribus, if he would undertake a study along the lines outlined by Congressman Satterfield. This is to be a high energy input and not a slow academic pursuit. The committee is established, the subcommittee is already appointed. As I told you earlier, Mr. Chairman, they are in California, now, hearing what is going on there. I expect a report to be a short-term one, so we can have the answer for your committee.

Mr. ROGERS. What about Interior's role in liaison with you? Is there any?

Dr. MIDDLETON. Yes, there is. Today there are several people in the audience from the Department of Interior who share my interests in this, and through their laboratory in Bartlesville, Oklahoma, that much of the work I reported on earlier was performed.

So through our liaison with them, through transfer of funds from the Department to the Bureau of Mines, they are able to assist in our studies and they, in turn, have resources themselves to pursue a number of these.

Mr. ROGERS. What about the Department of Transportation?

Dr. MIDDLETON. The Department of Transportation is not involved in this area. We are very hopeful they will bend their efforts to looking at the transportation system.

Mr. ROGERS. I didn't think they were in this either, but I saw in the paper yesterday that they had just let contracts to solve the air pollution problems of buses. Did you see that?

Dr. MIDDLETON. Perhaps I was making my remarks too limited in response to your question.

One of their specific areas of concern, and one in which we share in that concern, is when it comes to mass transportation systems. This is something that they focus on primarily. We work with them in offering our services in the evaluation of emissions and evaluation of systems. There is liaison in that area.

Mr. ROGERS. For air pollution?

Dr. MIDDLETON. From buses, mass transportation systems. We feel where transportation systems, highway design, movement of groups of people, that the vehicle system is of their concern, but when it comes to power plants and distribution of air pollution, that is our concern, so we share in the costs as well as the evaluation of the systems in those specific areas.

When it comes to research and development, the programs that go to the improvement of the internal combustion systems, to the improvement of fuels, this is mainly our problem.

Mr. ROGERS. Let me ask you this: If you could get oil companies and the automobile companies, and it proves to be feasible, say by 1971 or 1972, to bring about a sufficient amount of non-leaded fuels so the automobiles that will be out in 1971 can use that, would the catalytic devices that they have to place on these automobiles bring a more rapid solution of the control of air pollution than your standards set for 1975?

Dr. MIDDLETON. It could bring about a more prompt response to the standards set for 1975.

Mr. ROGERS. We could advance in effect those standards?

Dr. MIDDLETON. Move the whole thing forward and have cleaner air sooner.

Mr. ROGERS. About how much sooner, if we could? Suppose we could get enough gasoline for the 1971 models, what would you estimate this would do in that regard?

Dr. MIDDLETON. Since the standards apply to new vehicles only, and we are shifting from 1975 to 1971, by the hypothetical question phrased here, would mean that we would have a four-year advance, and, therefore, clean the air up four years sooner.

Since it takes roughly ten years, on the average, to have all motor vehicles controlled, I think you can see it would be four-tenths ahead. It would be significant movement.

(The following statement was received for the record:)

LEAD-FREE FUEL AVAILABILITY—MORE STRINGENT EMISSION STANDARDS BEFORE 1975?

A great deal of attention has been focused on recent statements by automobile manufacturers regarding the need for unleaded gasoline if the 1975 motor vehicle emission standards are to be met. Some gasoline manufacturers have expressed a readiness so market lead-free fuel when there is sufficient demand for it. This, in turn, has raised the question of whether the more stringent emission standards now scheduled to go into effect in 1975 could be implemented sooner if lead-free fuel becomes available sooner.

The scheduled reduction of carbon monoxide, hydrocarbon, nitrogen oxides, and particulate emissions to the levels contemplated for 1975 is a complex undertaking. It is expected to require engine redesign, development of new add-on emission control devices, such as catalytic mufflers and/or manifold reactors, plus exhaust gas recirculation systems. Research and development work on such devices and design changes is in progress, but has not been completed; it is not feasible, as yet, to build, on a mass-production basis, automobiles that will meet the 1975 emission standards.

Such work, however, has advanced to a point at which the automobile manufacturers—who are responsible for meeting emission standards—have become convinced that unleaded gasoline will be required if any of the systems that have so far been identified as having a potential of success are to function satisfactorily over an extended period of time. Studies have shown that leaded fuel tends to inactivate the catalysts being considered for use in emission control devices and can corrode and clog non-catalytic emission control devices. Thus, the availability of unleaded fuel has been identified as a significant component of the over-all system that will result in lower emissions; merely keeping lead out of gasolines is not the exclusive "key" which, if achieved, would immediately permit the application of more stringent emission control requirements.

Even if lead-free fuel were such a panacea, shifting the Nation's gasoline production and distribution methods to supply lead-free fuel is not a step that can be taken overnight. Lead as an additive currently is essential to achieve the octane ratings required for existing automobiles. Conversion of both refinery and distribution facilities will require a substantial period of time. It therefore is important to reach early decisions on the gasoline supplies to be available in the future, when new emission control systems are expected to be on new automobiles. The fact remains, however, that accelerated availability of lead-free gasoline cannot, of itself, speed up appreciably the availability of motor vehicles having significantly lower emission rates.

Mr. ROGERS. This would be for the old vehicles?

Dr. MIDDLETON. For gasoline fueled. It would not relate to the diesel fuel car at this time.

Mr. ROGERS. If it were possible for devices also to be placed on used cars, where non-leaded gasoline could be used, this would make it more significant?

Dr. MIDDLETON. I share your interest in having devices for used cars. We have, through our RQD program, tried to elicit interest in doing something for the used car. There are some things that do appear to have practicality in this area, but there is still yet much more work that needs to be done.

Mr. ROGERS. You are doing research on this now, are you not?

Dr. MIDDLETON. The private sector is primarily concerned with the development of systems for used cars and there are some things that do hold promise. It would be incorrect for me to leave an optimistic view, at this time. I want to leave the word that, yes, there are some areas in the private sector that do have systems that look very interesting, and some are now being tested to see whether they are worthy of application on used cars.

Mr. ROGERS. Are there about 9 million cars produced each year?

Dr. MIDDLETON. About.

Mr. ROGERS. From what date have you had requirements for regulations to begin to clean up the pollution?

Dr. MIDDLETON. The 1968 models were the first models to be cleaned up, based on a national program. The State of California was ahead of that by two years. So the State of California began in 1966, and they, therefore, have more than one-half of their population controlled at this time.

Mr. ROGERS. And we have what?

Dr. MIDDLETON. We have about three years' worth, which is about a third of the population.

Mr. ROGERS. About one-third that have these devices.

Now, how many of these cars have you tested to see if these devices that you have required are working according to Federal standards to assure the public is getting the performance they should?

Dr. MIDDLETON. I have no new data today, beyond that which I gave at your previous hearing. There have been some additional tests, but the information is not available at this time.

Mr. ROGERS. About how many did you test?

Dr. MIDDLETON. About 1,500. Approximately 8,000 have been tested by the State of California, with Federal support.

Mr. ROGERS. Of course that is not very many to have tested yet, but I realize your problem has been going for a short time.

Dr. MIDDLETON. We are sorry our resources are limited and don't allow us to do more, but the fact that with so few being tested, so poorly, I think, is of significance.

Mr. ROGERS. What is the average cost of the devices that have been required to be placed on, would you say?

Dr. MIDDLETON. I would like to correct the idea that it is a device or a thing; it is really a number of items that are installed in a motor vehicle and most of them are very integral parts of the engine, so the cost varies, depending upon the approach used by the motor vehicle company.

Mr. ROGERS. Now, I had understood that there were some devices that could be placed on, types of mufflers, is it?

Dr. MIDDLETON. There are no types of mufflers being used at this time to control the exhaust emissions from motor vehicles. The single entity that is a device for a control of pollution is the blow-by valve, and certainly that should not cost more than \$2 to \$3.

Mr. ROGERS. Is there a report that states that 53 percent of those devices are not meeting Federal standards and are wearing out in less than 12,000 miles?

Dr. MIDDLETON. If there is any blow-by device that wears out in less than 12,000 miles, the motor vehicle companies have made very poor advertising.

Mr. ROGERS. I said, Is there a report?

Dr. MIDDLETON. I am not aware of such a report.

Mr. ROGERS. Have you heard of such a report?

Mr. JOHNSON. No.

Mr. AUERBACH. No, I have not heard of such a report.

Mr. ROGERS. What about the engine modification and air engines?

Dr. MIDDLETON. What is that?

Mr. ROGERS. On the engine modification to various ways of accomplishing cleaning up this air pollution; the air engine system along with the engine modification. I think Chrysler has come up with this system, have they not?

Dr. MIDDLETON. To generalize, there are basically two kinds of approaches; one being to add supplementary air to burn up the materials after they leave the combustion chamber, the other to operate the engine on the lean side and not make so many emission products in the first place.

Chrysler, Ford, and, I believe, General Motors, now are using the lean side approach. There are some cars that use air injection as a way of controlling their pollution. It has all of the errors of a general statement, but essentially that is the route taken.

Mr. ROGERS. Have you done any surveys on a comparison of the methods?

Dr. MIDDLETON. Yes.

Mr. ROGERS. What is the result?

Dr. MIDDLETON. The results essentially show no real difference between them. There are more differences between makes and models than there are between the two kinds of systems, so it is the applicability of the system to the model rather than whether it is the air injection or lean air mixture.

Mr. ROGERS. Do you feel the automobile companies now are doing all they can to try to respond to this problem of air pollution?

Dr. MIDDLETON. I can report my real pleasure in this recent spurt, which is a way of showing that whenever there is a necessity shown, there is always more energy available to be applied.

Mr. ROGERS. Now, I notice in the President's message and in your testimony, you talk about standards for fuels as well as standards for the automobiles themselves.

What do you have in mind as far as standards for quality of fuel or components of fuel? Could you explain this to us?

Dr. MIDDLETON. What we have in mind, generally, Mr. Chairman, is that we look both at the additives in fuels and the composition of fuel itself, and in the case of additives, I think we have explored this in the sense of what metals are being added, what kinds of detergents, perhaps, should be added, Those kinds of things that are not hydrocarbons in themselves should be scrutinized to see if they contribute to pollution.

The other part of the answer to your question is the composition of the fuel itself, should we regulate the volatility of the fuel so we would be assured that there would not be a loss to the open air from the transfer of fuel, the storage of fuel, be it in the gas station, the refinery, or the motor vehicle, and perhaps more importantly, the actual composition of the hydrocarbon ingredients in the fuel, what kinds of aromatics can be safely used.

We must be assured that the aromatics we use are not polynuclear in nature and go through the engine unburned. This is the nature of our concern about fuel composition.

Mr. ROGERS. What research have you been doing on this?

Dr. MIDDLETON. There has been a good deal of research in this field, and again much of it has been done in concert with the American Petroleum Institute and the Bartlesville Laboratory of the Bureau of Mines, the reactivity studies of our own group in Cincinnati, Ohio, and through our research grants program in a number of institutions.

They have also been doing some reactivity studies by contract to a number of institutions so we will know if organic solvents used in the paint and varnish business are of concern. So we are being sure we talk about the whole hydrocarbon program and not solely the motor vehicle.

Mr. ROGERS. What are the present additives in gasoline? What do you classify as additives now?

Dr. MIDDLETON. I am unable to give you a complete listing of additives to gasoline. Many of them are commonly known. There are certain nickel compounds used by some oil companies as fuel additives, and there are a variety of compounds which are used either as antirust or easier fuel-flow compounds, and I am not in a position to enumerate these for you.

Mr. ROGERS. Is it because you have no knowledge of these, of all of the items that are used for the oil companies? Is that the reason or what?

Dr. MIDDLETON. We have not been able to proceed with the development of a registration system for gasoline and fuel at this time.

Mr. ROGERS. Do you contemplate this under the proposed law?

Dr. MIDDLETON. Under the proposed law, we could contemplate the registration and regulation of such fuel additives, and then there would be promulgation of rules and regulations concerning it.

Mr. ROGERS. How long would you anticipate, if the law is passed?

Dr. MIDDLETON. We do not have the authority to regulate the composition of fuel nor the additives in that fuel.

Mr. ROGERS. If the law were passed, what time element do you think there should be before you begin to set standards?

Dr. MIDDLETON. We could promulgate regulations for such items within a very short period of time, because of our having looked at the problem for some months with regard to its nature and ways in which we could acquire the information.

In a very few months, I would say mostly the time would be that, Mr. Chairman, required to issue proposed rulemaking, the appropriate time for comments, and then the time for the Secretary to promulgate the rule.

Mr. ROGERS. Have you yet furnished for the committee all of your contracts for research and your various subject matters of research in the funding of those projects?

Mr. AUERBACH. If there was a request at the last hearing for a list of contracts, I must have missed it. We are in the process of developing the materials that were requested and if you would like to have a list of our current research contracts, we can have that.

Mr. ROGERS. I think it would be well, and the subject matter and the time involved.

(The following information was received for the record:)

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS

| Contractor and contract No. | Purpose | Project officer and division | Amount |
|---|---|------------------------------|------------|
| Aerojet General Corp., El Monte, Calif., PH 86-68-77. | Applicability of aqueous solutions to the development of new processes for removing SO ₂ from flue gases. | G. L. Huffman (PCE). | \$436, 598 |
| Aerojet General Corp., El Monte, Calif., CPA 22-69-22. | Systems evaluation of retuse as a low sulfur fuel. | R. C. Lorentz (PCE).. | 344, 970 |
| Air Pollution Control Association, Pittsburgh, Pa., PH 86-66-96. | Provide abstracts and indexing terms of current literature on air pollution relating primarily to the engineering and physical sciences. | O. E. Houston..... | 204, 400 |
| Air Preheater Co., Inc., Wellsville, N.Y., PH 22-68-51. | Evaluation of fabric filter as chemical contactor for control of sulfur dioxide from flue gases. | D. L. Harmon (PCE). | 135, 705 |
| Alabama, University of, Birmingham, Ala., PH 86-67-39. | Alabama respiratory disease and air pollution study. | O. Celefiore (HER)... | 130, 522 |
| Albany Medical College, Albany, N.Y., CPA 22-69-10. | Detection of hearing impairment by exposure to carbon monoxide. | W. J. Baldrige (HER). | 45, 000 |
| Albert Einstein College of Medicine of Yeshiva University, Bronx, N.Y., PH 86-66-122. | Perform an epidemiological study of air pollution in New York City. | W. Rigger (HER).... | 174, 221 |
| Allied Chemical Corp., Morristown, N.J. PH 22-68-24. | Development of new processes for removing SO ₂ from flue gases. | G. L. Huffman (PCE). | 329, 225 |
| American Boiler Manufacturers Association, Newark, N.J., CPA 22-69-133. | A guide to good practice for Federal facility oil burning units. | J. O. Copeland (abatement). | 31, 522 |
| American Redietion Research Corp., Cleveland Heights, Ohio, CPA 22-69-160. | Biotelemetry system for rhesus monkey electroencephalograms. | B. L. Johnson (HER). | 51, 530 |
| Automotive Research Associeles, Inc., San Antonio, Tex., CPA 22-69-140. | Study of relationship of engine deterioration to exhaust emissions. | R. E. Kruse (MVPC).. | 48, 868 |
| Babcock & Wilcox Co., Cincinnati, Ohio, PH 86-67-127 | Pilot plant investigation to evaluate potential of direct limestone-dolomite additive injection for control of sulfur dioxide from combustion flue gas. | R. H. Borgwardt (PCE). | 379, 814 |
| Babcock & Wilcox Co., Philadelphia, Pa., CPA 22-69-162 | An aqueous slurry scrubbing pilot plant study. | G. Huffmen (PCE)... | 257, 900 |
| Berringer Research Ltd., Rexdele, Ontario, PH 22-68-44 | Test program of optical measurement of SO ₂ and NO ₂ . | J. S. Nader (C. & P.). | 74, 342 |
| Battelle Memorial Institute, Columbus, Ohio, PH 86-67-115 | Reaction kinetics of limestone dolomite with sulfur dioxide in a disperse solid contactor. | R. H. Borgwardt (PCE) | 385, 340 |
| Battelle Memorial Institute, Columbus, Ohio, PH 22-68-65 | Systems analysis study of the integrated iron and steel industry. | N. Plaks (PCE)..... | 280, 279 |
| Battelle Memorial Institute, Columbus, Ohio, PH 86-68-84 | Performance of scientific, engineering, technical, and related services. | O. R. Monti (PCE)... | 290, 000 |
| Battelle Memorial Institute, Columbus, Ohio, CPA 22-69-33 | Electron microprobe analysis of atmospheric aerosols. | J. Wagman (C. & P.). | 12, 295 |
| Battelle Memorial Institute, Columbus Laboratories, Columbus, Ohio, CPA 22-69-110 | Development of a rapid survey method of sampling and analysis for asbestos in ambient air. | R. J. Thompson (AQEO). | 39, 245 |
| Battelle Memorial Institute, Columbus, Ohio, CPA 22-69-146 | A survey and economic assessment of the effects of air pollution on elastomers. | J. Spence (EER)..... | 30, 705 |
| Battelle Memorial Institute, Columbus, Ohio, CPA 22-69-147 | Combustion research planning study..... | K. Jones (OST)..... | 157, 600 |
| Battelle-Northwest, Richland, Wash., -68-61 | Investigate the oxidative nature of air pollutants and their mechanism of effecting obstructive respiratory diseases. | S. O. Lee (HER)..... | 216, 752 |
| Battelle-Northwest, Richland, Wash., CPA 22-69-150 | Study of SO ₂ precipitation washout..... | C. R. Hostler (MeL).. | 175, 150 |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS—Continued

| Contractor and contract No. | Purpose | Project officer and division | Amount |
|---|---|------------------------------|-----------|
| Battelle Memorial Institute, Columbus, Ohio, CPA 22-69-153 | Study of the nature of the chemical characteristics of particulates collected from ambient air. | R. Thompson (AQED). | \$49,388 |
| Battelle Memorial Institute, Columbus, Ohio, CPA 22-69-157 | Fossil fuel cost-availability models for air quality regions. | R. Jameson (OPD).... | 143,280 |
| Bechtel Corp., San Francisco, Calif., PH 22-68-67 | Prototype study of limestone scrubbers for sulfur dioxide and dust removal systems. | R. E. Harrington (PCE). | 1,033,439 |
| Befco Pollution Control Corp., Paterson, N.J., CPA 22-69-143 | Study of pulsed power supply for electrostatic precipitator. | T. Davitt (PCE)..... | 20,255 |
| Bendix Corp., Ann Arbor, Mich., CPA 22-69-55. | Long-path spectrophotometric instrumentation for in-situ monitoring of gaseous pollutants in the urban atmosphere. | J. Nader (C. & P.)... | 113,950 |
| Bituminous Coal Research, Inc., Monroeville, Pa., PH 86-67-139. | Evaluation of coal-cleaning methods and techniques for removal of pyrite sulfur from fine size coal. | T. K. Janes (PCE)... | 221,034 |
| Booz Allen & Hamilton, Inc., Washington, D.C., CPA 22-69-103. | A study to determine residential soiling costs of particulate air pollution. | L. Johnson (EER).... | 86,645 |
| California State Department of Public Health, Berkeley, Calif., PH 86-68-35. | Preparation of reports and technical review of PHS reports. | R. Larsan (CS)..... | 206,711 |
| California State Department of Public Health, Berkeley, Calif., CPA 22-69-96. | Hemagglutination inhibition and complement fixation testing of blood samples. | M. Pearlman (HER)... | 20,540 |
| California, University of, Irvine, Calif., PH 86-68-28. | Basic curriculum in air pollution and its control, developed in computer-assisted learning mode. | C. R. Sleva (OMD)... | 234,612 |
| California, University of, Riverside, Calif., PH 86-68-70. | Conduct studies of effects of toxicity of photochemical atmospheres for experimental animals. | F. G. Huetar (HER)... | 128,228 |
| California, University of, Riverside, Calif., PH 86-68-71. | Conduct studies on the effects of air pollutants on plants and aerometry. | W. W. Heck (EER)... | 129,615 |
| Carnegie-Mellon University, Pittsburgh, Pa., PH 22-68-38. | Study of sulfur dioxide sorption by macroreticular ion exchange resins. | J. P. Earhart (PCE)... | 30,643 |
| Chemical Construction Corp., New York, N.Y., CPA 22-69-81. | Engineering analysis of emissions control technology for sulfuric acid manufacturing process. | W. G. Tucker (PCE)... | 69,660 |
| Chemical Construction Corp., New York, N.Y., CPA 22-69-151. | High sulfur combustor study | T. K. Janes..... | 216,601 |
| Children's Cancer Research Foundation, Inc., Boston, Mass., CPA 70-17. | Carcinogenic studies on atmospheric pollutants. | D. L. Coffin (HER)... | 143,000 |
| Cincinnati, University of, Cincinnati, Ohio, PH 86-67-68. | Eye irritation study | V. A. Newill (HER)... | 29,039 |
| Cincinnati, University of, Cincinnati, Ohio, PH 22-68-28. | Surveillance of air and population lead levels. | R. J. M. Horton (HER). | 69,414 |
| Cincinnati, University of, Cincinnati, Ohio, CPA 22-69-48. | A comprehensive annotated lead bibliography. | J. A. Brown (DTIP)... | 74,826 |
| Cincinnati, University of, Cincinnati, Ohio, CPA 70-14. | Symposium on evaluation of subclinical effects of lead (NAPCA, API, and ILZRD). | R. J. M. Horton (HER). | 3,755 |
| Columbia University, New York, N.Y., CPA 22-69-97. | Panelists as substitutes for taxicab drivers in studies of exposure to CD. | V. A. Newill (HER).... | 14,600 |
| Com-Shara, Inc., Ann Arbor, Mich., CPA 22-69-61. | Automotive pollution index monitor computing system (time sharing computer services). | A. D. Matzo (MVPC). | 12,000 |
| Consolidated Engineering Technology, Inc., Mountain View, Calif., CPA 22-69-70. | Investigation of a substitute fuel to control automotive air pollution. | S. L. Quick (MVRD)... | 42,269 |
| Copley International Corp., La Jolla, Calif., CPA 22-69-50. | Studies to assess the social and economic impact of odors—national survey of the odor problem. | D. Gillette (EER).... | 71,575 |
| W. E. Davis & Associates, Leawood, Kans., CPA 22-69-131. | National inventory of sources and emissions of cadmium, nickel, and asbestos. | C. Spangler (AQED) | 35,705 |
| Doughboy Industries, Inc., New Richmond, Wis., CPA 22-69-94. | Evaluation of Doughboy Industries control system. | M. A. Coggiano (MVPC). | 80,000 |
| The Dow Chemical Co., Midland, Mich., CPA 22-69-144. | Feasibility study and analysis of air pollutants by microwave spectroscopy. | J. A. Hodgeson (C. & P.). | 40,828 |
| The Dow Chemical Co., Midland, Mich., CPA 22-69-145. | Determine effect of fuel additives on the chemical and physical characteristics of particulate emissions in automotive exhausts. | J. Wagman (C. & P.). | 104,000 |
| Duke University, Durham, N.C., CPA 22-69-105. | A biochemical, histological, and clinical investigation of humans with air pollution related diseases and animals following exposure to air pollutants. | S. D. Lee (HER)..... | 72,448 |
| Duke University, Durham, N.C., CPA 70-14. | EEG effects of exposure to low levels of CO in humans. | P. Lavitt (HER)..... | 22,610 |
| Dunlap & Associates, Darien, Conn., CPA 22-69-123. | Study of classroom learning, comfort and behavior and of student health and absenteeism among climate-controlled and other schools. | R. J. M. Horton (HER). | 31,514 |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS—Continued

| Contractor and contract No. | Purpose | Project officer and division | Amount |
|---|--|--|-----------|
| Environmental Engineering, Inc., Gainesville, Fla., and J. E. Sirrine Co., Greenville, S. C., CPA 22-69-18. | System analysis study of emissions control in the wood pulp industry. | W. G. Tucker (PCE), F. L. Bunyard (EER). | \$380,307 |
| Environmental Research & Applications, Inc., Stamford, Conn., CPA 22-69-152. | Document on control techniques for odorous air pollutants. | J. D. Copeland (abatement). | 86,268 |
| Ernst & Ernst, Washington, D.C., PH 22-68-29. | Analytic studies in air pollution..... | R. Smith (DPD)..... | 299,200 |
| Ernst & Ernst, Washington, D.C., CPA 22-69-17. | Cost effective air pollution control report.... | P. H. Gerhardt (DPD). | 9,855 |
| Esso Research & Engineering Co., Linden, N.J., PH 86-67-130. | Fluidized bed contactor for reaction of SO_2 in flue gas with limestone-base material. | J. S. Bowen (PCE)... | 272,074 |
| Esso Research & Engineering Co., Linden, N.J., PH 22-68-55. | Systems study of nitrogen oxides control methods for stationary sources. | T. C. Gilman (PCE).. | 363,154 |
| Esso Research & Engineering Co., Linden, N.J., CPA 22-69-56. | Study of gasoline composition and vehicle exhaust gas polynuclear aromatic content. | T. W. Stanley (C. & P.). | 32,879 |
| Esso Research & Engineering Co., Linden, N.J., CPA 22-69-88. | A profile study of air pollution control activities in foreign countries. | B. L. Evans (DTIP).. | 74,493 |
| Esso Research & Engineering Co., Linden, N.J., CPA 22-69-89. | A feasibility study on the control of nitrogen oxides in automotive engine exhaust. | H. A. Ashby (MVPD). | 98,180 |
| Esso Research & Engineering Co., Linden, N.J., CPA 22-69-154. | Air pollutant and meteorological instrumentation R. & D. planning and programing. | R. Kirk (DPD)..... | 131,350 |
| Ethyl Corp., Ferndale Mich., CPA 22-69-66. | Study of the interactions of fuel volatility and automotive design as they relate to driveability. | G. Kittredge (MVRD). | 62,348 |
| Florida, University of, Gainesville, Florida, CPA 22-69-76. | Mixing height determination..... | G. Holzworth (Met).. | 23,464 |
| FMC Corp., Princeton, N.J., CPA 22-69-92. | Applicability of inorganic solids other than oxides to the development of new processes for removing SO_x from flue gases. | L. Stankus (PCE).... | 116,125 |
| The Franklin Institute, Philadelphia, Pa., CPA 22-69-30. | Translation services..... | B. L. Evens (DTIP). | 26,512 |
| The Franklin Institute, Philadelphia, Pa., CPA 22-69-75. | Screening, cataloging, abstracting, and indexing of air pollution technical literature. | P. Halpin (DTIP).... | 187,481 |
| GCA Corp., Bedford, Mass., PH 86-67-125. | Study of sulfur reactions in stack plumes.... | L. Niemeyer (Meteorology). | 80,320 |
| GCA Corp., Bedford, Mass., CPA 22-69-36. | Study to determine the fate of CD in the atmosphere. | J. J. Bufelini (C. & P.). | 14,231 |
| GCA Corp., Bedford, Mass., CPA 22-69-38. | Fabric filter system study..... | D. Harmon (PCE).... | 129,997 |
| General Dynamics Corp., San Diego, Calif., CPA 22-69-142. | Development of Infrared scanning spectrophotometer for remote monitoring of hot gas pollutants. | J. Nader (C. & P.)... | 116,490 |
| George Washington University, Washington, D.C., CPA 70-8. | Assist community understanding of facts and public issues about air pollution. | S. Samuels (DET).... | 87,600 |
| General Research Corp., Santa Barbara, Calif., CPA 22-69-127. | Modeling study to characterize the photochemical atmospheric reactions to the Los Angeles Basin area. | A. P. Altshuller (C. & P.). | 56,485 |
| General Technologies Corp., Reston, Va., CPA 22-69-59. | Infrared spectroscopic study of gas-solid interactions. | R. Larkin (PCE)..... | 51,879 |
| General Technologies Corp., Reston, Va., CPA 22-69-82. | Study of cost of sulfur oxide and particulate control using solvent refined coal. | J. Grout (DPD)..... | 38,272 |
| W. R. Grace & Co., Clarksville, Md., PH 86-67-129. | Development of improved alkalized alumina. | M. H. Hooper (PCE).. | 705,707 |
| Graphic Arts Technical Foundation, Pittsburgh, Pa., PCA 22-69-72. | Evaluations of emissions and control technologies in the graphic arts industries. | E. Pollard (PCE)..... | 62,767 |
| Herbridge House, Inc., Boston, Mass., CPA 22-69-58. | Recommendation and implementation of multiproject management system for the planning and control of engineering R. & D. activities performed by non-Federal contractors. | B. L. Beals (PCE).... | 9,878 |
| Prof. W. W. Holland, St. Thomas Hospital Medical School, London, S.E.1., England, CPA 22-69-32. | State-of-the-art review of chronic respiratory disease. | C. M. Shy (HER)..... | 8,067 |
| IIT Research Institute, Chicago, Ill., PH 86-67-30. | Conduct studies to determine the affects of exposure to atmospheric pollutants on the susceptibility of animals to respiratory diseases. | D. L. Coffin (HER)... | 277,309 |
| IIT Research Institute, Chicago, Ill., CPA 22-69-122. | Cooling tower study..... | J. Peterson (MeL)... | 48,733 |
| IIT Research Institute, Chicago, Ill., CPA 22-69-134. | Study for development of particulate emission control techniques for spark-ignition engines. | J. Reney (MVRD).... | 96,058 |
| Illinois Institute of Technology, Chicago, Ill., CPA 22-69-98. | Study of chemical species in diesel exhaust and their contributions to exhaust odors. | G. Kittredge (MVRD). | 33,000 |
| Illinois Institute of Technology, Chicago, Ill., CPA 22-69-121. | Study of effects of CD on performance capability of primates. | K. Anger (HER)..... | 31,417 |
| Illinois, University of, Urbana, Illinois, PH 86-67-26. | Sampling and evaluation of coal mines in Illinois by the Illinois Geological Survey. | T. K. Janes (PCE)... | 148,856 |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS—Continued

| Contractor and contract No. | Purpose | Project officer and division | Amount |
|--|--|-------------------------------------|----------|
| Illinois, University of, Urbane, Illinois, CPA 22-69-65 | Study of petrographic and mineralogical characteristics of carbonate rocks related to sulfur oxide sorption in flue gases. | J. S. Bowen (PCE)... | \$69,320 |
| Iowa State University, Ames, Iowa, CPA 22-69-107 | Behavioral and neurological effects of lead... | C. Xintaras and B. L. Johnson (HER) | 25,627 |
| A. T. Kearney & Co., Inc., Chicago, Ill., CPA 22-69-106 | System analysis of emissions and emissions control in the iron tundry system. | N. Plaks (PCE)..... | 264,356 |
| The M. W. Kellogg Co., Piscataway, N.J., PH 86-68-86. | Evaluation of alkali alumina process.... | M. H. Hooper (PCE)... | 265,30 |
| Linton, Miels & Coston, Inc., Washington, D.C., CPA 70-11 | Study of factors relating to the proposed designation of air quality control regions. | D. Calkins (ORA).... | 184,600 |
| League of Women Voters Education Fund, Washington, D.C. CPA 22-69-74. | Community support program..... | S. W. Samuels (OIE). | 7,807 |
| Arthur D. Little, Inc., Cambridge, Mass., CPA 22-69-63. | Investigations of diesel exhaust composition and odor. | G. D. Kittredge (MVRD). | 33,263 |
| Arthur D. Little, Inc., Cambridge, Mass., CPA 22-69-23. | Systems analysis study, reduction of air pollution from refuse incineration. | R. C. Lorentz (PCE)... | 205,281 |
| Litton Systems, Inc., Camarillo, Calif., PH 22-68-25. | Analytic studies in air pollution..... | R. Smith (OPO)..... | 296,500 |
| Los Angeles County Air Pollution Control District, Los Angeles, Calif., CPA 22-69-137. | Study of jet aircraft emissions and air quality in the vicinity of the Los Angeles international airport. | E. C. Tabor (AQED)... | 181,261 |
| Louisiana State University, Baton Rouge, La., PH 22-68-50. | Rotoslide sampling for aero-allergens associated with outbreaks of epidemic asthma in New Orleans. | V. Hasselblad (HER). | 14,749 |
| Louisiana State University, Baton Rouge, La., CPA 22-69-100. | A specific method for the determination of ozone in the atmosphere. | A. P. Altshuller (C. & P.). | 22,067 |
| Loyola University, Hines, Ill., PH 22-68-8. | Survey sources of mortality and morbidity data within Chicago and establish relationships between intracity variations in mortality and levels of air pollution. | C. M. Shy (HER)..... | 85,267 |
| The Marquardt Corp., Ven Nuys, Calif., CPA 22-69-128. | Study of continuous flow combustion systems for external combustion vehicle powerplants. | R. F. Machecek (MVRD). | 96,683 |
| Maryland, University of, Baltimore, Md., PH 22-63-5. | Effects of environmental factors on human respiratory function. | C. A. Cohen (HER) .. | 126,507 |
| Massachusetts Institute of Technology, Cambridge, Mass., CPA 22-69-44. | Research and development engineering services. | B. Beals (PCE)..... | 105,370 |
| Massachusetts, University of Amherst, Massachusetts, PH 22-68-39. | Study of the chronic effects of low levels of air pollutants upon floricultural and vegetable plants in the Northeast. | R. A. Reinert (EER)... | 42,652 |
| Walter C. McCrone Associates, Inc., Chicago, Ill., CPA 22-69-130. | Standard manual methods for particulate measurements for fossil-fuel combustion sources. | J. Burckle (PCE).... | 203,000 |
| McNally-Pittsburg Manufacturing Corp., Pittsburg, Kans., PH 22-69-59. | Design and cost analysis study for a prototype coal cleaning plant. | T. K. Janes (PCE).... | 78,175 |
| Marquette School of Medicine, Milwaukee, Wis., CPA 10-1. | Study of effects of CO on human behavior and performance (CAPM-3-68). | J. Knelson (HER).... | 35,022 |
| Medical College of South Carolina, Charleston, S.C., CPA 22-69-13. | Relationship of cadmium to blood pressure among superphosphate plant workers and toxemia of pregnancy. | C. M. Shy (HER)..... | 33,014 |
| Meteorology Research, Inc., Altadena, Calif., CPA 22-69-20. | Particle study-turbulence study..... | C. R. Hosler (Meteorology) | 68,183 |
| Midwest Research Institute, Kansas City, Mo., CPA 22-69-104. | Particulate pollutant system study..... | T. W. Devitt (PCE)... | 249,500 |
| Midwest Research Institute, Kansas City, Mo., CPA 22-69-113. | Systems analysis of the effects of air pollution on materials. | F. H. Haynie (EER)... | 98,942 |
| The Regents of the University of Michigan, Michigan, University of Ann Arbor, Mich., CPA 22-69-5f. | Kinetics of oxidation and quenching of combustibles in exhaust systems of gasoline engines. | G. Kittredge (MVRD). | 39,255 |
| Mine Safety Appliance Research Corp., Evans City, Pa., PH 22-68-11. | Applicability of inorganic liquids to the development of new processes for removing SO ₂ from flue gases. | E. O. Mergollin (PCE). | 211,923 |
| Monsanto Research Corp., St. Louis, Mo., PH 22-68-12. | Applicability of catalytic oxidation to the development of new processes for removing SO ₂ from flue gases. | G. L. Huffman (PCE). | 257,685 |
| Montana, University of, Missoula, Mont., CPA 22-69-161. | Study of accumulation in animals and vegetables of trace elements emitted from smelters in East Helena, Mont. | T. R. Lewis (HER)... | 10,438 |
| National Academy of Sciences, Washington, D.C., CPA 22-69-31. | Advisory service on scale-up of air pollution control processes. | P. W. Spaitte (PCE) .. | 50,000 |
| National Oil Fuel Institute, Inc., New York, N.Y., CPA 22-69-53. | Residual and fuel oil data for standard metropolitan statistical areas. | J. C. Fensterstock (AQED). | 4,562 |
| National Tuberculosis and Respiratory Disease Association, New York, N.Y., CPA 22-69-117. | Community support program..... | S. W. Samuels (OIE). | 150,000 |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS—Continued

| Contractor and contract No. | Purpose | Project officer end division | Amount |
|---|---|-------------------------------|-----------|
| New York, the City of, Department of Air Resources, New York, N.Y., CPA 21-69-135. | Study of air pollution aspects of various roadway configurations with relation to the proposed lower Manhattan Expressway. | J. Fensterstock (AQED). | \$187,633 |
| New York University Medical Center, New York, N.Y., CPA 22-69-35. | Study of effects of ozone on cell membranes. | P. Lavitt (HER)..... | 22,847 |
| North American Rockwell Corp., Atomics International Division, Canoga Park, Calif., PH 86-67-128. | Development of molten carbonate process for removal of sulfur dioxide from powerplant stack gases. | P. W. Spaitte (PCE) .. | 1,237,679 |
| North Carolina, University of, Greensboro, N.C., PH 22-68-2. | Conduct a comprehensive survey to identify and document known and suspected air pollution induced effects on various textiles and dyes. | J. B. Upham (EER)... | 72,266 |
| North Carolina, University of, Chapel Hill, N.C., CPA 22-69-67. | Symposium on multiple source urban diffusion models. | L. E. Niemeyer (Meteorology). | 8,100 |
| Northern Research & Engineering Corp., Cambridge, Mass., CPA 22-69-90. | Study of time requirements for retrofitting jet aircraft with improved combustor designs. | W. H. Megonnall (O./S. & C.) | 7,300 |
| North American Rockwell Corp., Canoga Park, Calif., CPA 70-3. | Development of particulate control techniques for spark ignition engines (molten carbonate scrubber process). | J. L. Ranay (MVRD) .. | 31,355 |
| Olson Laboratories, Inc., Dearborn, Mich., CPA 22-69-91. | Study of emissions from 2-cycle internal combustion engine. |do..... | 9,980 |
| Olson Laboratories, Inc., Dearborn, Mich., CPA 22-69-158. | Study of automobile exhaust emissions in consumer-owned vehicles. Great plains surveillance program. | Pinkart (MVPC)..... | 327,426 |
| Oregon State University, Corvallis, Oreg., PH 22-68-15. | Study economic impact of a fluoride-emitting source on the fruit tree industry in the Delles area, Oregon. | W. W. Heck (EER)... | 180,916 |
| Oregon State University, Corvallis, Oreg., CPA 22-69-86. | Study of the social and economic effects of changes in air quality. | D. D. Gillette (EER) .. | 47,220 |
| Owens-Corning Fiberglas Corp., Granville, Ohio, PH 22-68-54. | Evaluation of fabric filters to remove sulfur dioxide at elevated temperatures. | D. L. Harmon (PCE) .. | 46,746 |
| The Pennsylvania State University, University Park, Pa., CPA 22-69-37. | Air pollution research guide | R. L. Kolbinsky (OTIP). | 20,563 |
| Pittsburgh, University of, Pittsburgh, Pa., PH 86-67-73. | Pathophysiologic responses of humans and animals to single and multiple air pollution mixtures. | C. A. Cohen (HER)... | 93,316 |
| President & Fellows of Harvard College, Cambridge, Mass., CPA 22-69-45. | Laboratory technical services | G. L. Huber (HER)... | 9,372 |
| Pressure Chemical Co., Pittsburgh, Pa., CPA 22-69-21. | Procurement and preparation of airborne carcinogens. | O. L. Coffin (HER)... | 80,581 |
| Pope, Evans & Robbins, Alexandria, Va., CPA 70-10. | Characterization and control of air pollutants from a fluidized-bed combustion unit. | B. Henschel (PCE)... | 245,450 |
| Radian Corp., Austin, Tex., CPA 22-69-138. | Theoretical description of the limestone-wet scrubbing process for SO ₂ removal. | J. L. Phillips (PCE) .. | 80,519 |
| Research-Cottrell, Inc., Bound Brook, N.J., CPA 22-69-139. | Particulate collection study—TVA limestone tests. | T. W. Oavitt (PCE).... | 67,200 |
| Research Triangle Institute, Research Triangle Park, N.C., CPA 22-69-7. | Ozone chemiluminescent study..... | A. E. D'Keefa (C. & P.) | 103,278 |
| Research Triangle Institute, Research Triangle Park, N.C., CPA 22-69-57. | Studies related to air quality control regions, guides to good practice, control technology, and abatement field activities. | H. C. Millar (abatement). | 198,760 |
| Research Triangle Institute, Research Triangle Park, N.C., CPA 22-69-79. | Comprehensive economic cost study of air pollution control costs for selected industries and selected regions. | J. O'Connor (EER)... | 234,882 |
| Research Triangle Institute, Research Triangle Park, N.C., CPA 22-69-109. | An evaluation of techniques for the measurement of low concentrations of trace gases in the atmosphere. | A. P. Altshuller (C. & P.). | 34,416 |
| Resources Research, Inc., Raston, Va., CPA 22-69-111. | Development of a training exercise on benefit-cost evaluation of air pollution control strategies. | F. L. Cross (OMD)... | 31,318 |
| Resources Research, Inc., Reston, Va., CPA 22-69-119. | Evaluation and development of air pollutant emission factors. | C. B. Morita (AQED) .. | 48,779 |
| Roberts & Schaefer Co., Chicago, Ill., PH 22-68-62. | Design and cost analysis study for a prototype coal cleaning plant. | T. K. Janes (PCE)... | 79,000 |
| Scientific Research Instruments Corp., Baltimore, Md., PH 86-68-65. | Conduct studies on sulfur control by means of coal gasification. | E. D. Margolin (PCE) .. | 241,884 |
| Scientific Research Instruments Corp., Baltimore, Md., CPA 22-69-40. | Improved instrumentation for determination of exhaust gas oxygenate content. | J. E. Sigsby, Jr. (C. & P.). | 29,919 |
| Scott Research Laboratories, Inc., Plumsteadville, Pa., CPA 70-6. | Atmospheric reaction studies in the Los Angeles Basin. | A. P. Altshuller (C. & P.). | 75,617 |
| Scott Research Laboratories, Inc., Plumsteadville, Pa., CPA 22-69-47. | Effects of gasoline additives on carburetor and positive crankcase ventilation system performance as they relate to exhaust emissions. | C. Domke (MVPC)... | 34,025 |
| Scott Research Laboratories, Inc., Plumsteadville, Pa., CPA 22-69-68. | Investigation of passenger car refueling losses. | H. Hopkins (MVPC) .. | 15,856 |
| Scott Research Laboratories, Inc., Plumsteadville, Pa., CPA 22-69-129. | Study of exhaust emission from reciprocating aircraft powerplants. | G. Kittredge (MVRD). | 89,650 |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS—Continued

| Contractor and contract No. | Purpose | Project officer and division | Amount |
|--|---|---|----------|
| Scott Research Laboratories, Inc., Plumsteadville, Pa., CPA 22-69-156. | Study of the effect of laboratory ambient conditions on exhaust emissions. | Bozek (MVPC)..... | \$52,609 |
| Singmaster & Breyer, New York, N.Y., CPA 22-69-136. | Control techniques for fluoride air pollutants. | F. Alpiser (abatement). | 35,248 |
| Singmaster & Breyer, New York, N.Y., CPA 22-69-141. | Document on control techniques for lead air pollutants. | G. Crene (abatement). | 35,654 |
| Southern California, University of, Los Angeles, Calif., PH 86-68-43. | Toxicity of controlled and ambiently polluted atmospheres study. | F. G. Hueter (HER)... | 462,766 |
| Southern California, University of, Los Angeles, Calif., PH 86-68-44. | Reactions of the human respiratory and circulatory systems to Los Angeles air pollutant studies. | A. Hudson (HER).... | 184,189 |
| Southern Research Institute, Birmingham, Ala., CPA 22-69-73. | Electrostatic precipitator systems study. | T. Oevitt (PCE)..... | 289,277 |
| Southwest Research Institute, San Antonio, Tex., PH 86-67-72. | Investigation of diesel power vehicle odor end smoke. | R. Stahman (MVRD). | 232,448 |
| Southwest Research Institute, San Antonio, Tex., PH 22-68-23. | do | do | 237,578 |
| Southwest Research Institute, San Antonio, Tex., PH 22-68-36. | A field study of diesel engine exhaust. | J. L. Reney (MVRD).. | 117,954 |
| Southwest Research Institute, San Antonio, Tex., CPA 22-69-71. | Preparation of guide to good practice for diesel powered vehicles. | R. C. Stehmen (MVPC). | 27,225 |
| Southwest Research Institute, San Antonio, Tex., CPA 22-69-77. | Preparation of control techniques for CO, NO _x , and hydrocarbons from mobile fuel combustion sources. | S. Bergin (abatement). | 42,793 |
| Southwest Research Institute, San Antonio, Tex., CPA 22-69-102. | Electronspin resonance studies of vegetation damage. | W. Heck (EER)..... | 72,897 |
| Sperry Rand Corp., Sperry Rand Microwave Electronics Division, Clearwater, Fla., CPA 22-69-93. | Radiometric thermesonde program. | T. J. Lemmons (meteorology). | 52,055 |
| Sperry Rand Research Center, Sudbury, Mass., PH 22-68-22. | Determine the capabilities of millimeter wave radiometers for remotely measuring temperature profiles pertinent to air pollution. | C. R. Hosler (meteorology). | 209,280 |
| Sperry Rand Research Center, Sudbury, Mass., CPA 22-69-116 | Development and application of advanced techniques for determining atmospheric stability using the radiometric thermesonde. | T. J. Lemmons (meteorology). | 128,600 |
| Stanford Research Institute, Menlo Park, Calif., PH 86-65-27. | Studies of the effects of low levels of NO _x with regard to emphysema. | O. L. Coffin (HER)... | 299,751 |
| Stanford Research Institute, Menlo Park, Calif., CPA 22-69-43. | Study to determine the fate of CO in the atmosphere. | J. J. Bufelini (C. & P.). | 15,383 |
| Stanford Research Institute, Menlo Park, Calif., CPA 22-69-64. | Urban diffusion modeling. | C. R. Hosler (meteorology and C. & S.). | 40,000 |
| Stanford Research Institute, Menlo Park, Calif., CPA 22-69-78. | Feasibility study of new SO ₂ control process applied to smelter and other low emissions sources. | N. Plaks (PCE)..... | 35,000 |
| Stanford Research Institute, Menlo Park, Calif., CPA 22-69-115 | Study of catalytic control of exhaust emissions from Dto cycle engines. | S. L. Quick (MVRD).. | 45,340 |
| Stanford Research Institute, Menlo Park, Calif., CPA 22-69-125. | Investigation of photochemical reactivities of organic solvents. | S. Koczynski (C. & P.). | 94,760 |
| Stetens Naturverdsverk, The National Nature Conservancy Office, Solne, Sweden, CPA 22-69-99. | Screening and abstracting air pollution documents in the Scandinavian literature. | B. L. Evens (OTIP).. | 4,000 |
| Stone & Webster Engineering Corp., Boston, Mass., CPA 22-69-80. | Development of the Stone end Webster's sulfur dioxide removal and recovery process. | J. P. Earhart (PCE) . | 23,000 |
| System Development Corp., Sante Monica, Calif., PH 22-68-56. | Conduct a survey of driving patterns in 5 cities relative to auto air pollution. | C. J. Domke (MVRD)- | 85,928 |
| System Development Corp., Sante Monica, Calif., CPA 22-69-108. | Comprehensive technical report on all atmospheric contaminants associated photochemical air pollution. | O. S. Berth (B.C. & S.). | 149,620 |
| Temple University, Philadelphia, Pa., PH 22-68-52. | A study of economics of air pollution control. | P. Gerhardt (OPO)... | 34,712 |
| Thermo Electron Corp., Waltham, Mass., CPA 22-69-132. | Study of a Rankine cycle propulsion system for passenger vehicles. | R. Machecek (MVRD). | 174,173 |
| Thermo-Systems, Inc., St. Paul, Minn., CPA 22-69-83. | Development of a transducer for continuous air pollution aerosols using a quartz-crystal oscillator. | J. Wegman (C. & P.). | 46,363 |
| Travelers Research Corp., Hartford, Conn., CPA 22-69-14. | A study of indoor outdoor air pollutant relationships. | J. M. Bryant (AQEO). | 55,465 |
| TRW, Inc., Redondo Beach, Calif., CPA 70-4. | Holographic determination of injected limestone distribution in unit 10 of the Shawnee powerplant. | D. K. Felton (PCE)... | 84,500 |
| TRW, Inc., Redondo Beach, Calif., PH 22-68-46. | Applicability of organic solids to the development of new techniques for removing oxides of sulfur from flue gases. | E. D. Merzolin (PCE). | 93,414 |
| TRW, Inc., Washington, D.C., PH 22-68-60. | Systems analysis program for the National Air Pollution Control Administration. | R. M. Jameson (OPD). | 852,413 |
| TRW, Inc., Washington, D.C., PH 22-68-32. | Analytic studies in air pollution. | R. Smith (OPD)..... | 289,913 |
| TRW Systems Group, TRW, Inc., Redondo Beach, Calif., CPA 22-69-87 | Study of surveillance, inspection and maintenance procedures for minimizing automotive exhaust emissions. | K. Mills (MVPC)..... | 245,534 |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION ACTIVE CONTRACTS—Continued

| Contractor and contract No. | Purpose | Project officer and division | Amount |
|---|--|--|---------|
| Tulane University, New Orleans, La., CPA 22-69-120. | Development of a research program for the evaluation of the effects of NO ₂ and/or oxidants upon human health. | V. A. Newill (HER)... | \$6,026 |
| Tyco Laboratories, Inc., Waltham, Mass., PH 86-68-75. | Establish the feasibility of oxidizing the SO ₂ in powerplant flue gases to sulfuric acid. | G. L. Huffman (PCE) | 137,531 |
| United Aircraft Corp., United Aircraft Research Laboratories, East Hartford, Conn., CPA 22-69-114. | Technological and economic feasibility study of advanced power cycles and methods of producing nonpolluting fuels. | E. D. Margolin (PCE). | 292,654 |
| Vanderbilt University, Nashville, Tenn., CPA 22-69-60. | Socioeconomic and air pollution factors in neonatal mortality. | R. J. M. Horton (HER). | 30,224 |
| VDI-Verlag G.m.b.H., Dusseldorf, Germany, CPA 70-2. | License fee to publish an English translation of the Journal "STAUB-Reinhaltung der Luft." | B. L. Evans (DTIP)... | 5,100 |
| Virginia, University of, Charlottesville, Va., PH 22-68-7. | Establish design criteria and develop an aerosol ultracentrifuge for continuous operation in the ambient atmosphere. | J. Wagman (C. & P.). | 74,863 |
| Walden Research Corp., Cambridge, Mass., CPA 22-69-85. | Systematic study of air pollution from fossil-fuel combustion equipment. | R. Day (PCE)..... | 241,902 |
| Walden Research Corp., Cambridge, Mass., CPA 22-69-95. | Standard chemical methods for sampling and analysis of gaseous pollutants from the combustion of fossil fuels. | R. L. Larkin (PCE)... | 198,33D |
| Washington, University of, Seattle, Wash., CPA 22-69-3. | Study of air pollution and health in a normal urban population. | V. A. Newill (HER)... | 56,972 |
| Washington, University of, Seattle, Wash., CPA 22-69-126. | Feasibility study of the effects of air pollution and weather on mortality. | W. Riggan (HER).... | 32,946 |
| West Virginia University, Morgantown, W. Va., PH 22-68-18. | Pilot scaleup of processes to demonstrate utilization of pulverized coal fly ash modified by addition of limestone/dolomite SO ₂ removal additives. | T. A. Kittleman (PCE). | 47,842 |
| Westinghouse Electric Corp., Pittsburgh, Pa., CPA 70-9. | Evaluation of the fluidized-bed combustion process. | P. P. Turner (PCE)... | 344,487 |
| West Virginia University, Morgantown, W. Va., CPA 22-69-149. | Experimental investigation of the penetration and dispersion phenomena in the limestone injection process. | D. Clay (PCE)..... | 31,033 |
| Westinghouse Management Services, Inc., Baltimore, Md., PH 22-68-37. | Analytic studies in air pollution..... | R. Smith (OPD)..... | 43,724 |
| Whittaker Corp., San Diego, Calif., CPA 22-69-118. | Development of portable electrochemical transducers for the detection of SO ₂ and oxides of nitrogen. | R. K. Stevens (C. & P.). | 47,443 |
| Williams Research Corp., Walled Lake, Mich., CPA 22-69-84. | Gas turbine engine emissions..... | H. A. Ashby (MVPC). | 45,500 |
| The Regents of the University of Wisconsin, the University of Wisconsin-Milwaukee, Milwaukee, Wis., CPA 22-69-52. | Urban air pollution damage functions: theory and measurements. | P. H. Gerhardt (DPD) and B. Peckham (EER). | 38,683 |
| University of Wisconsin, Madison, Wis., CPA 22-69-101. | Studies on techniques for satellite surveillance of global air pollution. | R. McCormick (Met). | 48,005 |

Mr. ROGERS. Now, tell me about your funds that you are asking for the implementation of the administration's bill.

Mr. JOHNSON. The 1971 budget requests will be \$112,018,000. I beg your pardon. I gave you obligations rather than the request. If I could correct that, it would be \$106,003,000.

Mr. ROGERS. And for 1972 and 1973?

Mr. JOHNSON. I do not have those figures available. We do not have those. We will see if we can get them for you, Mr. Chairman.

Mr. ROGERS. We would like those figures, because this committee does not approve open-ended programs, and it will be necessary to have those figures so we will know exactly what you are going to do and how much money and if you could furnish those, I will appreciate it. (The following information was received for the record:)

FISCAL YEAR 1972 AND 1973 FUNDING FOR AIR POLLUTION CONTROL PROGRAM

The level of Administration requests for funding of the air pollution control program for fiscal years 1972 and 1973 cannot be projected at the present time except in general terms.

For fiscal year 1975, a projection derived from long range planning guides provided by DHEW in August 1969 was \$182,000,000. (This amount was allocated

to NAPCA by the Environmental Health Service from the total planning allocation given it by the Department for all its programs.) Based on this FY 1975 figure, NAPCA adopted as planning guides for FY 72 and FY 73 the figures \$154,030,000 and \$170,590,000 respectively. These figures should not, of course, be considered as approved by the Department.

Since development of the DHEW planning guides, the Administration's proposal for the amendment of the Clean Air Act has been developed and presented to the Congress. It will necessarily involve substantial expenditures over and above those required for carrying out the Department's responsibility under existing legislation even if the present schedule for control, research and all other activities should not be accelerated. New activities under the Administration proposal will include production line testing of motor vehicles and enforcement of standards in production cars, regulation of fuels and fuel additives, development of national emission standards for certain types of stationary sources, and substantially increased federal enforcement activities. Furthermore, adoption of the Administration's proposal will entail a considerably faster schedule and expanded effort in the review of state implementation plans and other activities. The precise form of the legislation Congress will see fit to adopt is a significant variable.

It must be kept in mind, of course, that development of the budgets for FY 72 and 73 will require taking into effect such normal budgetary considerations as the total availability of federal funds in the light of pressures on the national economy and the determination of priorities among competing programs, both within DHEW and outside.

Mr. ROGERS. Now, you plan to obligate \$112 million in 1971. Would you break that down as to how much for research in your various activities?

Mr. JOHNSON. We can get you information for the record on that.

Mr. ROGERS. Could you give us a quick rundown now?

Mr. JOHNSON. In terms of what we call abatement and control—that is our operating program in the field for grants—we would obligate about \$28 million. And for direct operations, that is the performance of our staff, about \$11 million.

In terms of research and development and demonstrations, and this is all of it for the total air pollution control program, grants and contracts, about \$40 million; direct operations, approximately \$22 million.

Mr. ROGERS. \$22 million?

Mr. JOHNSON. Yes, sir, in terms of manpower and training, which is one of our very necessary operations, grants are \$3.6 million and direct operations, \$2.2 million.

To operate the Office of the Commissioner, \$2.7 million.

Dr. MIDDLETON. There is another explanation of that figure, which I can give you at another time.

Mr. JOHNSON. We call that program direction and management services. Dr. Middleton suggests that I give you a little different breakdown in terms of some broad categories and that will give you a better picture, also.

We have what we call effects and surveillance. This is \$16.9 million or \$17 million in 1971. Control and compliance, \$86.1 million, and for other activities, about \$8.9 million.

I think there is one other figure you might like to have for an overview. In terms of our efforts in terms of research for conventional vehicles, we would spend about \$3.7 million, and for unconventional vehicles about \$9.2 million, for a total of \$12.9 million.

Mr. ROGERS. Now, the unconventional vehicles, is that your research on engines other than combustion?

Mr. JOHNSON. That is correct. Also funding in there for our testing of prototypes and our testing of fleet vehicles that prove out on a prototype basis.

Mr. ROGERS. What research are you doing on the present vehicle?

Mr. JOHNSON. Unconventional or conventional vehicles?

Mr. ROGERS. Both.

Mr. JOHNSON. In terms of conventional vehicles, we are testing the prototypes that are developed by the manufacturers. We do this at our Ypsilanti Laboratory for certification purposes.

In addition, we have some surveillance activities going on in term of actual production models to see how closely they align with the prototype vehicles.

I am going to ask Dr. Middleton to amplify some of this. I would say that in terms of unconventional vehicles, at this time in time, while we have not a testing program, we do have two contracts for evaluative purposes, and perhaps you would amplify that.

Dr. Middleton. These two programs are looking at the kinds of an external flame outside that would be required so it would be as clean as possible, as well as a type of a system that should be developed where an engine has the minimum pollution problem.

In addition, Mr. Chairman, in cooperation with the General Services Administration, we are testing vehicles on a variety of fuels, be it compressed natural gas, liquid natural gas or liquified petroleum gas, to determine the suitability of certain forms of fuel for existing conventional engines.

This we do in our Los Angeles facility, as well as elsewhere, to assist General Services in making a judgment on whether fuel conversion is a useful thing for the Federal Government.

Mr. ROGERS. I notice in your statement, Mr. Johnson, you say you are thinking of actually purchasing cars for testing, but also a procurement program to distinguish between the two.

Mr. JOHNSON. Yes, sir. Actually there are three phases to this. One, we would hope to be able to encourage a prototype development of a vehicle which we would have to test to see if they reach certain types of Federal standards. If they were successful in that avenue of approach, we would then seek to test these in a fleet of some type, fleet purchasing, with perhaps maybe 300 to 500 vehicles.

These are matters that we are discussing. I think this is the way we should go in this kind of activity.

Mr. ROGERS. You are giving some consideration for allowing GSA, is this what you have in mind, the same type of program?

Mr. JOHNSON. Yes, the same type of program and if the fleet testing proves out, and everything is satisfactory perhaps there would be an additional incentive where the Federal Government would establish a procurement program.

Mr. ROGERS. Does the 1967 Act allow you to register additives?

Mr. JOHNSON. Yes; we are authorized to register additives.

Mr. ROGERS. Have you done it?

Mr. JOHNSON. We have not. We started early last June to develop the rule-making procedure for this. We had considerable discussion with the industry as a result of this initial effort.

We are in the process of reviewing that in light of the latest developments and we are at that status right now, Mr. Chairman.

Mr. ROGERS. What abatement controls have you exercised?

Mr. JOHNSON. I think if we are talking about the automobile still, Mr. Chairman, the controls have been implemented through the national rule-making authority we exercised starting in 1968, and again in 1970, and culminating with our proposed 1975 standards.

Mr. ROGERS. I would like for you to outline to us what is being open in the abatement control by the agency, for the records and how it is working.

(The following material was received for the record:)

REVIEW OF ACCOMPLISHMENTS OF ABATEMENT ACTIONS INITIATED UNDER SECTION 108 OF THE CLEAN AIR ACT, AS AMENDED

The abatement provisions of the Clean Air Act were invoked in 10 areas of the United States from 1965 through 1969. These include three large metropolitan areas, five single point source actions, and two industrial-residential complexes in which most of the pollution was traceable to a few large sources. In nine of the 10 actions interstate air pollution was involved.

In each area, one or more abatement conferences were held and recommendations were issued by the Secretary of Health, Education and Welfare for the control of specific pollutants. One action (Selbyville, Delaware-Bishop, Maryland) was taken to public hearing and subsequently to court when it became evident that the conference and hearing recommendations would not be implemented. The courts ruled in favor of NAPCA.

In addition to the 10 formal abatement actions (see Table), technical studies were conducted in several other areas of the country in anticipation of possible conferences. These studies have provided significant information in Air Quality Control Regions and in point source situations and, in some cases, have prompted control measures even though abatement proceedings were not invoked.

NAPCA's approach in abatement studies has been:

(a) Consult with responsible states to evaluate preliminary findings and to design a program to further define the problems.

(b) Conduct a technical study of air quality, meteorology, emission sources and effects of air pollutants. All pertinent information is presented in a technical report issued prior to the abatement conference.

(c) Present technical information at the abatement conference including a review of the means of reducing pollution from the various types of sources involved. Together with the conferee states, NAPCA prepares recommendations for consideration by the Secretary.

(d) Recommendations issued by Secretary.

(e) Maintain surveillance to assure that the responsible states are implementing the provisions of the recommendations. Only in cases of default by the states does NAPCA take action to enforce the recommendations.

ACCOMPLISHMENTS

The abatement provisions of the Clean Air Act have instigated air pollution control measures directly and indirectly. This is reflected both in areas where abatement actions have been conducted and in potential abatement situations.

Area-wide Pollution Reductions.—In the three large metropolitan areas where abatement actions have been conducted (New York-New Jersey, Kansas City, Missouri-Kansas City, Kansas, and the Washington, D. C. National Capital Interstate area) appreciable reductions of sulfur dioxide and particulate contaminants have already been accomplished. In these areas further reductions will result from recent control legislation restricting pollution emissions from stationary sources.

Specific accomplishments regarding area-wide sources in the metropolitan abatement areas include:

Elimination of open burning and inefficient single chamber incinerators.

Encouraging and requiring state-of-the-art control of sulfur oxides and particulate pollution from industrial processes.

Support of regional approaches to solid wastes disposal and mass transportation.

Mandating uniform air pollution control codes in interstate areas.

Providing a major breakthrough in reducing sulfur levels in heating fuels.

The latter and, possibly, most significant result was accomplished through the 1967 New York-New Jersey Abatement Conference and to a lesser degree through

the National Capital Abatement Conference held later in the same year. The New York-New Jersey recommendations provided the needed incentive to petroleum refiners to utilize technology which was already available. The interim regulations enacted by the two responsible States have already yielded a 60 percent reduction in the sulfur content and in resultant sulfur dioxide emissions from the burning of high sulfur fuels. More importantly, petroleum refiners have committed major capital investments to fuel oil desulfurization plants which will be operative by 1971. Sulfur dioxide emissions in the largest metropolitan area of the country will be reduced to about 20 percent of the pre-Conference (1966) level. The breakthrough in fuel desulfurization will have a beneficial effect on the entire eastern coast, the nation's largest market for residual fuel oil.

Point Source Pollution Reductions.—There have been sizable reductions in emissions of sulfur dioxide and particulates at point sources in most abatement areas. In a few there were also reductions in odors and fluorides. The results have been, or will be, more vivid in those areas where essentially all of the pollution emanates from a single source. Nevertheless, even in the metropolitan areas, point source abatement measures have been significant.

Specific point source reductions accomplished in abatement areas include:

Sharp reduction in fuel sulfur at power plants and other large boilers and fired heaters.

Installation of carbon monoxide waste heat boilers to reduce carbon monoxide emissions markedly from the largest stationary sources, i.e. petroleum refinery catalyst regenerators.

Installation of new type sulfuric acid plants to reduce sulfur dioxide emissions by about 75 percent over conventional processes.

Conversion of older power plant boilers from coal to oil or gas. These changes were accomplished with little reduction in the total coal consumption by concentrating coal burning at newer plants with high efficiency particulate collectors.

Pilot plant stack gas desulfurization at power plants.

Improving Kraft pulp mill control techniques as a result of point source abatement actions. While these measures have not resulted in a pollution-free atmosphere the accomplishments are major steps on the road to acceptable control of Kraft pulp mills.

Plant shutdowns have been accomplished at a phosphate rock plant in Garrison, Montana and another permanent shutdown is imminent in the case of the rendering plant in the Bishop, Maryland-Selbyville, Delaware action. The Garrison plant is now closed for the second time and will not be allowed to resume operation until acceptable techniques are provided to remove fluoride emissions from stack gases.

SUMMARY OF ABATEMENT ACTIONS

| Area | Initiated by— | Consultation called | Consultation held | Conference called | Conference held | Recommendations issued | Remarks |
|---|--|---------------------|-------------------|-------------------|-----------------|------------------------|--|
| Seibsville, Del.-Bishop, Md. | Governor of Delaware | (1) | | Sept. 27, 1965 | Nov. 19, 1965 | Jan. 12, 1966 | Rendering plant point source of malodors, interstate transport to Delaware. |
| Shoreham, Vt.-Ticonderoga, N.Y. | Governor of Vermont | (1) | |do..... | Nov. 30, 1965 | Mar. 1, 1966 | Kraft pulp mill point source of malodors and particulates, interstate transport to Vermont. |
| New York-New Jersey: | | | | | | | |
| Phase I | Secretary | Nov. 5, 1965 | Dec. 10, 1965 | Nov. 17, 1966 | Jan. 3, 1967 | Mar. 17, 1967 | Heavily populated metropolitan area and industrial complex, many pollutants, interstate transport both ways. |
| Phase II | do | do | do | Dec. 18, 1967 | Jan. 30, 1968 | Apr. 9, 1969 | |
| Kansas City, Kans.-Kansas City, Mo.: | | | | | | | |
| Phase I | do | Mar. 25, 1966 | Apr. 27, 1966 | Dec. 28, 1966 | Jan. 23, 1967 | Apr. 12, 1967 | Heavy industrial particulate pollution surrounding airport plus metropolitan area pollution, interstate transport both ways. |
| Phase II | do | do | do | Mar. 15, 1968 | Apr. 30, 1968 | Oct. 17, 1968 | Kraft pulp mill point source of malodors and particulates, interstate transport to Washington. |
| Clarkston, Wash.-Lewiston, Idaho | do | Dec. 23, 1965 | Feb. 7, 1966 | Nov. 17, 1966 | Mar. 1, 1967 | June 9, 1967 | |
| Parkersburg, W. Va.-Marietta, Ohio: | | | | | | | |
| Phase I | do | May 3, 1966 | Aug. 24, 1966 |do..... | Mar. 22, 1967 | Pending | Industrial complex particulates, sulfur dioxide and other pollutants, interstate transport both ways. |
| Phase II | do | do | Dec. 18, 1968 | Sept. 23, 1969 | Oct. 30, 1969 |do..... | Phosphate rock plant point source of fluorides, interstate only. |
| Garrison, Mont. | Local government with concurrence of Governor | (1) | | July 7, 1967 | Aug. 16, 1967 | Oct. 4, 1967 | Metropolitan area, few industrial processes, interstate transport 3 ways. |
| Washington, D.C.-Maryland-Virginia | Secretary | Sept. 8, 1966 | Nov. 23, 1966 | Nov. 6, 1967 | Dec. 11, 1967 | Apr. 29, 1968 | Tri-state industrial complex, particulates, sulfur dioxide and other pollutants, interstate transport 3 ways. |
| Ironton, Ohio-Huntington, W. Va.-Ashland, Ky. | do | May 3, 1966 | Aug. 25, 1966 | May 10, 1968 | July 23, 1968 | Mar. 14, 1969 | Coal-burning powerplant source of particulates and sulfur dioxide, interstate transport to West Virginia. |
| New Cumberland, W. Va.-Knox Township, Ohio. | Local government with concurrence of Governor of West Virginia | (1) | | May 1, 1969 | July 8, 1969 | Aug. 22, 1969 | |

1 Not required.

Mr. ROGERS. I will yield to the gentleman from Virginia.

Mr. SATTERFIELD. Thank you, Mr. Chairman.

I just have a few questions at this point which I would like to get back to.

First of all, as I understand, H.R. 15848, you are actually seeking new authority in addition to the authority you have now in terms of setting standards. This is correct, isn't it?

Mr. JOHNSON. Yes. Are you talking about fuel additives and fuel at this point?

Mr. SATTERFIELD. As I understand the facts and the testimony, at this point in time we have been talking about standards of exhaust and other emission points in the automobile.

But now, under this bill, if I understand correctly, you are talking about creating new standards at the gasoline pump nozzle.

Mr. JOHNSON. That is correct.

Mr. SATTERFIELD. Let me go back to your statement. You mentioned on Page 5, I believe, that you felt it was necessary for a third party to become involved and to act as a catalyst, so to speak, to cause things to be developed to deal with exhaust pollution.

I am wondering whether the establishment of the emission standards wouldn't constitute that third party initiative about which you spoke.

Mr. JOHNSON. In one instance, what we are seeing happening now is there is considerable voluntary effort, and it is just which comes first, the chicken or the egg. We believe that the Federal Government can be a third party catalyst to help spur this voluntary effort on.

Mr. SATTERFIELD. Why wouldn't emission standards be sufficient?

Mr. JOHNSON. It would if we had the authority at this time. We do not have that authority and we believe we ought to keep moving even while the Congress is considering the President's legislation in this area.

Mr. SATTERFIELD. I thought you did have the authority?

Mr. JOHNSON. We do not have the authority to regulate fuels at this particular point.

Mr. SATTERFIELD. Now you are not talking about emissions.

Mr. JOHNSON. In terms of emissions, there are various ways to help, and we try to stay within the available technology. We also try to encourage people to broaden the available technology and by the voluntary effort that is now interposed by the industries, both oil and the automobile industry, we can broaden this technology base so we are not limited, because we can't put on a catalytic convertor to control emissions because of something that is in the gasoline.

Mr. SATTERFIELD. Why wouldn't it be better to follow the suggestion of the President that what we need are more stringent emission standards, and this is what you have incorporated in your emissions standards, and better enforcement. Why wouldn't this do the job? Why do we have to get into all the facets of the productions of products? Why not set the performance requirement and leave free enterprise to work it out in the way it has historically?

Mr. JOHNSON. That is one way of doing it. I don't think it is the best way, Mr. Satterfield.

Mr. SATTERFIELD. I think maybe that answers my question. I don't necessarily agree with you.

Let me get on to one other subject that occurs to me. We were talking a little while ago about the fact that automobiles can develop engines that run on lead-free gasoline by 1971. This puts me in a position of what is going to happen to me, personally? I just bought an automobile, and if we are going to non-lead gasoline in 1971, what is this going to require me to do to my automobile to make it work on non-lead gasoline?

Dr. MIDDLETON. The position being taken here is not to eliminate lead from gasoline completely. The point is to allow the development of clean, new motor vehicles, and work a phaseout program, so that those cars that require high octane fuels, which cannot now be met by substitution for lead, will have fuels for them.

Mr. SATTERFIELD. In other words, we are going to have a dual fuel system?

Mr. JOHNSON. You are going to have a difficult phasing out of fuels with and without lead, but that is possible. I think it ought to be pointed out here in answer to your response that we already have a dual fuel system. We have several qualities and grades of fuels among which the motorist sometimes has a difficulty of choosing even now.

Mr. SATTERFIELD. That is the truth, but the car will operate on them all.

Mr. JOHNSON. To some degree of efficiency.

Mr. SATTERFIELD. It is my understanding that if you take lead out of gasoline, you are going to lower the octane to where my automobile with a high compression engine will not operate.

Mr. JOHNSON. One oil company that already deals in free lead gasoline—we have one company that does that. The legislation would place the burden of proof on the manufacturer to be sure we are producing a gasoline that is equally safe in terms of the needs of the environment.

Mr. SATTERFIELD. I assume this study we have talked about the Commerce Department conducting will take into consideration all these possible elements of costs. I don't know whether they can develop nonlead gasoline, we can convert to it by 1971.

Mr. JOHNSON. Not only would the Department of Commerce take this into effect, but so would the Department of Health, Education, and Welfare in its implementation and carrying out the rulemaking authority that we would get in terms of fuel additives and fuels.

I think that economics is always an important ingredient when you consider this kind of a problem. I don't always think it is the most important ingredient. I think the health of the people is the most important ingredient.

Mr. SATTERFIELD. If you are going to get down to real lead-free gasoline and lower the octane, somewhere along the line, you are going to have automobiles operating with a low-compression ratio that can operate only with low-octane gasoline and you will have others with a high-compression ratio that won't operate very well, if at all, on that kind of gasoline.

Mr. JOHNSON. We would want to be sure that there was complete understanding on the part of the fuel producers as well as the automobile manufacturers. I think what you say is certainly true, that there will be a period toward the end of the phasein, phaseout operation in which people with high-compression engines may have some difficulty.

I think this is the nature of the events if we are going to do anything about the environment, that seems to be the crisis situation, as I believe it is at this time.

Mr. SATTERFIELD. Thank you. I have no more questions at this time.

Mr. ROGERS. Dr. Carter?

Mr. CARTER. Thank you. I believe our distinguished colleague from Virginia might well use Amoco and save his car.

What percentage of pollution is from automobiles?

Mr. JOHNSON. On a national average, over 50 percent. In some communities it is as high as 70 to 80 percent.

Mr. CARTER. How dangerous is the pollution?

Mr. JOHNSON. We believe it is one of the crisis areas of concern in the environment. It certainly is damaging to health in many respects and particularly to people who are somewhat impaired by respiratory-type ailments and even cardiac conditions. We believe that it is a severe economic burden in terms of much of the population, and, of course, has harm in terms of just plain esthetics as far as cleaning up the community is concerned.

Dr. MIDDLETON. You might also be interested in knowing that healthy young people are adversely affected by smog. Very interesting results from the Los Angeles area in which long-distance runner high school teams had their performance measured and correlated with the occurrence of smoggy days, there were levels as low as .05 of a part per million of oxidants, their performance was reduced.

That is to say that healthy, virile, active young people have adverse effects from very low concentrations of the reaction products from automobiles. So it is not only the infirm adult; the eager young athlete in high school is also affected.

Mr. CARTER. Has it lessened since 1968?

Dr. MIDDLETON. In some areas where we have had rather active air pollution control programs, we began to see some signs of improvement. I think on a national basis we are really beginning to implement our program to a degree where it can be made. Yes, there has been improvement, significantly perhaps in New York in terms of sulfur oxide emissions, and this is because there has been a rather stringent program in that city and we are beginning to see the effects of this control operation.

Mr. CARTER. Has it improved in California where we have had this problem for some time?

Mr. JOHNSON. In some respects, particularly the stationary sources, the pollutants that were emanating from them, there has been a decided improvement. In terms of automobiles, I think also the growth in population in California has created a need to have increasingly more stringent standards. Ultimately, we will see the improvement there that we are seeking.

As Dr. Middleton has said many times, this is only going to be so long as we maintain the population and the automobile population as static. Both of these are increasing, the time will come when even these controls will not be sufficient to do the job.

Mr. CARTER. Is the amount of polluted air increasing throughout the earth?

Mr. JOHNSON. There are statements to this effect and I believe that perhaps they are true. I think there is only a question as to the degree of this increase or the acceleration of the increase.

Mr. CARTER. How does nature rid itself of polluted air?

Dr. MIDDLETON. It is part of the whole cycle. The rains used to wash our air and bring this back down through the earth and it was dealt with through the soil and pass on out to the sea and go up again and renew this. In some sectors of the country we are getting to where we exceed the ability of nature to use this cleansing process.

Mr. CARTER. Is nature able to do this process at the present time?

Dr. MIDDLETON. In my opinion, not without the kinds of help we can bring to bear with the kinds of technology and know-how we have.

Mr. CARTER. In this case, then, will there come a time when the air is so polluted it will not support life?

Dr. MIDDLETON. Certainly if the current trends are continued, that time might arise. I am not sure just how far down the road that time would be.

Mr. CARTER. That is my next question.

Dr. MIDDLETON. I think, with the knowledge we have, for us to ignore this knowledge and to wait for some catastrophe that can happen, as it did in London, I believe, in 1952, and this then would signal that we have really gone much farther than we can go in terms of what we can do to protect ourselves against this.

Mr. CARTER. I don't believe you still fixed the time or approximate time.

Mr. JOHNSON. I don't quite have the crystal ball that some people have. I can only say the time to do something about what might happen in the future, we know that it can happen, is now.

Mr. CARTER. I will agree with you on that. I think we have been very languid in this and we must go forward with it.

Dr. MIDDLETON. In the case of motor vehicles, we could give you the dates from which you could make your own estimates. The standards we presently have for motor vehicle emissions will in 1980 provide air quality about the same as that in 1953. So that even with these stringent standards, we expect the air quality in 1980 to be as poor as 1953 air.

Unless we have more stringent standards, it will then begin to degrade again, so that the date when air becomes intolerable depends on the actions in the interval.

Mr. CARTER. We expect it to improve until 1980, is that right, and at that time it will revert. It will be about like it was in 1953, is that what you are saying?

Dr. MIDDLETON. That is correct. At present emission standards the tonnage of carbon monoxide and hydrocarbons is decreasing, and when it gets down to 1980 levels, it will be just about what it was in 1953, and without any other standards, it will again be getting worse.

Mr. CARTER. What year was this incident in Pennsylvania?

Mr. JOHNSON. 1948.

Dr. MIDDLETON. Which was from pollutants quite different from those in motor vehicles.

Mr. JOHNSON. John's curve is on emissions from automobiles and he was talking about carbon monoxide and hydrocarbons. In terms of other pollutants, we still have a control job to do.

Mr. CARTER. It seems we have a massive control job if we are not going to be any better than we were when we had no problem.

Mr. JOHNSON. Dr. Middleton tried to point out that the incident in Pennsylvania was from pollution from stationary sources rather than exclusively from automobiles in that particular situation.

Mr. CARTER. Yes, I think that is true. But in London?

Mr. JOHNSON. I would say that was due to a combination of many circumstances.

Mr. CARTER. In Los Angeles, that was from automobiles, was it not?

Mr. JOHNSON. I am not aware of an incident in Los Angeles.

Mr. CARTER. Well, they have had more than one.

Mr. JOHNSON. Certainly, in terms of smog that causes smarting of the eyes, this is from the automobiles.

Dr. MIDDLETON. The problem in London, Mr. Carter, has been alleviated considerably by a change in fuel policy on the part of the British Government. The policy which obliges clean fuels, largely coke, to be used in the inner city, and this is not only sulphur oxides. So by controlling the source of sulphur oxides, in particular, one can expect control, and these programs were expecting to take place here.

Mr. CARTER. Yes, I see we are increasing the number of proposed standards that we will have as far as cars are concerned, three grams per mile, is that correct?

Dr. MIDDLETON. That is true. The 1975 model, which means the calendar year 1974.

Mr. CARTER. That seems rather slow. There are many other emissions and I don't see them recorded here. I think you should have standards for them also.

Thank you, Mr. Chairman.

Mr. ROGERS. Did you want to comment on that?

Mr. AUERBACH. Listed on that chart are the principal emissions from motor vehicles. They account for most of what comes out of the exhaust pipe.

Mr. CARTER. There are some other very toxic ones which are not named there?

Dr. MIDDLETON. There are a number of other pollutants that come purely from the motor vehicle and from stationary sources. Perhaps you are aware of the fact that we are publishing this month's criteria for not only carbon monoxide and hydrocarbons and plan to have them for polynuclear hydrocarbons, and oxides of nitrogen next year.

These, then, will pave the way for the control of the other pollutants you are discussing, I believe.

Mr. CARTER. I am glad to hear that. Thank you.

Mr. ROGERS. What is the generally accepted percentage that automobile pollution contributes to the overall air pollution problem in the Nation? I heard 60 percent. Is that generally accepted?

Dr. MIDDLETON. 55 percent of the total tonnage of pollutants in this country come from transportation sources and of the transportation sources, the motor vehicle is far and away the highest percentage, in excess of 90 percent. These pollutants, however, are not all the pollutants that are emitted into the atmosphere. There are hydrocarbons and others.

Mr. ROGERS. If we can do something about this, as it looks like it is feasible to do now with the automobiles, nonleaded gasoline, this will be, I presume, the most significant step we can take in fighting air pollution in the immediate future, isn't that true?

Mr. JOHNSON. It certainly is one of the most significant steps and it is a step we must certainly take.

Mr. ROGERS. Is there any more significant step you can think of at this time?

Mr. JOHNSON. I don't think there is any more important step. I think there is one in terms of sulphur oxide that makes up a large percentage of the tonnage, but not as much as comes from the automobile.

Mr. ROGERS. What would be the percentage of the sulphur problem?

Dr. MIDDLETON. The automobile and the stationary sources of combustion, largely fuel sources, account each for just about half the problem, 45 percent each, and 10 percent from miscellaneous sources.

Mr. ROGERS. What is your definition of clean air? How many particles of pollution in a section of air, say, half the size of a sugar cube or do you get it down to that?

Dr. MIDDLETON. My definition of clean air is something that is not only protective of health and welfare, but that gives me an environment I have had to go to distant places to find. Being a former Californian, I am most accustomed to clean air in the High Sierras. I am very happy to locate some areas on the Eastern Seaboard. They are a little harder to find, but I find some areas in Virginia and Maryland, on the Chesapeake Bay area, very attractive.

It is not only the allowable amounts of pollutants, but it is the physical characteristic of air that permits a person to enjoy an environment. So my definition of clean air is something that is more like the earth originally had been than it is today.

Whether we can achieve that everywhere is unlikely, but we must protect air of a good quality where it exists and control air pollution where we have problems down to acceptable levels.

Mr. ROGERS. Are you aware of the work done by the Atmospheric Research Center?

Dr. MIDDLETON. Yes, I am.

Mr. ROGERS. They say there is no clean air now, according to their standards, in the United States and I think they relate that to at least 2,000 particles of pollution in a section of air half the size of a sugar cube.

Most metropolitan areas today average 15,000 particles.

Dr. MIDDLETON. If it was taken into account the condensation nuclei of 0.2 microns in diameter, I would have to agree with their figures.

Mr. ROGERS. Of course, they project unless we do something in 20 years, men will live in new cities and in 10 to 15 years all of us will have to wear a breathing helmet to survive outdoors. This is their projection.

Dr. MIDDLETON. There is room for differences of opinion in many areas and this may be one in which I would like to reserve it.

Mr. ROGERS. I would like to have your comment on that for the record.

(The following information was received for the record:)

Projections such as the one cited above generally are based on an assumption that no progress will be made in dealing with the Nation's air pollution problems. Certainly, if no progress is made, the problem will worsen, amounts of pollutants emitted into the air will increase, and air quality will continue to deteriorate.

Mr. ROGERS. We appreciate your presence here at this time. We may want to, of course, consult with you later. If you would furnish those things for the record which we have asked to have. On these automobiles that you did test for these systems that you have asked to bring the standards down, what did you test there?

Dr. MIDDLETON. We tested for carbon monoxide and hydrocarbons, to determine whether they are in compliance with the emission standards according to the test procedures we adopted.

Mr. ROGERS. What was the result of the test?

Dr. MIDDLETON. The result of the test was on the average cars failed to meet the carbon monoxide standards by about 25 percent, the hydrocarbon by about 15 percent. There were differences, you may recall, Mr. Chairman, among the four motor vehicle companies, with the American Motor Company being among the cleanest.

Mr. ROGERS. Did you check as far as life expectancy of any of the systems?

Dr. MIDDLETON. Yes, we do. As I indicated earlier, our durability test is not satisfactory and we are in the process of developing one that will be more realistic.

Mr. ROGERS. Could you tell us what was shown by the tests you gave?

Dr. MIDDLETON. The durability tests very often showed that as cars grew older, the emission control systems grew better. That is statistically unlikely.

Mr. ROGERS. Who did the testing?

Dr. MIDDLETON. The emissions tests were performed both by the motor vehicle company and ourselves, but the cars tested were primarily in the control of the motor vehicle companies.

Mr. ROGERS. Would you say you are designing new tests?

Dr. MIDDLETON. We are designing a different way of making durability tests to make sure there is not an automobile engineer in every trunk of every tested car.

Mr. ROGERS. You are going to furnish us a breakdown of the number of people involved in the various activities?

Mr. JOHNSON. If we have not, we will supply it.

Mr. ROGERS. And give us some budget breakdown and we wanted the control activities, also the research activities and on surveillance are you actively participating in a program in trying to set up surveillance programs?

Mr. JOHNSON. Yes, we are.

Mr. ROGERS. Can you tell me briefly what progress you are making there?

Mr. JOHNSON. We are actively working with the States as they develop their pollution control programs and they tend to become part of the national surveillance network, and we are carrying out active training programs for the people engaged in this type of endeavor and we will be glad to let you know.

Dr. Middleton would like to make an additional comment.

Dr. MIDDLETON. I think you would be interested to know because of our grants system to the states and localities for air pollution control purposes and the development by State and local governments of air quality monitoring systems and the collection of that data, that through contracts and through those air pollution control agencies and our own computer facilities now, we are developing for publication this May a report on the air quality in different cities across the

country that will be a regular annual reporting system, so we can see and detect whether there are, in fact, improvements in air quality.

Mr. ROGERS. I think that is excellent. Now you have set air quality standards, have you, for all of the air sheds of the country?

Dr. MIDDLETON. The standards are in the process of being set by the States. The Secretary has announced his approval of the standards for the air quality control region embracing Philadelphia, and you can expect other standards to be approved by him.

Mr. ROGERS. How many have now been approved by the Secretary since the law was passed?

Dr. MIDDLETON. The standards of the States of Pennsylvania, New Jersey and Delaware for the Philadelphia metropolitan area were approved, I believe, last week.

Mr. ROGERS. And have any others? These are the only ones that have been approved in the Nation?

Dr. MIDDLETON. The only ones that have been approved to date.

Mr. ROGERS. This does not seem to be very rapid progress, does it?

Dr. MIDDLETON. Considering the difficulties in the states and the fact that we have before us now a number, more than a dozen, state standards to approve, I think this is progress.

Mr. ROGERS. I would like to have the committee advised on the states that you anticipate will be ruled on shortly or at least who have asked for approval. How many have not even submitted? How many have not submitted anything to you at all?

Dr. MIDDLETON. I could supply that for the record. (See table on pp. 234 to 237.)

Mr. JOHNSON. I think it is important to point out that while this may seem like slow progress, it is fairly within the timetable prescribed by the Act and it does take a minimum of about 15 months to arrive at a point when you are actually approving standards.

Mr. ROGERS. Are you going to try to set national standards on air quality rather than just letting regional standards be set?

Mr. JOHNSON. That is part of the legislation before you. I believe a time when we come back, we will be glad to discuss those aspects.

Mr. ROGERS. This is contemplated?

Mr. JOHNSON. This is contemplated.

Mr. ROGERS. Do you plan to have more enforcement powers to get some action? Because I don't see very many control actions brought about by local authorities yet. Is this true?

Dr. MIDDLETON. Of course, Congressman Rogers, you recognize that for the air quality control regions within the States, the amount of action depends upon the State's interest, and so there is good control in some places. Mr. Johnson mentioned improvement in sulphur oxides in New York City as an example.

There are other areas where we would like to see more progress, much more.

Mr. ROGERS. Would you let us know those areas where you feel there is sufficient progress and those areas where you are not having much progress on control?

(The following information was received for the record:)

The attached table summarizes the progress States are making in the adoption of air quality standards and implementation plans for air quality control regions designed under the Clean Air Act, as amended.

| | | | | | | |
|----------------------------|---------------|---------------|---------------|----------------|---------------|---------------|
| Houston | Oct. 28, 1969 | Nov. 10, 1969 | Jan. 20, 1970 | Texas | Apr. 20, 1970 | Feb. 12, 1970 |
| Dallas-Ft. Worth | Oct. 29, 1969 | Nov. 12, 1969 | do | do | do | do |
| San Antonio | Oct. 30, 1969 | Nov. 14, 1969 | do | do | do | do |
| Birmingham | Dec. 9, 1969 | Dec. 17, 1969 | Mar. 7, 1970 | Alabama | do | do |
| Toledo | do | Dec. 19, 1969 | do | Dhlo | do | Mar. 6, 1970 |
| Stuebenville | Aug. 13, 1969 | Aug. 27, 1969 | Dec. 6, 1969 | Michigan | do | do |
| Chattanooga | Dec. 9, 1969 | Dec. 18, 1969 | do | West Virginia | Mar. 6, 1970 | Feb. 5, 1970 |
| Atlanta | Feb. 3, 1970 | Feb. 13, 1970 | do | Tennessee | do | do |
| Memphis | Jan. 17, 1970 | Jan. 28, 1970 | do | Georgia | do | do |
| Portland | do | do | do | Mississippi | do | do |
| Salt Lake City | do | do | do | Tennessee | do | do |
| New Orleans | do | do | do | Arkansas | do | do |
| Miami | Mar. 21, 1970 | Mar. 31, 1970 | do | Dregon | do | do |
| Oklahoma City | Mar. 19, 1970 | Mar. 26, 1970 | do | Washington | do | do |
| Dmaha | do | do | do | Utah | do | do |
| Honolulu | do | do | do | Louisiana | do | do |
| Beaumont-Port Arthur | do | do | do | Florida | do | do |
| Charlotte | do | do | do | Oklahoma | do | do |
| Portland | do | do | do | Nebraska | do | do |
| Alberquerque | do | do | do | Iowa | do | do |
| Lawrence-Lowell-Manchester | do | do | do | Hawaii | do | do |
| El Paso | do | do | do | Texas | do | do |
| Las Vegas | do | do | do | North Carolina | do | do |
| Fargo-Moorhead | do | do | do | Maine | do | do |
| Boise | do | do | do | New Mexico | do | do |
| Billings | do | do | do | Massachusetts | do | do |
| Sioux Falls | do | do | do | New Hampshire | do | do |
| Cheyenne | do | do | do | Texas | do | do |
| Anchorage | do | do | do | Nevada | do | do |
| Burlington | do | do | do | North Dakota | do | do |
| San Juan | Mar. 19, 1970 | Mar. 20, 1970 | do | Minnesota | do | do |
| Virgin Islands | Mar. 10, 1970 | Mar. 20, 1970 | do | Idaho | do | do |
| | do | do | do | Montana | do | do |
| | do | do | do | South Dakota | do | do |
| | do | do | do | Wyoming | do | do |
| | do | do | do | Alaska | do | do |
| | do | do | do | Vermont | do | do |
| | do | do | do | New York | do | do |
| | do | do | do | Puerto Rico | do | do |

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION AIR QUALITY CONTROL REGION INFORMATION RELATING TO STANDARDS FOR SULFUR OXIDES AND PARTICULATE MATTER—WEEKLY SUMMARY, MAR 22-28, 1970

| REGION | Boundaries Proposed | | | | Designation | State | Standards | | | | Implementation plans | | | |
|----------------------|---------------------|----------------|----------------|----------------|----------------------|----------------|---------------|---------------|---------------|-----|----------------------|------------|-----|-----------|
| | Proposed | Consultation | Oct | Aug | | | Due | Submitted | "approval" | Due | Submitted | "approval" | Due | Submitted |
| Washington, O.C. | Jul. 31, 1968 | Aug. 22, 1968 | Oct. 1, 1968 | Oct. 1, 1968 | Virginia | Nov. 10, 1969 | Oct. 13, 1969 | May 7, 1970 | May 7, 1970 | | | | | |
| | | | | | Maryland | do | Feb. 3, 1970 | do | do | | | | | |
| | | | | | District of Columbia | do | Nov. 7, 1969 | do | do | | | | | |
| New York City | Aug. 30, 1968 | Sept. 30, 1968 | Nov. 20, 1968 | Nov. 20, 1968 | New York | do | Nov. 19, 1969 | do | do | | | | | |
| | | | | | New Jersey | do | Oct. 30, 1969 | do | do | | | | | |
| | | | | | Connecticut | do | Nov. 7, 1969 | do | do | | | | | |
| Chicago | Sept. 28, 1968 | Oct. 21, 1968 | Dec. 4, 1968 | Dec. 4, 1968 | Illinois | do | Nov. 3, 1969 | Mar. 27, 1970 | do | | | | | |
| | | | | | Indiana | do | Nov. 10, 1969 | do | do | | | | | |
| Philadelphia | Oct. 4, 1968 | Oct. 28, 1968 | Dec. 17, 1968 | Dec. 17, 1968 | Pennsylvania | do | Nov. 3, 1969 | Feb. 25, 1970 | do | | | | | |
| | | | | | New Jersey | do | Oct. 30, 1969 | do | do | | | | | |
| | | | | | Delaware | do | Oct. 29, 1969 | do | do | | | | | |
| Denver | Nov. 9, 1968 | Nov. 26, 1969 | Jan. 15, 1969 | Jan. 15, 1969 | Colorado | do | do | do | do | | | | | |
| Los Angeles | Nov. 23, 1968 | Oct. 10, 1968 | Jan. 29, 1969 | Jan. 29, 1969 | California | do | Oct. 15, 1969 | do | do | | | | | |
| St. Louis | Oct. 21, 1968 | Jan. 14, 1969 | Apr. 11, 1969 | Apr. 11, 1969 | Missouri | Jan. 6, 1970 | Jan. 5, 1970 | July 6, 1970 | July 6, 1970 | | | | | |
| Boston | Oct. 24, 1968 | Jan. 17, 1969 | Apr. 12, 1969 | Apr. 12, 1969 | Massachusetts | Jan. 7, 1970 | Jan. 15, 1970 | do | do | | | | | |
| Cincinnati | Jan. 10, 1969 | Jan. 27, 1969 | May 2, 1969 | May 2, 1969 | Massachusetts | Jan. 27, 1970 | Mar. 17, 1970 | July 27, 1970 | July 27, 1970 | | | | | |
| | | | | | Indiana | do | Feb. 25, 1970 | do | do | | | | | |
| San Francisco | Jan. 10, 1969 | Jan. 31, 1969 | May 1, 1969 | May 1, 1969 | Kentucky | do | Jan. 22, 1970 | do | do | | | | | |
| Cleveland | Feb. 12, 1969 | Feb. 26, 1969 | May 23, 1969 | May 23, 1969 | California | Jan. 26, 1970 | Dec. 15, 1969 | do | do | | | | | |
| Pittsburgh | do | do | do | do | Ohio | Feb. 17, 1970 | Mar. 17, 1970 | Aug. 17, 1970 | Aug. 17, 1970 | | | | | |
| Buffalo | do | do | do | do | Pennsylvania | Jan. 26, 1970 | Nov. 3, 1969 | July 27, 1970 | July 27, 1970 | | | | | |
| Kansas City | Mar. 26, 1969 | Apr. 11, 1969 | July 19, 1969 | July 19, 1969 | New York | do | Jan. 27, 1970 | do | do | | | | | |
| | | | | | Missouri | Apr. 15, 1970 | do | Oct. 12, 1970 | Oct. 12, 1970 | | | | | |
| Detroit | Oct. 16, 1969 | Nov. 3, 1969 | Dec. 17, 1969 | Dec. 17, 1969 | Kansas | do | do | do | do | | | | | |
| Baltimore | May 7, 1969 | May 23, 1969 | Aug. 16, 1969 | Aug. 16, 1969 | Michigan | Sept. 14, 1970 | do | Mar. 12, 1971 | Mar. 12, 1971 | | | | | |
| Hartford-Springfield | Apr. 16, 1969 | Apr. 29, 1969 | Oct. 3, 1969 | Oct. 3, 1969 | Maryland | May 13, 1970 | Nov. 9, 1970 | Nov. 9, 1970 | Nov. 9, 1970 | | | | | |
| | | | | | Connecticut | June 30, 1970 | do | Dec. 28, 1970 | Dec. 28, 1970 | | | | | |
| Indianapolis | May 23, 1969 | June 10, 1969 | Sept. 18, 1969 | Sept. 18, 1969 | Massachusetts | do | do | do | do | | | | | |
| Minneapolis-St. Paul | May 7, 1969 | May 21, 1969 | Aug. 16, 1969 | Aug. 16, 1969 | Indiana | June 15, 1970 | do | Oct. 14, 1970 | Oct. 14, 1970 | | | | | |
| Milwaukee | July 8, 1969 | July 21, 1969 | Sept. 18, 1969 | Sept. 18, 1969 | Minnesota | May 13, 1970 | Nov. 13, 1970 | Nov. 13, 1970 | Nov. 13, 1970 | | | | | |
| Providence | July 12, 1969 | July 29, 1969 | Oct. 6, 1969 | Oct. 6, 1969 | Wisconsin | June 15, 1970 | do | Dec. 14, 1970 | Dec. 14, 1970 | | | | | |
| | | | | | Rhode Island | Sept. 2, 1970 | do | Mar. 1, 1971 | Mar. 1, 1971 | | | | | |
| Seattle-Tacoma | July 23, 1969 | Aug. 5, 1969 | Oct. 25, 1969 | Oct. 25, 1969 | Massachusetts | do | do | do | do | | | | | |
| Louisville | Oct. 7, 1969 | Oct. 17, 1969 | Dec. 6, 1969 | Dec. 6, 1969 | Washington | July 22, 1970 | do | Jan. 18, 1971 | Jan. 18, 1971 | | | | | |
| | | | | | Kentucky | Sept. 2, 1970 | do | Mar. 1, 1971 | Mar. 1, 1971 | | | | | |
| | | | | | Indiana | do | do | do | do | | | | | |

| | | | | | | |
|---------------------------------|---------------|---------------|---------------|---------------------|----------------|---------------|
| Dayton..... | Oct. 2, 1969 | Oct. 16, 1969 | Dec. 17, 1969 | Ohio..... | Sept. 14, 1970 | Mar. 12, 1971 |
| Phoenix..... | Oct. 11, 1969 | Oct. 21, 1969 | | Arizona..... | | |
| Houston..... | Oct. 28, 1969 | Nov. 10, 1969 | Jan. 20, 1970 | Texas..... | Oct. 19, 1970 | Apr. 15, 1971 |
| Dallas-Fort Worth..... | Oct. 29, 1969 | Nov. 12, 1969 | .do. | Texas..... | .do. | .do. |
| San Antonio..... | Oct. 30, 1969 | Nov. 14, 1969 | .do. | Texas..... | .do. | .do. |
| Birmingham..... | Oct. 9, 1969 | Dec. 17, 1969 | Mar. 7, 1970 | Alabama..... | | |
| Toledo..... | .do. | Dec. 19, 1969 | | Ohio..... | | |
| Steubenville..... | Aug. 13, 1969 | Aug. 27, 1969 | Dec. 6, 1969 | Michigan..... | Sept. 2, 1970 | Mar. 1, 1971 |
| Chattanooga..... | Dec. 9, 1969 | Dec. 18, 1969 | | West Virginia..... | .do. | .do. |
| Atlanta..... | Feb. 3, 1970 | Feb. 13, 1970 | | Georgia..... | | |
| Memphis..... | Jan. 17, 1970 | Jan. 28, 1970 | | Mississippi..... | | |
| | | | | Tennessee..... | | |
| Portland..... | | | | Arkansas..... | | |
| Salt Lake City..... | | | | Oregon..... | | |
| New Orleans..... | | | | Washington..... | | |
| Miami..... | Mar. 21, 1970 | Mar. 31, 1970 | | Utah..... | | |
| Oklahoma City..... | Mar. 19, 1970 | Mar. 28, 1970 | | Louisiana..... | | |
| | | | | Florida..... | | |
| Honolulu..... | | | | Oklahoma..... | | |
| Beaumont-Port Arthur..... | | | | Nebraska..... | | |
| Charlotte..... | | | | Iowa..... | | |
| Portland..... | | | | Hawaii..... | | |
| Albuquerque..... | | | | Texas..... | | |
| Lawrence-Lowell-Manchester..... | | | | North Carolina..... | | |
| | | | | Maine..... | | |
| El Paso..... | | | | New Mexico..... | | |
| Las Vegas..... | | | | Massachusetts..... | | |
| Fargo-Moorhead..... | | | | New Hampshire..... | | |
| | | | | Texas..... | | |
| Boise..... | | | | Nevada..... | | |
| Billings..... | | | | North Dakota..... | | |
| Stoux Falls..... | | | | Minnesota..... | | |
| Cheyenne..... | | | | Idaho..... | | |
| Anchorage..... | | | | Montana..... | | |
| Burlington..... | | | | South Dakota..... | | |
| | | | | Wyoming..... | | |
| | | | | Alaska..... | | |
| | | | | Vermont..... | | |
| | | | | New York..... | | |
| | | | | Puerto Rico..... | | |
| San Juan..... | Mar. 10, 1970 | | | | | |
| Virgin Islands..... | | | | | | |

Mr. ROGERS. The committee will stand in recess until 1:30 this afternoon.

(Whereupon, at 12:20 p.m. the subcommittee recessed, to reconvene at 1:30 p.m. of the same day.)

AFTER RECESS

(The subcommittee reconvened at 1:30 p.m., Hon. Paul G. Rogers presiding.)

Mr. ROGERS. The subcommittee will come to order.

Our first witness this afternoon is Mr. Earl T. Hayes, Acting Director, Bureau of Mines, Department of the Interior. Welcome, Mr. Hayes.

STATEMENT OF EARL T. HAYES, ACTING DIRECTOR, BUREAU OF MINES, DEPARTMENT OF THE INTERIOR, ACCOMPANIED BY J. WADE WATKINS, DIRECTOR OF PETROLEUM RESEARCH

Mr. HAYES. Thank you, Mr. Chairman. I am accompanied today by Mr. J. Wade Watkins, Director of Petroleum Research, Bureau of Mines. I have a short statement which I would like to read into the record.

Scientists and engineers at the Bartlesville Petroleum Research Center of the Bureau of Mines have acquired unique competence in research on fuels combustion over a period of many years. Because of that recognized competence, the Bartlesville Center was chosen by the Public Health Service of the Department of Health, Education, and Welfare (now the National Air Pollution Control Administration), the American Petroleum Institute, and the Coordinating Research Council to undertake a comprehensive program on fuels-combustion problems as related to the abatement of air pollution caused by emissions from automobile and diesel engines.

As a part of the Bureau's overall fuels-combustion research program, a study was begun in mid-1968 on the effect of lead, per se, as a component of gasoline and the effect of lead deposits on automotive exhaust emissions. This was not a major effort, but was a part of a more inclusive research project on the effect on emissions of variations in fuels. The work in fiscal year 1970 includes the evaluation of fuel additives and lead. No work has been devoted exclusively to the lead problem.

Results to date indicate that lead as a component has no effect on emissions other than as a particulate, about 75 percent of which is emitted in the exhaust stream. The lead deposits that remain in the engine do increase the emissions from some engines, but the effect varies with the engine and its operating cycle.

An additional result of the described research is that blending to produce gasolines having an octane number comparable to that of today's premium gasoline, but not containing lead, can increase the pollution effect by as much as 25 percent. This occurs because the aromatic components used to replace lead are highly reactive with sunlight and are the components most likely to form smog.

The entire question of lead particles emitted from the exhaust systems of vehicles that burn leaded gasoline has been of great public

concern recently. It is becoming apparent that the petroleum industry will have to refine and market unleaded fuels and that the automobile industry will have to manufacture and market automobiles with engines designed to operate on unleaded gasolines. Spokesmen for both industries have indicated a willingness to make these moves to combat air pollution caused by emissions from internal-combustion engines. The principal unanswered question is how rapidly the transition to unleaded fuels and redesigned engines can be effected. Critics of leaded fuels cite the fact that one oil company the American Oil Company—now markets an unleaded gasoline. This is true. However, the unleaded gasoline sold by AMOCO is its premium-grade fuel only, which is marketed in 25 Eastern and Southern states. AMOCO's regular-grade fuel in all areas and its premium-grade fuel marketed in other states do contain lead. Reportedly the unleaded fuel marketed by AMOCO amounts to about 20 percent of the company's gasoline sales. The principal reason for this, and for the higher cost of AMOCO premium-grade gasoline, is that existing refinery equipment and processes are not capable of supplying the quantities of refined blending stocks that would be required to manufacture all the unleaded gasoline required having octane numbers comparable to present-day regular and premium fuels. Thus, the unleaded gasoline the refiners now are talking about that will be available in the near future will not have an octane number of 100+, but probably will be somewhere at about the 90 octane level. Neither will the automobile engines the industry spokesmen refer to be the high-compression engine of today, but will have a lower compression ratio, which will assist in controlling emissions of oxides of nitrogen. Thus, it is probable that the transition to all unleaded fuels may require a few years if fuels suitable for the high-compression engines in existing automobiles continue to be available.

There will be two principal effects of going to all unleaded fuels. First, some new refining units will be required and refining processes will have to be changed, especially if it is desired to gradually come back to high-octane fuels and high-compression engines. The cost has been estimated by some refiners at a few billion dollars. Unless the refiners are able to absorb that cost, it will be passed on to the consumer in higher prices for gasoline.

Second, it is probable that new automobiles designed to burn unleaded gasoline will be equipped with catalytic converters to reduce to a minimum, with other control systems, toxic exhaust constituents, such as carbon monoxide, and reactive constituents, such as unburned hydrocarbons and oxides of nitrogen. Present catalytic converters are not effective in processing exhaust emissions from engines burning leaded fuels because the deposition of lead particles tend to deactivate the catalyst.

Mr. Chairman, that concludes my formal statement.

Mr. ROGERS. Thank you very much.

Mr. Satterfield?

Mr. SATTERFIELD. Thank you, Mr. Chairman.

In reading the final, principal effects that you mention in your statement, apparently you are considering a temporary period for the removal of lead from gasoline. You do not suggest this should be a permanent thing.

Mr. WATKINS. Mr. Satterfield, we did not mean to imply that. What the statement implies or what it should imply is the fact that the consumer, being used to a high-compression, high-performance car, may not be completely happy with one which gives him lower performance, and that the trend may gradually shift back to higher compression engines and higher octane fuel, but without lead, made by blending particular components.

Mr. SATTERFIELD. Do you discount the fact that they might find the means whereby, whether you use a catalytic device or some other device to remove the pollutant from exhaust a system can be developed that would work equally well with leaded gasoline? This is not impossible, is it?

Mr. WATKINS. Nothing is impossible, but on the basis of our experience with present technology it looks improbable.

Mr. SATTERFIELD. If we go to unleaded gasoline, such a development will be improbable because there will be no reason for it, is that correct?

Mr. WATKINS. I did not understand the question.

Mr. SATTERFIELD. If we go to a unleaded gasoline, we will not develop such a device because there will no longer be a reason for it?

Mr. WATKINS. Right. There will be no occasion to.

Mr. SATTERFIELD. Are you familiar with an article written by R. W. Hurn, project coordinator of the Petroleum Research Center in Bartlesville, Okla., which appeared in an SME publication—I don't have a date here, but recently?

Mr. WATKINS. Yes, sir.

Mr. SATTERFIELD. Do you agree with what it says?

Mr. WATKINS. Yes, sir.

Mr. SATTERFIELD. It is possible, is it not, that devices other than catalytic converters could be developed that would do the same job as catalytic converters would do?

Mr. WATKINS. It is possible.

Mr. SATTERFIELD. And it is only with the catalytic converter that we have trouble with lead?

Mr. WATKINS. As far as reactive emissions are concerned, yes.

Mr. SATTERFIELD. Is this because it affects the catalyst itself and makes it inoperable?

Mr. WATKINS. It is more probable, we feel, that it plates out on the catalyst rather than a poisoning of the catalyst which is coated with lead particles. There may be chemical action.

Mr. SATTERFIELD. But it prevents the catalyst from functioning as a catalyst?

Mr. WATKINS. Correct.

Mr. HAYES. I would like to add some views which may help clarify our position. We view with a little alarm any precipitous action. We are a Government agency concerned with natural mineral resources and any change in the supply and demand pattern upsets not only one industry, but several others.

For instance, there are 100 million cars or so on the road. Roughly 10 million of these are junked each year. If you speed up the rate of obsolescence, as you might, you already aggravate a problem that is

just barely in balance at this time. When a car is junked, the copper from the radiator and alternator is recovered, the lead in the battery is saved; but when you finish with the carcass of about 1700 pounds, it often does not pay to process it.

In the last few months there has been an unusual demand for scrap steel. But over the longer term, since the basic oxygen furnace came in, it aggravated the problem of disposal of the thinner automobile scrap.

We in the Bureau of Mines also worked on recovering the other metals from junk cars. We think that given more time, we will be able to recover more of these, aluminum, zinc, copper and the like.

The second feature is that the lead used in gasoline today constitutes 20 percent of the sales of the lead industry. They have gone through this before, given suitable time, and have adjusted as witness the story of the demise of lead paints.

Certainly an orderly withdrawal pattern is desirable. I do not want you to misunderstand us for a minute. We did not set the standards for toxicity or the like, but we do have to keep in mind the natural resources. There is also another feature to consider. If you had to increase the refinery capacity to create a gasoline a la Amoco by cracking and reforming, you would have a shortage of platinum.

This is not a highly attractive market for the platinum producer. It takes five to seven years to develop a mine after you have the ore reserve and you see the market up ahead. But this is a one- or two-shot market, so to speak, it is not a very enticing one.

I believe seven or ten years given for this transition—would certainly help the national mineral resources planning.

Mr. SATTERFIELD. You are really saying that there are some other things that we have not discussed today that ought to be considered when we consider the economic impact of the various routes that we may have to choose from?

Mr. HAYES. That's right. We do not question at all the decision to take lead out of gasoline. All we say is that it should be planned and orderly.

Mr. SATTERFIELD. Do you say you must take lead out of gasoline to get the pollutant out of the exhaust system.

Mr. HAYES. It would appear from the testimony that this is necessary.

Mr. SATTERFIELD. You don't think there is any other way it might be done or that we cannot develop some other way to do it?

Mr. HAYES. I was a research metallurgist for 18 years and I would never say that anything could not be done.

Mr. SATTERFIELD. Thank you sir.

Mr. ROGERS. Would you describe for us the composition and function of the National Petroleum Council in this field?

Mr. HAYES. Mr. Watkins will answer that.

Mr. WATKINS. The National Petroleum Council, Mr. Chairman, was established by the Secretary of Interior several years ago to advise him on matters pertaining to the petroleum industry. It has two co-chairmen, the Secretary of Interior and a co-chairman from industry. It meets, I believe, biannually. The composition of it is very much either chairmen of the board or presidents of oil companies.

Mr. ROGERS. Now what is their role in this particular field?

Mr. WATKINS. Often periodically the Secretary has asked them to undertake certain studies. They form a committee or task force, make the study and come back to the Department with a report on the results of it.

Mr. ROGERS. Has it been done in this area?

Mr. WATKINS. Not to my knowledge, sir.

Mr. ROGERS. Is there any plan to do so?

Mr. WATKINS. So far as I know, there are no plans to do so.

Mr. ROGERS. Would you let us have a statement to that for the record?

Mr. HAYES. We will furnish a statement for the record.

(The following statement was received for the record:)

STATEMENT ON THE NATIONAL PETROLEUM COUNCIL

In May 1946, the President of the United States, by letter to the Secretary of the Interior, stated that he had been impressed with the great contribution of Government-industry cooperation to the success of the World War II petroleum program, and that he felt the values of such close and harmonious relations between Government and the petroleum industry should be continued. Accordingly, the President suggested that the Secretary of the Interior establish an industry organization to consult with and advise the Secretary on oil and gas matters.

Pursuant to this direction, the National Petroleum Council was established by the Secretary of the Interior, Hon. J. A. Krug, on June 18, 1946.

The purpose of the National Petroleum Council is solely to advise, inform, and make recommendations to the Secretary of the Interior with respect to any matter relating to petroleum or the petroleum industry submitted to it by, or approved by, the Secretary. The Council does reserve the right to decide whether it will or will not consider any matter referred to it. The Council does not concern itself with trade practices or the like, nor does it engage generally in any of the usual trade association activities.

Members of the National Petroleum Council are appointed each fiscal year by the Secretary of the Interior for one-year terms, the membership being drawn from all segments of the petroleum and natural gas industries, from the production phase to the retail marketing level. The Council is wholly supported by the voluntary contributions received from its members.

The Council is headed by a Chairman and Vice Chairman, both members of the Council and the industry. The Secretary of the Interior serves as Co-Chairman of the National Petroleum Council.

Typical of the studies made by the National Petroleum Council are the following:

Petroleum Resources Under the Ocean Floor

Materials Requirements for Petroleum Exploration and Production

Skills and Occupations of Petroleum in the United States Oil and Gas Industries

Impact of New Technology on the U.S. Petroleum Industry (1946-1965)

Factors Affecting U.S. Exploration, Development and Production 1946-1965

U.S. Petroleum and Gas Transportation Capacities

Critical Materials Requirements for Petroleum Refining

Estimated Productive Capacities of Crude Oil, Natural Gas and Natural Gas Liquids in the United States (1965-1970)

Petroleum Policies for the United States

What is the Emergency Petroleum and Gas Administration

Emergency Fuel Convertibility

Proved Discoveries and Productive Capacity of Crude Oil, Natural Gas and Natural Gas Liquids in the United States

Civil Defense and Emergency Planning for the Petroleum and Gas Industries

Petroleum and Gas in A National Emergency

The National Petroleum Council has an active study group on air and water pollution, which currently is engaged in a study of the broad aspects for the Department. Undoubtedly, this group will look at the air pollution potential, economics, and logistics of leaded and unleaded gasolines, although the field of inquiry will be much broader than this problem alone. The study group's report will be submitted to Secretary Hickel in the near future.

Mr. ROGERS. We have a call to the floor for a vote. We will perhaps ask you to come back later if we need to for questioning, but I do not think we will at the present time continue. So we will excuse you at this time and we will recess the committee just long enough for us to go vote, if that is satisfactory to you.

Then we will come back and our next witness—because we have a witness who has come from out of town—will be Mr. Robert Gunness, president of Standard Oil Co. of Indiana.

Mr. Gunness, is he present? Mr. Gunness, if you will bear with us, we will recess and be right back and then we will take your testimony.

The committee will stand in recess.

(Whereupon a short recess was taken.)

Mr. ROGERS. I will call on Mr. Spear to introduce our next witness to the committee.

Mr. SPEAR. Thank you, Mr. Chairman.

It is a pleasure to present to you Mr. Robert C. Gunness, president of Standard Oil of Indiana. Mr. Gunness holds a doctor's degree from Massachusetts Institute of Technology in Chemical Engineering. He has had a great deal of experience in the refining business.

He has made many substantial scientific contributions to the development of refining processes. He is familiar with all aspects of the business. I think he will be able to furnish a great deal of valuable and informative information to your committee. He is accompanied by two gentlemen who he will identify.

Mr. ROGERS. Thank you. We do welcome you to the committee and we will be glad for you to proceed.

STATEMENT OF ROBERT C. GUNNESS, PRESIDENT, STANDARD OIL COMPANY OF INDIANA; ACCOMPANIED BY W. W. SPEAR, WASHINGTON REPRESENTATIVE; DR. PHILIP C. WHITE, GENERAL MANAGER OF RESEARCH; AND RUSSELL C. MALLATT, COORDINATOR FOR AIR AND WATER CONSERVATION

Mr. GUNNESS. Distinguished members of the committee:

In addition to Mr. Spear, I am accompanied by Dr. Philip C. White and Mr. Russell C. Mallatt. Dr. White is our General Manager of Research. Mr. Mallatt is Standard's Coordinator for Air and Water Conservation.

We consider it a privilege to appear before this committee.

In recent months our company has received inquiries from several Members of Congress concerning the history of manufacture and marketing of unleaded gasoline by our wholly owned subsidiary, American Oil Company. We were also advised last fall that when this committee reconvened, that you would be interested in hearing our views on the problems our company and the petroleum industry as a whole would face if use of lead in gasoline were to be prohibited.

We understand that H.R. 15848 has since been referred to this committee and your inquiry has been broadened. We would like to address the first part of our testimony to the far-reaching provisions of this bill. Secondly, we would like to give you our views on the relation between lead content in gasoline and effective emissions control. Then we will review briefly our experience in the development and marketing of both leaded and unleaded gasoline, and the problems we see in a nationwide changeover to unleaded gasoline.

Although there are many features in this bill, which will be discussed by others. Section 5 includes such important provisions that I would like to address myself primarily to this portion of the bill.

Section 5 would authorize HEW to establish standards for the composition and/or the chemical or physical properties of any fuel or fuel additive to assure that they will not cause or contribute to emissions which would endanger the public health or welfare or impair the functioning of control devices.

The objective of this legislation is to improve the quality of the air we breathe. Control of automotive emissions is obviously one of the direct and necessary routes to reach this objective. In 1965, Congress granted the Secretary of Health, Education, and Welfare authority to establish emission standards.

The experience of the past few years has overwhelmingly shown that once HEW promulgates realistic and desired emission control goals, the automotive and petroleum industries will apply their research and technical resources, competing vigorously within each industry, to achieve these goals.

There certainly has been no evidence that the industries will not continue to do so with respect to future emission standards. Indeed, the recent flurry of announcements regarding the removal of lead from gasoline, which we will discuss in more detail later, is a prime example of the competitive forces in action to meet the anticipated Federal 1975 and 1980 emission standards.

Control of fuel composition does not necessarily contribute directly to the control of emissions. On the contrary, imposition of Government controls in a matter as complex as motor fuel blending may well inhibit the industry's ability to develop the most effective approach to pollution abatement. It will certainly stifle innovative approaches and reduce competition within our industry. If one thing is clear, it is that we need to remain flexible and unfettered in our search for the most desirable fuels.

Section 5 would authorize HEW to establish standards for the composition or the chemical or physical properties of any fuel or fuel additive, regardless of whether an incontrovertible relationship had been established between such properties and automotive emissions. We feel this requirement to be unwisely restrictive, and that need for such authority has not been demonstrated.

Section 5 extends registration requirements far beyond provisions of the 1967 Air Quality Act. This new bill would authorize HEW to withhold registration of fuels until the manufacturer furnished practically any information HEW deems "reasonable and necessary." In 1967 in framing the Air Quality Act, the Congress wisely rejected this as a fishing expedition-type approach. We believe this continues to be a valid position.

We further question the significance of the entire procedure of registering a "fuel," since fuels are normally mixtures of hundreds of hydrocarbon types, whose exact composition is unknown and fluctuates from day to day within a range of physical properties already closely specified by the American National Standards Institute and other recognized scientific bodies.

In summary, it is our position that Government should concern itself with the incidence of automotive emissions which contaminate our environment, rather than with factors of fuel composition or

engine design which may or may not result in such emissions. A minimum of restriction should be placed on the automotive and petroleum industries in reaching prescribed objectives. This is not to say that certain factors may not be of such compelling importance as to demand specific limitation. The content of lead in gasoline may be such an example.

So much for comments directly related to H.R. 15848. I would now like to turn more specifically to the matter of the interrelationships of lead in gasoline and pollution control.

In the past 15 years much has been accomplished in lowering automotive emissions without limiting the use of lead in fuel. Crankcase ventilation control, reduction of evaporation from the fuel system, and use of secondary air in the exhaust, coupled with modified adjustments in carburetor and ignition timing have collectively accomplished an 80 percent reduction in total hydrocarbon and carbon monoxide emissions. It is only when we need to reach still lower hydrocarbon and carbon monoxide levels, and to tackle nitrogen oxide reduction, that we have to turn to techniques where lead poses a problem.

To date the technology has been developed for two approaches for the further reduction of hydrocarbons, carbon monoxide, and nitrogen oxides from automobile exhaust. One system, based on temperature effects, involves carburetion and timing adjustments in conjunction with exhaust-gas recirculation and afterburners. It does a commendable job. For still lower emission we must turn to a more advanced approach. A catalytic system is required in which one catalyst reduces nitrogen oxides to nitrogen and byproducts, and another catalyst converts carbon monoxide to carbon dioxide and water. Both systems are limited in their capabilities, particularly as related to service life, when used with fuels containing lead. Afterburners are corroded by the halogen scavengers contained in the lead fluid, and controls of the exhaust recirculation system are fouled by lead deposits. All known exhaust catalysts are deactivated by lead and the catalyst for reduction of nitrogen oxide is poisoned rapidly.

To overcome these adverse effects, while still enjoying the advantages of lead in gasoline, we have directed much of the recent research towards the development of effective lead traps and lead-resistant catalysts. We have investigated several types of lead traps, and none was more than 50 percent effective. We tested more than 200 catalysts, particularly those useful in reducing nitrogen oxide emissions, and found none which really perform satisfactorily with leaded fuels.

On the contrary, a number of catalysts were found to work effectively for extended periods of time with unleaded gasolines.

Based largely on such technical data, it became evident to us and to other knowledgeable people in both the automotive and oil industries that the ultimate reductions in automotive air pollution would not be possible unless lead content of gasolines is eliminated. It should be understood, however, that this conclusion is based upon the adverse impact of leaded fuel upon the proper functioning of emission control devices, rather than upon the pollution effect of lead emissions themselves.

It is only when some or all of the more advanced emission control equipment is used with unleaded fuel that important reductions in emission can be achieved. Of course, elimination of lead from gasoline will remove it as a direct atmospheric contaminant, but the significance of lead itself as a direct pollutant is still a matter of some controversy.

In the light of the foregoing, on February 10, 1970, Mr. John E. Swearingen, Chairman of the Board of our company, announced that to help reduce pollution from the automobile, Indiana Standard would make unleaded gasoline available in its marketing areas at such time as the auto-makers distribute cars equipped to require such fuels.

I am sure the committee is aware that the elimination of lead from gasoline poses major problems for both automotive and fuel manufacturers. The economic resolution of adaption to a lead-free fuel will undoubtedly require accommodation of both engine and fuel design. Simple removal of lead from gasoline so lowers octane numbers as to require major modifications in engine design to permit satisfactory operation. Although fuel octane numbers can, in substantial degree, be restored by more intensive refining, it can be done only at the expense of yield of product on crude and increased operating and capital costs.

Based on recent announcements by executives of one leading auto manufacturer, it is evident that automobiles with engines modified to operate on an 91 octane unleaded fuel will begin to appear on our highways late in 1970. Some petroleum companies will undoubtedly supply this unleaded gasoline in limited volumes for these new models. To the extent feasible, our company will also make such a product generally available. However, I will have to say later more on the problems associated with the industry meeting such an objective universally at an early date.

The projected 1971 model cars, as we understand the manufacturers' plans, will not be equipped to do a much better job of pollution control than are the current '70 cars, even though operated on an unleaded fuel. Wide-scale introduction of the more advanced control equipment seems to be two or three years away. Therefore, it would be misleading to imply that all the benefits which the removal of lead from gasoline can bring to automotive pollution control will be available this fall, or in 1971. The ultimate benefits of lead removal can only be obtained when the most advanced emission control equipment is incorporated in all cars on the highway.

Of equal complexity and importance to the petroleum industry is the matter of how the transition is accomplished from a situation in which all cars are designed to operate on high octane lead-containing fuels as they are today to the point in time, perhaps ten years hence, when all cars then on the road are designed to operate on lead-free fuels. It has been suggested by one automotive manufacturer that this transition be eased by adjusting all cars presently on the road to operate at lower octane numbers than presently required. This, in turn, would permit the petroleum industry to supply a leaded premium-grade fuel, of say 97 octane number, and an unleaded fuel of adequate octane number, say 91, to meet the needs of both existing regular-grade cars and all new model cars. Such a program would

ostensibly permit the petroleum industry to avoid a heavy investment in new refining facilities and at the same time serve the public needs with only two grades of fuel.

Although we agree that such a program, if fully implemented, would avoid major new refining investment, we have serious doubts that it is a practical program. There are nearly 100 million cars and trucks on the road which would require adjustment to permit operation on the proposed lower octane fuels. In the face of the limited service facilities capable of making the necessary adjustments, and owner resistance to engine modifications for reasons of both cost and convenience, we believe that there will remain a heavy demand for current quality fuels. We feel a heavy responsibility to meet these demands of our customers. As we view it, the only method by which the suggested two-fuel system might work would be through imposition, by regulation or otherwise, of restrictions on the quality of fuels, both minimum and maximum. It is our judgment that, in all realism, any such regulation would likely be so delayed that we must be prepared to meet the needs of unmodified existing cars, while at the same time supplying a new unleaded fuel for the new model cars.

Provision of an added grade of fuel poses an enormous distribution problem for most of the petroleum industry. Today only 20 percent of the service stations are so equipped that they could market two grades of leaded and one grade of unleaded fuel. We estimate that to equip the remaining stations to distribute such fuels would require nearly 1 million additional gasoline pumps and 300,000 added gasoline storage tanks, as well as a massive installation effort. These requirements are manifold in excess of current annual manufacturing capacity. For the industry the costs of equipping to distribute generally an additional fuel is perhaps \$2-3 billion. For our own company we estimate it roughly at \$150 million. The capital requirements are of great importance to our company and to the industry, and must ultimately be recovered from the consumer in the form of higher prices. With respect to timing, the magnitude of the task leads us to conclude that the transition to a three-grade marketing situation, in which unleaded fuel is broadly available, will require several years to accomplish, even though at selected locations unleaded fuel will almost certainly become available this fall.

It is further our view that the difficulties of car modifications coupled with competitive conditions in the marketplace are unlikely to permit a general reduction in the quality of present grades of fuels. We, therefore, do not believe that the production of an unleaded gasoline can be accomplished by reduction in the quality of present fuels, but rather that new refining facilities will be required to make this product. We view it as essential that car models designed to be operated on unleaded fuel be capable of satisfactory operation with gasolines with octane ratings no higher than the suggested level of 91.

I have indicated that, although the matter is still under study, we have so far perceived no entirely practical method of meeting the public need during the transition period other than by the supply of three grades of fuel, two leaded and one unleaded. Such matters as other possible solutions to the problem, grades of fuels to be marketed, prices, et cetera, all remain to be resolved. However, I may state at this time that it is abundantly clear that the costs for manufacture

and distribution of an additional unleaded 91 octane fuel are significantly higher than for the presently available leaded 94 octane fuel and that the unleaded product must carry a higher price. Such resolution of the matters referred to above cannot be accomplished unilaterally, but only in the face of the competitive forces at work in the free marketplace.

I have dwelt for some time on the problems of manufacture and distribution of unleaded fuels, urging that the magnitude of the problems be recognized and that the process cannot be accomplished overnight. At the same time I am conscious that the committee knows that our subsidiary, the American Oil Company, has for many years distributed in the East and South an unleaded fuel of premium quality, Amoco Super Premium gasoline. We are thus in the unique and favorable position of having available high quality unleaded fuels for our customers in 25 states and the District of Columbia. Since this high quality product has been available for over half a century, there is frequently raised the obvious question: If American can manufacture and distribute such a product, why can't other oil companies? I would like next to address myself to this subject, commenting first that our success as the nation's only manufacturer of unleaded gasoline cannot be directly extrapolated to the rest of industry. Let me begin with a little history.

Manufacture and marketing of unleaded gasoline by American Oil Company began as a regional operation along the East Coast. It had its origin in the use of surplus benzol stocks acquired after World War I. As the compression ratios of engines increased and other refiners, including our own Midwest operations, turned to lead antiknocks to meet higher octane requirements, it was observed that Amoco gasoline containing benzol had a superior octane rating despite its lack of lead. As a result, it achieved an unusual market acceptance which has continued to this day.

People like the engine cleanliness, reduced maintenance, and improved mileage of Amoco. As octanes have steadily increased in the intervening years, we have built the necessary specialized refining capacity to keep this product competitive in quality with leaded premium gasolines. In the process, we have pioneered in the use of catalytic reforming to produce the high-octane aromatic components needed to formulate this product without the use of lead. It should be recognized, of course, that this product comprises less than 20 percent of our total gasoline volume. It is produced primarily in our Texas City refinery and marketed only in a portion of our territory, as previously noted.

Several factors have favored the continued production of unleaded premium gasoline. The crudes which supply our Southern and Eastern refineries are unusually well suited to catalytic reforming and only the most favorable portions are used for Amoco manufacture. Further, much of the equipment used was built during periods of lower construction costs.

We are frequently asked why our company does not extend its marketing of unleaded Amoco, which brings an additional penny a gallon, into the remainder of our marketing area. We have made many studies of our operations over the years on the economics both of marketing an unleaded regular as a companion of our unleaded premium, and of extending our unleaded premium marketing to other

parts of our territory. In all cases, our studies have lead us to conclude that the wider distribution of unleaded fuels is economically unattractive.

It is substantially more expensive to make both regular and premium grades unleaded than to make just premium crudes without lead. In the latter case one can select the most favorable crudes, using only the best fractions to produce Amoco, diverting the rest to regular grade.

In summary, I must emphasize that our experience in manufacturing and marketing unleaded gasoline is not representative of what would be necessary today for the industry, or our company, to make all of its gasoline unleaded. Thus, we consider it imperative that the present movement toward the elimination of lead from gasoline be planned realistically and over a period of time. Only in this way can the interests of the public be served while giving practical recognition of what it is possible for both the petroleum and automobile industries to accomplish.

Congress has recognized that when industry makes expenditures for the purpose of providing cleaner air, it should receive some form of tax relief. The latest expression of this principle is contained in Section 704 of the Tax Reform Act of 1969, under which taxpayers will be permitted to amortize the cost of pollution control facilities over a shorter than normal period of time. However, the type of facilities that would be required to make the transition from leaded to unleaded gasoline, such as new reformers for refineries, and additional pumps, storage tanks, et cetera, at service stations, would not appear to come within the definition of pollution control facilities as contained in Section 704. We strongly urge the Congress to broaden this provision in order to grant the tax relief to taxpayers undertaking these tremendous expenditures to help control air pollution.

In conclusion, from the standpoint of legislation relating to clean air, there are two important points:

1. Present voluntary actions of the automobile and petroleum industries, in the interest of solving environmental problems, have clearly demonstrated that there is no need for HEW to establish standards for the composition of any fuel or fuel additive as suggested in Section 5 of H.R. Bill 15848.

2. The Air Quality Act of 1967 provides HEW with access to adequate information on fuel and additives in relation to the control of emissions.

From the standpoint of further reducing automotive emissions, there are these important considerations which deserve reemphasis:

1. The ultimate benefits of lead removal can only be obtained when the most advanced emission control equipment is incorporated in all cars on the road.

2. The newly equipped 1971 cars and future models must not require an unleaded fuel higher than 91 octane if exorbitant expenditures by the petroleum industry are to be avoided and consumer costs are to be minimized.

3. For the present two-grade fuel distribution system employed by the major fraction of the petroleum industry to adequately serve both current and future cars during the transition period to all unleaded fuel would appear to require severe Government restrictions both on fuels and engines. This matter requires further careful consideration.

4. Conversion to a three-grade marketing and distribution system will entail heavy capital expenditures and an extended period to accomplish. The added costs involved ultimately must be reflected in higher fuel prices.

5. Tax relief for pollution control facilities provided in the recent tax reform act should be broadened to cover similar facilities related to the removal of lead from gasoline.

In closing, I would like to reassure you of our company's dedication to the cause of clean air. Over a number of years, we have conducted a great deal of research to help devise the means to make the automobile virtually pollution-free, and that goal is now in sight—through a combination of engine modification and elimination of lead in fuels.

For the reasons I have given, this cannot be accomplished overnight, and to force a faster pace than the physical realities make possible is going to impose a needless burden of our society. While air pollution yields undoubted social penalties, so does inflation—and some of the painful consequences of the latter are a good deal easier to identify than particulates in the atmosphere. To mandate an unrealistically rapid program of the scale we are considering here simply to get lead out of gasoline more quickly without corresponding benefits in pollution control, would have inflationary consequences which could not be defended. I know this committee and the Congress are very much aware of both problems.

We thank you for the privilege of appearing here, and will be pleased to answer any questions you may have.

Mr. ROGERS. Thank you for your statement. It will be most helpful to the committee.

Mr. Satterfield?

Mr. SATTERFIELD. Thank you, Mr. Chairman.

I would like to welcome you and add my own observation of what a good statement I think this was and I think it will help tremendously. I would like to say to you that I feel that the conclusions you stated at the end of your statement are indeed well taken. They certainly raise points that bother me and points that I think will be of tremendous concern to this committee as we proceed with this legislation.

I would like to ask you a couple of questions that I am not real clear on. I notice that you referred to a favorable type of crude as making available the premium nonleaded gasoline that Amoco produces today.

Can I infer from this that whether or not you can produce the proper kind of lead-free gasoline will depend on the type of crude you deal with?

Mr. GUNNESS. That is not exactly the case. The particularly favorable crudes to which I refer make it readily accomplishable to produce the high octane components that are needed for our unleaded fuel. Using less favorable feed stocks, but more intensive refining procedures, we can make unleaded fuel of the same quality from other crudes.

In other words, we minimize the expense we have to go to in order to produce unleaded fuel, by using particularly suitable feed stocks for processing.

Mr. SATTERFIELD. The less favorable the crude the more expensive?

Mr. GUNNESS. Right, and if we must produce unleaded octane from all of our crude, then we are confronted with a substantially more difficult refining problem than in making first our unleaded Amoco.

Mr. SATTERFIELD. This would require in any one plant several different refining systems, would it not?

Mr. GUNNESS. Either that, or refining systems designed to operate at higher intensity than would otherwise be the case.

Mr. SATTERFIELD. I was pleased with your comment about efforts by industry to try to solve these problems. I think all of us are vitally concerned about air pollution. I would like to know whether or not you feel that the establishment of emission standards as was testified to here this morning constitute an adequate incentive to industry to attempt to solve these problems?

Mr. GUNNESS. We believe that the basic purpose with which the committee is concerned is the quality of emissions and the way to accomplish this is to establish limitations on what emissions will be acceptable.

Mr. SATTERFIELD. Do you feel to go further and establish standards, as I said this morning, that a nozzle of a gas pump will increase that incentive?

Mr. GUNNESS. No. As I gave in my testimony, it is our view this is unnecessary limitation on flexibility existing on the automotive and petroleum industries. We oppose that.

Mr. SATTERFIELD. I believe you stated you felt this would actually impede—

Mr. GUNNESS. Impede progress and technological development and innovation.

Mr. SATTERFIELD. This makes a lot of sense to me. When one considers the tremendous costs we are talking about there is even additional incentive now to try to solve these problems. I am confident you and the other people in this industry will certainly bend every effort in this direction. I would hope so.

Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Hastings?

Mr. HASTINGS. I have no questions, Mr. Chairman. I would just like to make an observation. I am sure all industries are just as interested and concerned as HEW and this committee and the entire Congress in attacking the problem. I am somewhat interested in your conclusions.

I don't disagree with them. I am not so sure I totally agree with all of them either. I would hope that the Congress would provide additional incentives as you recommend to private industry so that they themselves might facilitate the problems that are faced by you in the gasoline business and automotive people in their business to accomplish what we all want to do, to meet the emission standards as quickly as HEW has outlined or quicker, if possible.

I put the emphasis on "if possible." I appreciate hearing your testimony.

Mr. ROGERS. I also appreciate your testimony and I am sure the committee will give it very careful consideration.

Now, you say, "The experience of the past 5 years has overwhelmingly shown that once HEW promulgates realistic and desired emission control, the automotive and petroleum industries will apply research and technical resources competing vigorously to achieve the goals." What goals?

Mr. GUNNESS. This relates to emission standards established in California initially and more recently by Federal Government.

Mr. ROGERS. What has the petroleum industry done comparable to automobile industry?

Mr. GUNNESS. At this point I think it would be fair to state that we have done little to affect the output of our gasoline. We have done a great deal of work in anticipation of further restrictive controls.

Mr. ROGERS. In other words, in research?

Mr. GUNNESS. We have also concerned ourselves with procedures whereby we can minimize the problems associated with elimination of lead by our study of catalysts, which could operate conceivably with a lead-containing fuel while accomplishing the oxidation of hydrocarbons and carbon monoxide.

I might remark that while the fuel being sold today is little different than the fuel sold a number of years ago as far as emission problems are concerned, the petroleum industry has supported through the American Petroleum Institute a program of collaborative research with automotive industry, and our own company has joined with a series of other oil companies and with a large automotive manufacturer to jointly work on this problem of reduction of automotive emissions.

Mr. ROGERS. That is commendable. I know everyone would join in that commendation.

Now let me ask you this. There seems to be an indication that to move into nonleaded fuel would require another delivery system.

Mr. GUNNESS. So far this appears to be the only practical technique.

Mr. ROGERS. You might not know this, but what is your impression of the number of cars that can now use regular gasoline, nonleaded, as far as the octane content?

Mr. GUNNESS. The regular gasoline, as it is presently produced, is 94 octane fuel. If, as proposed the octane number were to be dropped to 91, we would have a lower percentage of cars satisfied by that fuel. 50 percent of all cars would be satisfied with 91 octane fuel.

Mr. ROGERS. With 91 octane. This is presently possible for all gasoline companies to make, is it not, 91 octane?

Mr. GUNNESS. For most of them the ability to make 91 octane unleaded fuel is dependent on what is done with respect to the supply of the present leaded grades of fuels. Presently we produce our regular-grade fuel, which has a rating of about 86 octane number by adding lead to bring it up to 94 octane level. If we were required to bring it to 91 without the use of lead, it would require added refining facilities.

In making this statement we presume we would have to continue to supply the same quality fuels as we are presently supplying to service existing automobiles.

Mr. ROGERS. I understand that, but let me say what I am trying to get at is this. From what I understand, the technology is such that presently if you were to draw a graph, you can presently come up to say, 91 octane, with present refining capability. You even do more than that with nonleaded. But this is what most companies will do for their high octane gas.

They come up to 91. Then they add lead to bring it up to 100 or whatever it may be. It is about that ratio, isn't it?

Mr. GUNNESS. No. Actually we are taking a regular-grade unleaded gasoline of about 86 octane, adding lead to it and making it 94 octane. We are also taking a premium-grade unleaded gasoline of about 94 octane and adding lead to it and making it up to 100.

Mr. ROGERS. What I am saying is the technique is now available where most companies in making their high octane now refine their gasoline before lead is added to about 91 or maybe a little more, so the technique is here.

Mr. GUNNESS. Yes, sir.

Mr. ROGERS. Now they get the added octane by adding the lead. This is presently done basically?

Mr. GUNNESS. They do two things. They have a 91 octane fuel. We agree that is the average of what the industry produces. This is divided into two pots, 86 and 94. Lead is added to both, resulting in 94 octane regular grade and 100 octane premium grade.

Mr. ROGERS. Suppose the Congress would say, "No lead." We will not do that I am sure precipitously, but if you can produce 91 octane, will that now handle at least 50 percent of the cars that are presently made?

Mr. GUNNESS. Right.

Mr. ROGERS. On the road right now?

Mr. GUNNESS. That is correct.

Mr. ROGERS. In fact, I understand most of the cars coming out, most of the companies produce about 16 percent of their cars that require high octane.

Mr. WHITE. 16 to 20 percent.

Mr. ROGERS. So that maybe 80 percent of the cars could operate right now on 91 octane gasoline—or near there, perhaps with some adjustment?

Mr. WHITE. One point I think should be made. That is, to blend this 91, which can be done today, requires using some of what is used normally for premium octane. So, to produce the unleaded 91 octane fuel we would have to use some of what is now going into our more expensive product.

Mr. ROGERS. I understand that. But it still could be done?

Mr. WHITE. Yes, sir.

Mr. ROGERS. You do it with your high octane for one cent per gallon more?

Mr. WHITE. Yes, sir.

Mr. ROGERS. If we can produce the gasoline for all of the lower octane users, which could be done because the technique is here, they are presently doing it—this handles all of the cars on the road now except for the high octane users, and you have the technique to serve the high octane users, which I understand would be very expensive for other companies to move into—but to say we have to move into the third distribution, I am not sure that is so if we simply use the current capability of producing 91 octane for regular.

The real problem we have is getting the companies to produce the high octane for 20 percent of the cars they produce. I realize it is a big adjustment, but I am not sure that if we put our minds to it, it could not be done with the current system. Don't you think this is possible? I am not saying it is. It is most feasible?

Mr. GUNNESS. It is not probable, but I would not say it is not a possible solution to the problem without further study.

Mr. ROGERS. I understand your position.

Mr. GUNNESS. We must recognize that many of the regular grade cars, the 80 percent of the automobiles, would knock seriously on a 91 octane fuel.

Mr. ROGERS. The automobile companies tell us they will adjust this.

Mr. GUNNESS. We have reservations as to whether that is, in fact, a practical expedient, as mentioned in my talk. We are concerned about whether there is adequate service facilities available to accomplish that and whether when the public finds out what the bill is for accomplishing it, they are going to be prepared to pay for it, and whether they will be willing.

Mr. ROGERS. The only point is—and you made the point, too—it is being done now to provide our high octane for one cent more. I am sure it would have to have some additional cost. Perhaps the Government can give a tax subsidy.

Mr. GUNNESS. This needs to be explored. I agree we should encourage the study.

Mr. ROGERS. I understand a study has been done saying the average consumer drives a car a little less than about 10,000 miles a year. Now they said if you translate this into gasoline costs, this whole business, say, anywhere from 1 to 3 cents additional, this would amount to something in the range of \$7 to \$21 per year for the average driver. What we have to see is if this is feasible, and we are going to need your expertise, of the oil industry and the automobile industry, to try to make a measured judgment as to whether this is feasible and what the cost would be and what is the cost if we do not do it in the air pollution problem.

Now with air pollution being anywhere from 45 to 60 percent attendant basically on emission from the motor vehicles, buses and cars, this could be a tremendous step forward if it could be accomplished. I realize some time will be needed.

Now I am encouraged that everybody is at least receptive to going into it. And I commend you and most of the oil industry that we have seen statements which indicate a receptive attitude. I think there is one or two companies that have not indicated that. We hope to hear from them, but the automobile industry unanimously has said they will move into this. They think it is the feasible solution and that they will do it as soon as 1971.

Now this may not be feasible for the oil industry and I assume from your testimony you feel it is not.

Mr. GUNNESS. I think that is correct. What the automobile industry is contemplating doing in 1971, as I brought out in my statement, is to so adjust their cars that they will run on 91 octane. They are not planning on adding on any sophisticated equipment which is really necessary to take advantage of the absence of lead to cut the emissions.

Mr. ROGERS. We will go into that with them.

Mr. GUNNESS. I think you should. It is our view that the emissions of 1971 cars will be about the same as for the 1970 cars.

Mr. ROGERS. We will go into that and ask the companies to put that on the record, because I think that will be important.

Let me ask you this. Has the Secretary of HEW been in contact with you to ask you to come in and discuss this problem with them?

Mr. GUNNESS. As far as I know, we have had no formal requests from HEW to participate in any discussions. We have had informal discussions with members of their staffs to acquaint them with our views, but this is not in response to a formal request. We would be most pleased to appear were someone to request us to come forward.

Mr. ROGERS. I am sure you would. I feel the Secretary should have done this.

Now perhaps this could be accomplished without law, which I think this committee would like to see, if it could be done on a co-operative basis. But I do not know if this is possible. For instance, the antitrust laws might not permit it. You might need loss for this purpose or for coordinating purposes.

Mr. GUNNESS. To the extent emission standards are promulgated, you have started the machinery moving.

Mr. ROGERS. I think this is true and this is what the Department, the President, is asking for, as you have noted in your statement.

Now I think, too, we are having research done on the health aspects of lead itself. I presume your company has some information in this regard.

Mr. GUNNESS. To my knowledge we are not engaged in any research on the toxic effect.

Mr. MALLATT. We are underwriting work of API in that regard.

Mr. ROGERS. But other than that, you have not studied health aspects of lead pollution?

Mr. MALLATT. We have sponsored no direct research in our laboratory.

Mr. ROGERS. We are getting studies now, for instance, a very recent one from Finland.

Mr. GUNNESS. I believe that API is cooperating with HEW in connection with the conduct of this work.

Mr. ROGERS. I am sure there is cooperative work going on. But this indicates that lead is absorbed into human organisms by respiratory and digestive routes and is distributed to organs and tissues by the blood stream. One of the disturbing things about this research is that lead can accelerate as a result of increasing environmental contamination.

So I do not know that we can say that lead is not a contaminant as such. I think perhaps it is premature, but the research now indicates that it is. And of course we will follow that up very closely.

What would be the savings to people—maybe you have not done research on it—what would be the savings to people in the maintenance of their automobiles and automobile parts if lead was not in gasoline? Is there any study on that?

Mr. GUNNESS. We have had considerable experience in this area and have conducted a number of tests to evaluate the advantages of a lead-free gasoline, specifically our unleaded Amoco gasoline, as regards fouling of spark plugs and corrosion of mufflers.

In general, our conclusion is that the life of spark plugs and the life of mufflers will be doubled by the use of lead-free gasoline compared to gasoline containing lead. This is due to the lead and to the other materials which are in the lead fluid, and are implicit in the addition of lead to gasoline.

Mr. ROGERS. At least your lead-free is a definite saving then?

Mr. GUNNESS. There is a saving related to this.

Mr. ROGERS. If you have any specifics on that, if you would submit them for the record please.

Mr. GUNNESS. We do have information and we will be glad to submit it.

(The following supplemental statement was received for the record:)

SAVINGS ATTRIBUTABLE TO THE USE OF UNLEADED GASOLINE COMPARED WITH LEADED GASOLINE

Tests we have conducted on advantages to the customer in using unleaded gasoline in contrast to leaded gasoline show that these may reach 2-4¢ per gallon. This is made up of 1.2¢ per gallon saving due to a 3% increase in mileage, which may be applicable at the premium level and to only a minor extent for regular grade gasolines. The balance is savings in maintenance costs, realized as an average over several years of car ownership. Detailed supporting data for these figures are appended.

APPENDIX

SAVINGS ATTRIBUTABLE TO THE USE OF UNLEADED GASOLINE COMPARED WITH LEADED GASOLINE

Mileage Savings

Experimental work and field tests carried out by the American Oil Company show that AMOCO Super Premium gives increased mileage that averages 3% over leaded premium fuels. This number is an average based on data from four different sets of tests and has shown up consistently for a number of years. It is readily explained in that AMOCO Super Premium is of higher density than comparable leaded premium fuels due to the fact that it has a higher concentration of aromatics which are more dense than paraffins. This difference is, of course, one of the reasons for the higher cost in producing unleaded fuel, namely, a higher weight of raw material is represented by each gallon. This difference gives our AMOCO Super Premium about 3% more Btu's per gallon, or thermal energy, than a leaded fuel. At a 3% mileage advantage, the saving amounts to 1.2¢ per gallon at a typical cost for premium gasoline of 40¢ per gallon, including taxes. The higher Btu content, and hence mileage advantage, applies to gasolines at the premium octane level where the unleaded fuel has the highest concentration of high density components. The unleaded regular gasoline, such as may be produced toward the end of 1970, may show a smaller mileage advantage compared with leaded regular; however, some small difference would still be expected.

Maintenance Savings (applicable to both premium and regular unleaded fuels)

Our information on maintenance costs is derived from two sources, controlled fleet tests and customer interviews. Controlled fleet tests show, in three years to date, a savings advantage of 3.4¢ per gallon; customer interviews show 1.8¢ per gallon.

Fleet Tests

American Oil Company has underway a test to determine relative maintenance costs for cars using leaded fuel vs. cars using non-leaded fuel. In late 1966 a fleet consisting of four Chevrolets, four Fords, and four Plymouths, all of the 1967 model year with premium-requirement engines, were placed in metropolitan driving service at Automotive Laboratories, Inc., in Chicago. Two of each make has been operated exclusively on non-leaded Amoco gasoline. The other pair of each make was operated on American Super Premium leaded gasoline for the first year of operation, on a competitive leaded premium gasoline for the second year and currently, another competitive leaded premium gasoline in the third year. In the fall of 1967, an additional 12 cars, again 4 each of Chevrolet, Ford and Plymouth 1968 models, were added to the fleet. Again one pair of each make of cars has been operated exclusively on non-leaded Amoco gasoline while the others are operated on competitive leaded premium gasolines as are the 1967 models.

Automotive Laboratories, Inc., rotates driver assignments for the cars among their employees for use in metropolitan commuting driving so that all cars get similar driving treatment in the long run. Each car averages about 7,000 miles per year in Chicago and suburbs. Prescribed warranty procedures, for oil and filter changes and other maintenance practices, as described in the owner's manual, are followed. In addition when some operability problem is reported by two or more drivers of a car, the car is returned to an authorized service garage for that make for maintenance. All invoices for maintenance work are retained by Automotive Laboratories, Inc. Gasoline-related maintenance costs, such as fouled plugs, malfunctioning carburetor and exhaust system replacements are summed for each car. Accurate records of mileage and gasoline consumption are also kept. From these records the comparative maintenance costs can be determined and expressed in terms of unit cost per gallon of gasoline consumed as shown in Table I.

The operations to-date do not provide enough data to establish representation mileage obtainable on spark plugs and mufflers. However, as shown in Table II, many more changes of spark plugs and mufflers have been required for those cars operating on leaded gasoline.

Customer Interviews

The data was collected by motorists belonging to National Family Opinion's consumer panel. This company was founded about 20 years ago in Toledo, Ohio. It is a marketing research firm specializing exclusively in panel operation. They maintain a nationwide panel of over 90,000 families, who are used mainly to test new products. These families are selected to represent a cross-section of families in the United States, and are balanced with respect to geographic division, population density, age of homemaker, and annual family income.

A short screening questionnaire was sent to the 40,000 NFO panel members who reside in 26 East and South states, inquiring whether they keep records on the operation and maintenance of their cars and whether they would be willing to lend these records. Based on their responses, we were able to generate 50 pairs of Amoco lead-free gasoline users and leaded gasoline users who were matched on:

1. Car year
2. Car make and model
3. Geographic area
4. Mileage

These were later augmented through additional recruiting, and at present we have increased our sample size to 179 pairs.

Each panel member was asked to keep a monthly diary of their car operation and maintenance expenses, and to mail us the diary complete with maintenance records at the end of each month. The diary covered the following subject areas:

1. Automobile Identification
 - a. Make
 - b. Year
 - c. Beginning mileage
 - d. Ending mileage
2. Gasoline Purchases
 - a. Date of purchase
 - b. Brand name
 - c. Grade
 - d. Number of gallons
 - e. Cost
3. Oil Purchases
 - a. Date of purchase
 - b. Place of purchase
 - c. Brand
 - d. Number of quarts
 - e. Cost
 - f. Reason for purchase
4. Maintenance/Parts
 - a. Date of service
 - b. Place of service
 - c. Explanation of service
 - d. Parts purchased
 - e. Cost of parts
 - f. Total cost of parts and labor

Whenever repair work was done on the car, we requested that they send us their receipts so that we could maintain legal documentation of our data.

Neither lead-free nor leaded panel members who are cooperating with NFO know that American Oil is connected in any way with this study. All contacts are maintained through the offices of National Family Opinion in Toledo.

The data were then coded and tabulated according to the following subject areas:

1. Ignition/Tune-Ups
 - a. Points
 - b. Plugs
 - c. Condenser
 - d. Distributor
 - e. PCV valve
2. Fuel System
 - a. Carburetor
 - b. Choke
 - c. Fuel pump
 - d. Fuel filter
 - e. Air filter
3. Engine
 - a. Valves
 - b. Cylinder block
 - c. Crankshaft
 - d. Piston rings
 - e. Rod or main bearing
 - f. Hydraulic valve lifters
 - g. Timing gears
4. Exhaust System
 - a. Exhaust pipe
 - b. Tail pipe
 - c. Muffler
 - d. Resonator
 - e. Heat riser valve
 - f. Exhaust manifold
5. Lubrication
 - a. Lube job
 - b. Oil
 - c. Oil filters
 - d. Oil additives

A summary of the differences is shown in Table III. These are broken down by the car-pairs and various model years in Table IV, and by the nature of the maintenance needed in Table V.

Total Savings

The sum of mileage and maintenance savings can reach almost 4¢ per gallon, as shown in the table below.

Savings—From use of AMOCO super premium

| | |
|---|------|
| Increased mileage—3¢ of 40¢..... | 1. 2 |
| Lower maintenance (1.8-3.4¢) (average)..... | 2. 6 |
| Total..... | 3. 8 |

TABLE I

| | Nonleaded Amoco gasoline | | | | Leaded premium gasoline | | | | Maintenance cost advantage for nonleaded Amoco gasoline cents per gallon |
|----------------|--------------------------|------------------------|----------|--|-------------------------|------------------------|------------|---|--|
| | Total miles driven | Total gallons gasoline | Total | Gasoline-related maintenance cost Cents per gallon | Total miles driven | Total gallons gasoline | Total | Gasoline-related maintenance costs Cents per gallon | |
| 1967 cars..... | 147,393 | 13,774 | \$370.35 | 2.69 | 143,675 | 13,858 | \$1,053.34 | 7.51 | 4.82 |
| 1968 cars..... | 107,451 | 9,279 | 175.17 | 1.89 | 101,402 | 9,311 | 496.91 | 5.34 | 3.45 |

TABLE II.—NONLEADED AND LEADED GASOLINE

| | Nonleaded Amoco gasoline | | | Leaded premium gasoline | | |
|----------------|--------------------------|------------------------------|---------------------------|-------------------------|------------------------------|---------------------------|
| | Total miles driven | Number of Spark plug changes | Number of muffler changes | Total miles driven | Number of spark plug changes | Number of muffler changes |
| 1967 cars..... | 147,393 | 5 | 2 | 143,675 | 11 | 7 |
| 1968 cars..... | 107,451 | 3 | 0 | 101,402 | 10 | 2 |

TABLE III.—Comparison of automobile repair costs—Leaded versus Amoco (overall basis)

| | |
|---|------|
| Number of car-repairs..... | 179 |
| Difference in repair costs (leaded—Amoco) (cents per mile)..... | 0.15 |
| Saving, cents per gallon (12.4 miles per gallon)..... | 1.8 |
| Amoco (miles per gallon)..... | 12.8 |
| Leaded (miles per gallon)..... | 12.1 |

TABLE IV.—COMPARISON OF AUTOMOBILE REPAIR COSTS, LEADED VERSUS AMOCO

[By year of automobile]

| | 1968 | 1967 | 1966 | 1965 | 1964 | 1963 |
|---|------|------|------|------|------|------|
| Number of car-pairs..... | 98 | 24 | 18 | 22 | 11 | 6 |
| Difference in repair costs (leaded—Amoco), cents per mile..... | 0.03 | 0.16 | 0.12 | 0.16 | 0.17 | 0.24 |
| Saving, cents per gallon (12.4 miles per gallon, year to year)..... | 0.4 | 1.9 | 1.5 | 1.9 | 2.1 | 2.9 |
| Saving, cents per gallon (12.4 miles per gallon, cumulative)..... | 0.4 | 1.1 | 1.3 | 1.4 | 1.5 | 1.8 |

TABLE V.—COMPARISON OF AUTOMOBILE REPAIR COST—LEADED VERSUS AMOCO

(By systems)

| | Fuel system | Ignition tuneup | Exhaust system | Lubrication | Engine work | Total |
|---|-------------|-----------------|----------------|-------------|-------------|-------|
| Leaded..... | 0.043 | 0.146 | 0.078 | 0.137 | 0.028 | 0.43 |
| Amoco..... | .037 | .082 | .038 | .117 | .006 | .28 |
| Difference in repair costs (leaded—Amoco) (cents per mile)..... | .006 | .064 | .040 | .020 | .022 | .15 |
| Savings (cents per gallon) (12.4 miles per gallon)..... | .074 | .793 | .496 | .248 | .272 | 1.8 |

Mr. ROGERS. Are there any other questions?

Mr. Preyer?

Mr. PREYER. Thank you, Mr. Chairman.

I think this has been very helpful in pointing up how wrong some of our conventional wisdom is. I think the average person thinks since there is unleaded gasoline already being sold, it should be a simple matter to put it in all the pumps. You make clear it is not that easy.

As I understand it, lead-free gasoline requires both accommodations from the engine point of view as well as fuel design. On the engine manufacturing, the present cars we have could be adjusted to take lead-free gasoline. Is that right?

Mr. GUNNESS. The characteristics of an automotive engine which is controlling in this particular relationship is octane requirement. And what has so far been proposed is that a gasoline of 91 octane number be made available. Cars which are presently being turned out in largest volume require 94 octane number. Those cars can be adjusted so they will operate satisfactorily on 91 octane number.

Mr. PREYER. But that adjustment would be expensive?

Mr. GUNNESS. The degree of expense I would leave to others to testify to. A General Motors executive has made statements putting forth his viewpoint that this is a feasible program.

Mr. PREYER. The main cost of the fuel design aspect of obtaining lead-free gasoline, the main additional cost there would be involved in new refining facilities plus new marketing?

Mr. GUNNESS. There are three major components in the cost of manufacture and distribution of a higher octane unleaded fuel. We secure a lower yield on the crude we process so we require more raw materials to produce a high octane fuel than a low octane fuel.

The processing of that material entails processing costs and heavy capital investment in specialized refining equipment to make higher octane fuel. There are additional costs. In the case of our unleaded Amoco that I have already referred to, we recover the added costs by charging an extra penny a gallon for the unleaded fuel as compared to a corresponding quality lead-containing fuel.

As to whether or not there would be added costs associated with distributing unleaded fuel that really relates to whether the ultimate answer to this whole problem involves three grades of fuel or whether it can be accomplished with two grades of fuel.

If there are two grades of fuel, the distribution of unleaded fuel would cost no more than distribution of a leaded fuel.

Mr. PREYER. I was not clear; you mentioned the two grades of leaded and one grade of unleaded in the distribution system, and I got the impression that you envision getting to a lead-free gasoline distribution system over a 10-year period of transition. Was that about your time scale?

Mr. GUNNESS. We think this fall we will have to supply the same quality premium fuel we are presently supplying, to satisfy those portions of our customers who use this product, and we think we will have to supply the same quality regular grade fuel as we are presently supplying as will be required by those customers.

In addition, a new crop of customers will come in the market. Some 10 million cars will be produced next year, all designed to run on lead-free fuel. In order to provide a fuel for those cars, it is at least our present thinking that it will be necessary to supply them with a third fuel, an unleaded 91 octane fuel. This is not a solution we would recommend, but the only one that seems to us to be practical.

Mr. PREYER. So that through the years—

Mr. GUNNESS. Through the years the amount of 91 octane unleaded fuel that will be required will increase at the rate of about 10 percent of total gasoline consumption as new models come along, which are turned out from the factories capable of processing 91 octane unleaded fuel. The time will come when we can phase out our leaded fuels.

Mr. PREYER. That would be approximately 10 years?

Mr. GUNNESS. Approximately 10 years.

Mr. PREYER. Thank you very much.

Mr. ROGERS. Thank you. We appreciate your presence here and your associates. You have been most helpful to the committee.

We are going to try to hear our next witness before we answer the vote.

Myron Tribus, Assistant Secretary of Commerce for Science and Technology, we are delighted to see you and welcome you and your statement will be received at this time.

STATEMENT OF DR. MYRON TRIBUS, ASSISTANT SECRETARY FOR SCIENCE AND TECHNOLOGY, DEPARTMENT OF COMMERCE; ACCOMPANIED BY FRANK C. CACCISPAGLIA, JR., EXECUTIVE SECRETARY, COMMERCE TECHNICAL ADVISORY BOARD

Dr. TRIBUS. Thank you, Mr. Chairman and members of the subcommittee. I am accompanied this morning by Mr. Frank C. Caccispaglia, Jr., Executive Secretary, Commerce Technical Advisory Board.

I appreciate the opportunity to appear before this Subcommittee on Public Health and Welfare in connection with the role of the Commerce Technical Advisory Board (CTAB). I enjoyed being here early and hearing previous testimony and particularly your questions. I think they are very much to the point and CTAB, as I will describe in a few moments, is going to try to provide the answers to those questions.

The Commerce Technical Advisory Board (CTAB) was established in January 1963 by the Secretary of Commerce at the direction of the President. This was done in view of the increasing importance of science and technology to the Nation's economic growth, and the action of the Department of Commerce to develop policies and programs to encourage the expansion of our scientific and technological capability and to stimulate its use in industry and commerce. The Board was created to bring outside views to bear on the technical activities of the Department, assessing the future and continuing role of its scientific and technical agencies, and to consider the interaction of economic and business matters with research and development. Also, to the end that economic growth may be promoted, the Board was to suggest ways of stimulating research and development by private industry for private industry and to advise on specific technical problems of major material significance as they arise.

CTAB functions in two modes. One is through presentations and discussions relating to organization, policy, and technical activities of the agencies and bureaus of the Department. The other is through the chartering of panels to study specific problem areas. The panels operate under the chairmanship of a CTAB member and report to the Secretary of Commerce through CTAB.

Panels were established early in CTAB's history to examine three major areas of responsibility within the Department: transportation research, the patent system, and engineering and commodity standards.

During its 7-year history CTAB has matured from studying purely internal Department of Commerce programs and problems to wide-scope national interest problems. For example, CTAB panels have studied and reported on the technological problems of surface effect ships, the promotion and management of invention and innovation, the utilization of the electromagnetic spectrum, research and development relating to high-speed ground transportation, and the feasibility of using electrically powered highway vehicles to mitigate air pollution caused by automotive internal combustion engines.

I have with me some samples of CTAB reports. Probably you have seen the report on automobile and air pollution which was developed a couple of years ago and which contains many recommendations which have been put into effect and which bear upon the airpollution problem.

(The CTAB report entitled "Automobile and Air Pollution" may be found in the committee's files.)

Mr. ROGERS. We will be glad to receive that for the file.

Dr. TRIBUS. Thank you, Mr. Chairman. We will supply it.

In February 1970, CTAB released the report of the Panel on Housing Technology, "The Housing Industry—A Challenge for the Nation."

I have a copy of that report also.

(The CTAB report entitled "The Housing Industry—A Challenge for the Nation" may be found in the committee's files.)

Dr. TRIBUS. The Department of Housing and Urban Development assisted in supporting the work of this Panel.

A number of other panels are currently conducting or have recently completed their studies. The reports of the Panel on International Transfer of Technology, of the Panel on Venture Capital (particularly for financing new technologically oriented enterprises), and of the Panel on Noise Pollution are due for release within the next several months.

At its January 1970 meeting a most important and timely panel to report on automotive fuels and air pollution was chartered by CTAB. This was the result of a request from Dr. DuBridge on behalf of the President's Environmental Quality Council. Dr. DuBridge stated that in view of CTAB's pioneering study on "The Automobile and Air Pollution" published in the fall of 1967, the Council believed that CTAB would be a logical choice for this second study.

The Department of Health, Education, and Welfare and the Department of Transportation jointly are supporting CTAB in this work. This Panel on Automotive Fuels and Air Pollution is currently being constituted and will consist of 12 members from the private sector. It is hoped that within 90 days after its having been constituted, the Panel will submit a report on the costs and consequences of removing lead from gasoline.

I should like to read for you the charter of the Panel on Automotive Fuels and Air Pollution:

In relation to the effects of gasoline compositions, particularly certain additives, on man and his environment and

In relation to the effects of variations in gasoline composition on the general performance of internal combustion engines and on the control of pollution from these engines,

To identify and evaluate the costs and consequences of alternative ways of modifying the engines or fuels or both to achieve appropriate reductions in emissions; and

To recommend (a) specific policies with regard to the required changes, (b) specific standards and procedures for controlling the additives to gasoline, (c) plans for the institution of the necessary programs for modifying the fuel or the engines or the use of the additives in the most effective way, (d) strategies for marketing new fuels and engines without obsoleting the existing inventory of vehicles and fuel supply equipment.

I shall also submit for the record a statement outlining the functions of CTAB.

(The statement referred to follows:)

COMMERCE TECHNICAL ADVISORY BOARD FUNCTIONS

1. Study and evaluate the technical activities of the Department and recommend measures to increase their value to the business community.

2. Assess the future and continuing role of the Department's scientific and technical agencies in terms of the changing requirements of industry and commerce.

3. Provide the liaison to inform industry of the technical services available from the Department and to inform the Department of the technical requirements of industry.

4. Identify and evaluate the interaction of economic and business matters with research and development.

5. To the end that economic growth may be promoted, suggest ways of stimulating research and development by private industry for private industry, and of helping industry to get the maximum benefit from Federally-sponsored research and development.

6. Advise on specific technical problems of major material significance as these arise.

Dr. TRIBUS. In closing, I would like to observe that in 1966 the Department of Commerce received the Industrial Science Award from the American Association for the Advancement of Science "for significantly increasing the communication between science and industry to benefit all segments of the population in meeting human needs and aspirations." The Secretary of Commerce, acknowledging the award, stated, "I consider this citation relating directly to the activities of the Commerce Technical Advisory Board which * * * has rendered outstanding service to the Commerce Department and the Nation."

I would be happy to answer any questions.

Mr. ROGERS. Thank you very much, Mr. Secretary. I appreciate your being here. It is most helpful to know that you have constituted or are constituting a panel to study this problem in some depth.

When will the panel be constituted?

Dr. TRIBUS. I estimate that we should be able to make an announcement concerning membership of the panel within the next week to 10 days. The reasons for the delay are primarily concerned with the fact that members of the panel are chosen because of their expertise. We check their expertise and also for their reputation for integrity and honesty and ability to judge these complex technical matters.

I might also mention that the panel actually will consist of two classes of members. We will appoint this panel of 12 members, but the panel itself will probably appoint unofficial members to work with it in drafting many of the materials. In this way we avoid having direct representatives of affected industries issuing a panel report. On the other hand, we get them involved with the work of the panel and we rely on the technical expertise and integrity of the main panel members to sift through this information and give us a report which will stand up under scrutiny.

Mr. ROGERS. Now this report will be due 90 days after—

Dr. TRIBUS. The panel will probably give us two reports. One report will be very much concerned and focused upon the lead problem. That report is due in 90 days. The other report will be a longer report and be concerned with larger issues.

In addition to lead, there are other things added to gasoline and to oils. There are also other things that are done in the composition of gasolines which require our attention, and we are asking the panel to look at the larger issues as well as the specific one.

Mr. ROGERS. Do you think it is necessary for Congress to withhold action on legislation until that panel reports? For instance, the President has asked us to act on legislation to give certain authority to go into standards for gasoline registration and so forth.

Dr. TRIBUS. I don't know how to answer that question. A lot depends on the degree of unanimity that you perceive in the witnesses before you. If you continue to receive conflicting testimony—for example, I know what I heard here today and I have heard other people speak—then it seems to me Congress may well wish to have this very authoritative report.

If we can possibly have information for you earlier than 90 days, we will try to do so. But it does seem to me that it will be difficult to give you the information in less than that time, because we do have to allow all of the technical experts an opportunity to say what they believe is true and then we have to correlate this information.

Mr. ROGERS. We understand that. Any questions?

Dr. TRIBUS. I guess I really did not answer your question as to what you ought to do, but in a way I am afraid you have to be the judge.

Mr. ROGERS. Any questions?

Thank you for being here and letting us know. We may want to have you back and maybe some of your experts.

Dr. TRIBUS. I will be delighted to help if we can.

Mr. ROGERS. The committee feels that is a very significant part, as testimony has shown, of the air pollution problem in the country and perhaps could be solved in this way rather quickly.

I might just ask you: You published a report on the automobile and pollution. What is the percentage factor that you feel is attributed to the automobile of the pollution problem? Is it about 60 percent?

Dr. TRIBUS. It varies from one place to another. In Los Angeles, where I at one time worked on pollution problems, we estimated it to be 60 percent. I think there is another aspect of this; that is, the fixed systems which pollute the atmosphere are fairly easy to bring under control one way or another.

So as time goes on the automobile becomes a bigger and bigger factor, but I think figures in the order of 50 and 60 percent are correct. We do have some tables in our report.

Mr. ROGERS. That would substantiate that?

Dr. TRIBUS. These tables give specific numbers as of that time. As of 1966 motor vehicles constituted roughly 60.6 percent of the total, by weight, of materials added to the atmosphere. The difficulty with using that figure is this: For example, a steel mill may very well emit a fairly high tonnage of material, but a lot of that will fall to the ground not far from the plant.

The gaseous emissions of this sort, particularly oxides and nitrogen from an automobile, are particularly obnoxious and so I think that if we were to ask the questions in terms of nuisance value, what fraction of automobiles produce these gaseous emissions, I am sure it would be more than 60 percent.

Mr. ROGERS. More than 60 percent?

Dr. TRIBUS. Yes, sir.

Mr. ROGERS. I saw a court order, a decision today that said that a cement plant that had been found guilty of polluting, however, could continue as long as they pay damages. This was an interesting decision, I thought. We may have to go into that problem later.

Thank you for being here.

(The following letter was received for the record:)

THE ASSISTANT SECRETARY OF COMMERCE,
Washington, D.C., April 14, 1970.

Hon. JOHN JARMAN,
Chairman, Subcommittee on Public Health and Welfare, Interstate and Foreign Commerce Committee, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: You will recall from my testimony before the Subcommittee on March 5 that the Commerce Technical Advisory Board, which I chair, recently convened a panel to conduct a study on automotive fuels and air pollution. The study is concerned with the cost and consequences of removing lead from gasoline and includes an in depth examination of alternatives of modifying, either or both, automotive fuels and internal combustion engines to overcome atmospheric lead pollution. The study does not seek to answer whether or not lead should be removed from gasoline, but is aimed explicitly at identifying ways in which removal of lead can best be realized, having due regard for the interests of the public and the affected industries.

The panel is sponsored by the Departments of Commerce, Transportation, and Health, Education and Welfare. Assistant Secretary of HEW, Dr. Egeberg, and I confer concerning its progress. Dr. Middleton, Commissioner of NAPCA, has direct liaison with the panel. We are all working together to assure the most useful report.

With regard to my testimony before your Subcommittee, Mr. Rogers asked me the following question:

"Do you think it is necessary for the Congress to withhold action on legislation until that panel reports? For instance, the President has asked us to act on legislation to give certain authority to go into standards for gasoline registration and so forth."

In order to avoid any possibility of misinterpretation of my testimony, I would like to emphasize that I do not believe that it is necessary or desirable to defer action on the legislation proposed by the President until completion of the CTAB panel study. Rather, the panel report will assist in deciding the optimum use of the authority provided in the legislation.

I shall be pleased to furnish whatever additional information and assistance that may be helpful to the Subcommittee in this important undertaking. I will, of course, forward to you the results of the CTAB study when available.

Sincerely,

MYRON TRIBUS.

Mr. ROGERS. Unfortunately we did have another witness and I am afraid we are going to have to go for a vote. I hope our witness will understand and we will try to get to him at a later date.

We appreciate his patience.

The committee will stand adjourned.

(Whereupon, at 3:20 p.m. the subcommittee adjourned, to reconvene at the call of the Chair.)

AIR POLLUTION CONTROL AND SOLID WASTES RECYCLING

MONDAY, MARCH 16, 1970

SUBCOMMITTEE ON PUBLIC HEALTH AND WELFARE,
HOUSE OF REPRESENTATIVES,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in room 2132, Rayburn House Office Building, Hon. Paul G. Rogers presiding. (Hon. John Jarman, chairman).

Mr. ROGERS. The subcommittee will come to order, please.

We are continuing our hearings on air pollution and solid waste disposal.

Our lead off witnesses this morning will be a few of our colleagues in the House. They have statements that they would like to present to the committee.

We shall hear first from the Honorable Thomas M. Pelly from the State of Washington. Welcome, sir, proceed as you see fit.

STATEMENT OF HON. THOMAS M. PELLY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. PELLY. Mr. Chairman and Members of the Subcommittee on Public Health and Welfare, I appreciate this opportunity to express my support for H.R. 16033, to amend the Clean Air Act.

This legislation is vital to our efforts to clean up our environment, particularly with regard to providing national standards of ambient air quality, expediting enforcement of air pollution control standards, authorizing regulation of fuels and fuel additives, providing for improved controls over motor vehicle emissions, and establishing standards applicable to dangerous emissions from stationary sources.

I am a cosponsor of H.R. 16033 because of my long commitment to saving our environment. Fortunately, most Americans are heeding the cry to save our environment at long last. I only hope it is not too late.

We today are beginning the greatest battle man has ever waged, a true battle for survival. The stakes in this battle are far greater than any other we have ever fought. To lose this one is to lose the planet earth, and at this moment we are losing—decisively.

In the United States alone, Mr. Chairman, we pour more than 22 million tons of sulfur dioxide into our skies each year. Sulfur dioxide combines in the atmosphere to form sulfuric acid.

Also, each year, we add 100 million tons of carbon monoxide to the air we breathe. Carbon monoxide is a deadly poison.

The grand total, the best current estimate for all the junk we Americans throw away each year into our water, our land and our sky; two and a half billion tons of pollution.

It is critical to our survival that we clean up this mess. However, the means of accomplishing this are the subject of great debate.

Consider the automobile. It has become almost the symbol of our triumphant technological society, yet it is the number one source of air pollution in the world today. H.R. 16033 is designed to help in this regard by providing for the testing of motor vehicles and engines to make sure they remain in conformity to regulations and providing for the registration and regulation of fuels and fuel additives.

Further, Mr. Chairman, H.R. 16033 deals with National Air Quality Standards so as to abate air pollution from all sources.

There is far more than abating pollution of the air, however, and in the overall, I have co-sponsored each of the President's bills designed to clean up our environment.

There is no other place in the solar system for us to escape, and the time to act is now.

Mr. Chairman, I urge immediate favorable consideration of H.R. 16033 and similar bills, and again I appreciate this opportunity to present my views.

Mr. ROGERS. Thank you, Mr. Pelly. Nice to have you with us today.

Mr. PELLY. Thank you, Mr. Chairman.

Mr. ROGERS. Next we have from the State of New York, the Honorable Ogden R. Reid.

STATEMENT OF HON. OGDEN R. REID, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. REID. Mr. Chairman; I very much appreciate this opportunity to indicate my strong support for more stringent air pollution control legislation. On April 16, I introduced H.R. 17090, the Clean Air Act Amendments of 1960, which would authorize the Secretary of Health, Education, and Welfare to establish nationally applicable standards of air quality.

In my judgment, the application of national air quality standards will be necessary if this nation is to achieve its goal of cleaning up the air in the foreseeable future. In the past, States have played leading roles in the attack on environmental problems, but it would appear that some States are now dragging their feet. For example, the National Air Pollution Control Administration has rejected the ambient air quality standards submitted by the State of New York for its portion of the New York Metropolitan Area Air Quality Control Region, on the grounds that the proposed standards for particulate matter and sulfur dioxide "do not provide for the margin of safety consideration requirement" established by the NAPCA. Standards could surely be put into effect more quickly if they were set directly by the Federal Government, instead of submitted by the States for Federal approval. Hopefully, the Federal Government will also set the stringent standards which will be necessary if we are to make our air clean again, and enforce those standards very strictly.

In addition to authorizing the Secretary of Health, Education, and Welfare to set nationally applicable air quality standards, my bill would ban from interstate commerce gasoline containing lead or other fuels the combustion of which results in emission of lead particles. According to a recent New York Times article, approximately 600 million pounds of lead were consumed as anti-knock gasoline additive in the United States in 1968. Much of that lead is now suspended in the air above American cities, in the form of tiny particles of lead compounds which are one product of combustion in automobile engines. In view of the well-known toxicity of lead, the health hazard to the American people is clear. We must ban lead from gasoline forthwith.

Clearly, lead is not the only dangerous pollutant which is a by-product of the internal combustion engine. Therefore, the bill I am introducing today would authorize the Secretary of HEW to establish standards respecting the composition or the chemical or physical properties of any fuel or fuel additive, and to test motor vehicles and engines off actual production lines (rather than prototypes) to make sure that automobile manufacturers are meeting motor vehicle emission standards. If motor vehicles or engines fail to meet the emission standards, the certificate authorizing their manufacture will be revoked. In view of the fact that the automobile is a major source of air pollution in this country, such strict attention to curbing emissions from automobile engines is not unwarranted. According to one expert, an idling car emits 100 billion particles per second. That figure must be drastically reduced if we are to begin to alleviate the air pollution problem, which has reached the crisis point.

H.R. 17090 would also instruct the Secretary of HEW to establish standards regarding emissions from "stationary sources" such as factories. The standards would be enforced through the injunctive process in Federal courts, with penalties of up to \$100,000 per day after the time allotted the defendant to take remedial action. Fines must be sufficiently large to be an effective deterrent.

We must take immediate remedial action if we are to have any hope of reversing the present trend toward pollution of our atmosphere. According to Dr. Vincent Schaefer of the State University of New York, the bluish and greyish hazes which increasingly limit visibility are the result of effluents consisting of invisible particulate matter and accompanying vaporous gases which cannot be seen when they are released into the atmosphere.

There is some evidence that these tiny particles can result in inadvertent weather modification. Dr. Schaefer believes that misty rains and very light snows can sometimes be attributed to automobile pollution, and that the emission of particulate matter in the upper atmosphere by the SST might also cause changes in weather patterns. This is an extremely complex problem which, in my judgment, deserves more attention than it has received in the past.

I would hope that this Committee will therefore act promptly to report out legislation along the lines I have suggested, and that, following passage of the necessary legislation, the Secretary of Health, Education and Welfare will quickly establish national air quality standards. In my judgment, attention should be given to the problem

of controlling emission of invisible particles and their effect on possible weather modification as those standards are established. Equally, stringent enforcement procedures must be set up, and used. We must act quickly if we are to keep from polluting ourselves off the planet—the supply of breathable air can no longer be considered inexhaustible.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you, Mr. Reid.

Our next witness will be the Honorable Frank J. Horton of New York. Welcome, sir.

STATEMENT OF HON. FRANK J. HORTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. HORTON. Mr. Chairman, dirty air seems to be everywhere, and we are finally facing the reality of coming up with some hard answers to this growing problem.

Almost all dirty air comes from some kind of burning combustion—from gasoline in automobile engines; from coal, oil and other fuels in industrial plants; from garbage and trash incineration; and from jet airplane exhausts.

It is evident that we need some solution to unclog the air we have so congested.

Therefore, I am most pleased to have this opportunity to testify before the Interstate and Foreign Commerce Committee in support of the Clean Air Act Amendments and the Wastes Reclamation and Recycling Act.

As you know, I am one of the co-sponsors of these bills, H.R. 16054 and H.R. 16053.

There are ten provisions to the Clean Air Act Amendments.

1. It authorizes the Secretary of Health, Education and Welfare to publish more stringent motor vehicle emission standards for 1973 and 1975.

2. It requires vehicles to be tested for compliance with emission standards throughout the year.

3. It requires regulation for gasoline composition and additives.

4. It initiates extensive Federal research and offers incentives to private companies to develop and produce a low pollution auto within five years.

5. It initiates testing and evaluation programs to assist private developers of low pollution autos.

6. It establishes national air quality standards, so that there are uniform standards, and will allow the states to prepare within one year abatement plans for meeting these standards.

7. It accelerates the designation of inter-state air quality control regions.

8. It establishes national emission standards for pollutants that are extremely hazardous to health.

9. It strengthens enforcement of Federal air pollution control authority to both inter- and intra-state situations.

10. It subjects violators of air quality standards to court imposed fines of up to \$10,000 a day.

Mr. Chairman, the Wastes Reclamation and Recycling Act is also vitally needed. Our grandmothers used to find ways to use coffee cans and jelly jars. Now, no one saves anything and that is our problem.

Last year, Americans threw away 50 billion cans, 30 billion bottles and jars and 4 million tons of plastic. We junked 7 million cars and trucks.

Dump grounds and junk heaps take up about 7,000 square miles of the United States. Open dumping accounts for 85 per cent of the way we advanced Americans dispose of our waste.

If we can recycle what we are finished using, to be reused, we are not only lessening pollution, we are also conserving our resources.

This bill will direct research toward techniques for re-cycling materials and producing packaging materials that are easily degradable.

It will also authorize the Council on Environmental Quality to develop bounty payment or a similar system to ensure prompt scrapping and re-cycling of junk automobiles.

Mr. Chairman, there is no doubt in my mind that these measures are needed immediately. I feel confident that the committee will concur and favorably report these bills.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you, Mr. Horton, for sharing your views with us today. Our colleague from the State of Pennsylvania, the Honorable George A. Goodling, has a statement he would like to share with us. Welcome, sir, proceed as you see fit.

STATEMENT OF HON. GEORGE A. GOODLING, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Mr. GOODLING. Mr. Chairman, the instant concern of this Subcommittee is legislation dealing with clean air and wastes reclamation and recycling. I am co-sponsor on H.R. 16059 and H.R. 16019, bills dealing with these matters respectively.

I am certain that a vast array of materials will be submitted to this Subcommittee to demonstrate the need for remedial action in the particular areas that are the object of this Subcommittee's interest. Rather than burden the record with detail that would, in all probability, be duplicated, I would like to make some observations and recommendations relating to the implementation of remedies for air pollution and solid wastes.

With respect to air pollution, I would like to stress the seriousness of this problem by pointing out that there is enough evidence on hand to strongly suggest that unless we act expeditiously to do something about purifying the air that is basic to our existence, we will be signatory to our own ultimate destruction.

While air pollution results from many causes, it should be recognized that automobile exhaust accounts for essentially 60 percent of the pollutants in our air. In view of this, it would be well if we promptly zeroed in on this prime offender of our air. Toward this end, efforts must be made to reduce or neutralize the ingredients in our fuels that act to pollute our atmosphere, and attempts will have to be made to

develop engines that do not saturate the air with noxious discharges. It is said that in these processes our cars could lose some of the great muscle they now possess; however, I would consider it an eminently fair exchange if cars were to lose some of their muscle and, in return, people were to have their lives saved, highway-wise and otherwise.

Frankly, I cannot help but feel optimistic about our solving the problem of air contamination resulting from internal combustion engines in vehicles, because any nation that has the technical ingenuity to place a man on the moon certainly has the competence to detoxify an exhaust pipe.

With respect to wastes reclamation and recycling, there is enough evidence in our every-day lives to show that there is a desperate need for something to be done toward cleaning up the face of America. All kinds of trash clutter the American landscape, the principal offender being the junked automobile. It is imperative that a major effort must be made to convert these gigantic metal eyesores into something that would serve a useful purpose for our society. We have already done enough in this regard, as in reclaiming vehicle hulks by compressing them into compact metal packages, to provide encouragement for even greater accomplishments in recycling and reclaiming these huge metal discards. In summary, the genius that was implemented to create these automotive masterpieces for the highways must be directed toward keeping the exhausted forms of these creations from cluttering up the side roads and streets of America.

There is no question about our having the ingenuity and the technology to improve our environment, and the principal problem appears to be one of implementing this genius so that it focuses full force on the problems being considered by this Subcommittee.

In consideration of how to generate the forces that will operate to cope with these pollution problems, we must resort to every means to bring these forces into operation.

The Federal Government must, of course, take the lead in this anti-pollution and waste disposal effort, for the vastness of the enterprise will require prime Federal participation, with a heavy focus on getting political subdivisions and individual citizens into the act.

The Federal Government will, of course, play a very important part in setting up guidelines and standards for the various types of clean air and solid-waste-use programs and, at the same time, providing encouragement for the enforcement of the various control measures at the State and local levels.

It is expected that the Federal Government will, in the instance of junked automobiles, provide an inducement for disposing of these discarded metal behemoths. This is reflected in President Nixon's Message on Environmental Quality submitted to the Congress on February 10, 1970, when he said, "I have asked the Council on Environmental Quality to take the lead in producing a recommendation for a bounty payment or other system to promote the prompt scrapping of all junk automobiles."

Undoubtedly this provision to provide a bounty payment for promoting the prompt scrapping of junked automobiles would prove an effective device for eliminating this form of visual pollution. But, Mr. Chairman, the problem confronting us is a gigantic one, and no stone should be left unturned toward the end of obtaining maximum results. For this reason, I am recommending that this Subcommittee

give serious consideration to implementing, either via recommendation to the Council on Environmental Quality or through legislation, a system of "Anti-Pollution Prizes." Such a system would be on a pilot basis, represented by cash awards that would be given to an individual, a corporation, or a company that develops, or causes to have developed, a device, system, or method that will serve to purify our air and put our solid wastes to practical use.

Mr. Chairman, this prize technique is one that has been used with great success by many of our big corporations throughout the United States for the purpose of drawing on the genius of the grand American population to promote their products and services. Perhaps our Federal Government can use this prize technique in inviting this same genius to work its way on air pollution and solid waste problems. And if such a prize system proved worthwhile, it could be tried in other pollution problem areas.

The Council on Environmental Quality, which already is established and considered by President Nixon to be the keeper of our environmental conscience, would be ideally equipped to administer such a prize pilot program. The Council would determine the types and amounts of awards, would administer the contests and lay down the contest rules, and would select the prize winners.

Mr. Chairman, everyone is intrigued by the prospect of winning a prize. The "Anti-Pollution Prize" system would offer a prize-winning opportunity to the American population at large and, in the process, give America a prime opportunity to use the genius of its population in solving pollution problems that threaten both our country and its people.

Mr. Chairman, I deeply appreciate having the opportunity of presenting this statement to you and the Members of your Subcommittee.

Mr. ROGERS. Thank you, Mr. Goodling, for a very fine statement.

Mr. GOODLING. Thank you, Mr. Chairman, for allowing me to present my views.

Mr. ROGERS. The Honorable Clarence E. Miller of Ohio is our next witness. It is good to see you Mr. Miller, proceed.

STATEMENT OF HON. CLARENCE E. MILLER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OHIO

Mr. MILLER of OHIO: Mr. Chairman, with the enactment of the Air Quality Act of 1967 the Federal government, State and local agencies, industry, and every citizen were provided with a great opportunity and a tremendous challenge to attack the problem of air pollution in a systematic, knowledgeable manner, on a regional basis.

Since 1967, progress has been made in many ways, along many fronts. The principal atmospheric areas of the contiguous United States were defined. Next, over twenty-five air quality regions were established following hearings and consultations with State and local agencies, and after technical evaluations of the many factors which contribute to the spread of air pollution over an area.

Air quality criteria for sulfur oxides and for particulates have been published, indicating the extent to which these pollutants are damaging health and property. Detailed guidelines concerning the cost and

effectiveness of techniques available to abate and control sulfur oxide and particulate pollution were published together with the criteria. States are now in the process of establishing standards based on these criteria which will be enforced by them following approval by the Secretary of Health, Education, and Welfare.

While stricter national standards have been established for motor vehicle pollution since the promulgation of the Act, numerous federally-assisted research projects are underway to improve the performance of existing automotive engines and fuels, and to develop alternate low emission power plants.

These and many other programs are in progress and more are planned, for we have not yet turned the corner in our battle for cleaner air. It could hardly be expected that in the three years for which the Act was funded we would be able to do much more than organize, arm ourselves, and begin to fight back.

State and local governments, industry and the public have been made aware of their responsibilities, but they continue to look to the Federal government for guidance, and for technical and financial assistance in every phase of pollution control activity that they undertake. It would be unthinkable to turn away from our goals and to discontinue our efforts at this stage.

Therefore, on December 10, 1969 I introduced HR 15192 which would amend the Clean Air Act to authorize appropriations through fiscal year 1973. The amounts this bill request are, in my opinion, reasonable sums which will be needed to carry on a comprehensive nationwide air pollution control program successfully: to both continue projects which are now underway, and to initiate new activities which changing circumstances may warrant. To do less would mean to stand still. To stand still at this point is to invite disaster—a situation so dangerous that it may prove overwhelming.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you, Mr. Miller.

Next we shall hear from the Honorable John T. Myers of Indiana. Mr. Myers has a brief statement for us this morning.

STATEMENT OF HON. JOHN T. MYERS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF INDIANA

Mr. MYERS. Mr. Chairman, I support, unequivocally, the proposed legislation, H.R. 16110 and H.R. 16111, which I co-sponsored and which are identical to other bills amending the Clean Air Act and proposing a Wastes Reclamation and Recycling Act.

These two proposals are a part of the Administration's comprehensive program on environmental quality. I want to commend this Subcommittee for scheduling early hearings on these measures and for joining in a bi-partisan effort to solve this problem.

While there are those who want to believe the problem of environmental pollution will fade with time, I am convinced we must act now in order to assure future generations of an environment capable of sustaining life. It is a fearful thought. Nevertheless, the problem is that urgent.

There is every reason to believe that the basic causes of environmental pollution—industrialization, urbanization, and the growth of population and income—will cause the pollution problem to become

more severe for many years to come, unless effective control measures such as we are considering in these hearings are adopted immediately.

As the President said in his message to Congress, "The task is ours together." I am hopeful that with the new awareness and attitude among all Americans this Subcommittee will act favorably on this legislation to help us wage a constructive and effective campaign against pollution.

Mr. ROGERS. Thank you, Mr. Myers, for a very concise statement.

Mr. MYERS. Thank you, Mr. Chairman.

Mr. ROGERS. Our final congressional witness today will be the Honorable William L. Scott of Virginia. Welcome sir, proceed as you see fit.

STATEMENT OF HON. WILLIAM L. SCOTT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF VIRGINIA

Mr. SCOTT. Mr. Chairman: There might have been a time when this Nation could afford to squander its natural resources, when it could afford to shoot plumes of deadly smoke into the sky and pump streams of poisonous wastes into our rivers and streams.

There might have been a time like that . . . but the time is now long past.

Our industrial might has reached a stage where it now can—and must—give thought and study to its effects on the total environment. There is still much need for further industrial development. But it no longer need be at the expense of a pillaged landscape, a ravaged waterway, a ruined atmosphere.

The pollution we live in is of our own making. We created it and we must destroy it or, surely, it will destroy us. Even now, in some places, we choke on the air we must breathe, we gag on the water we must drink. Some of our foods contain chemicals harmful to man . . . and man has placed them there. Much of our land is littered with the discards of what we are pleased to call civilization—rusting and wrecked auto hulks, trash discarded along the roadside, and the ever-present beer can . . . in the deepest woods, along the most remote streams we can see its hard glitter among the softer outlines of nature.

The United States—technologically—is the most advanced nation in the world. Maybe that's why our air, our water, and our land are polluted. But our technology, which has brought us so far, must now help us move back. We must learn now how to go backwards—to the days of sweet-water streams, to the days of smog-free air, to the days of an unlittered land and a restful, peaceful, natural beauty in the world.

Our technology can help us clean up the dumps of our land, the sewers of our streams, the poison gas of our atmosphere. We can eliminate pollutants from our automobiles and smokestacks. We can erase our auto graveyards, our junk piles, our dumps. We can bring back to life our lakes and rivers.

We can do all these things and, Mr. Chairman, we must.

I make this urgent plea, Mr. Chairman, not only from my own deep conviction. I also represent here my 600,000 constituents. In a recent questionnaire, 9 out of 10 indicated their deep concern with threadbare quality of their natural environment.

As a result, I have cosponsored a package of bills designed by the President to make a fresh new start in this area. Two of the bills before you today are identical to bills I am cosponsoring. I am here to strongly advocate the passage of those bills—H.R. 15847, which authorizes research to find new disposal methods for the debris of civilization, and H.R. 15848, which charts a new path in our search for pure air.

I urge this committee to approve these bills and the five others which have yet to come.

Thank you.

Mr. ROGERS. Thank you, Mr. Scott, for sharing your views with us this morning.

Mr. SCOTT. It has been a pleasure, Mr. Chairman.

Mr. ROGERS. We have scheduled as our next witness today the Honorable Robert H. Finch, Secretary of the Department of Health, Education, and Welfare. It is our understanding he is slightly indisposed and cannot be with us.

We are pleased to have the Under Secretary, Mr. Veneman, with his associates.

The committee welcomes you.

I understand that you have the statement that the Secretary was going to give. Whatever statements you have will be made a part of the record at this point, without objection, and then if you desire you can proceed in any way you like.

You might want to identify those who are with you.

STATEMENT OF HON. JOHN G. VENEMAN, UNDER SECRETARY, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE; ACCOMPANIED BY CHARLES C. JOHNSON, JR., ADMINISTRATOR, ENVIRONMENTAL HEALTH SERVICE; DR. JOHN T. MIDDLETON, COMMISSIONER, NATIONAL AIR POLLUTION CONTROL ADMINISTRATION; RICHARD VAUGHAN, DIRECTOR, BUREAU OF SOLID WASTE, ENVIRONMENTAL HEALTH SERVICE; AND SIDNEY SAPERSTEIN, ASSISTANT GENERAL COUNSEL, HEW

Mr. VENEMAN. Thank you very much, Mr. Chairman.

I do have a statement that I will read on behalf of the Secretary. He certainly expresses his regrets he could not be here. He called in at eight this morning, not very ill but not able to be in the office today.

We also have two other statements that we will file for the record pertaining to the two specific bills that we will not attempt to read. (See pp. 284 and 286.)

To identify those at the table with me, to my far left is Mr. Richard Vaughan, who is the Director of the Bureau of Solid Waste of the Environmental Health Service.

To my immediate left, Mr. C. C. Johnson, the Administrator of the Environmental Health Service.

To my far right is Sid Saperstein, Assistant General Counsel of the Department of Health, Education and Welfare.

To my immediate right, Dr. John Middleton, who is the Commissioner of the National Air Pollution Control Administration of the Environmental Health Service.

With your consent, Mr. Chairman, I shall read the statement that was prepared for the Secretary.

I will be available for questions and understandably part of the questions may have to be diverted to the staff.

Mr. ROGERS. Certainly we understand that many of the technical questions we would not expect you to know.

STATEMENT OF HON. ROBERT H. FINCH, SECRETARY, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, PRESENTED BY HON. JOHN G. VENEMAN, UNDER SECRETARY, HEW

Mr. VENEMAN. Mr. Chairman, it is a privilege to appear before you today to discuss two major Administration initiatives in the area of environmental protection and restoration. First, I will take up the Clean Air Act Amendments of 1970 (H.R. 15848), and then turn to the Wastes Reclamation and Recycling Act of 1970 (H.R. 15847). As I mentioned, I have the report on each that will be submitted for the record.

Both are essential components in a comprehensive national environmental strategy. Both are designed to fulfill the President's commitment—declared in his February 10, 1970 Message to the Congress on Environment—to begin repaying the nation's debt to the world we inhabit. For centuries we have abused, sometimes consciously and sometimes mindlessly, the air, water and land we inherited. Our life-support systems are literally in peril. And now the long process toward environmental restoration must begin—in complete earnest, on all fronts, for as long as it may take.

The questions are no longer “why” or “whether”—but only “how” we must proceed. We think we all agree on that proposition, and it is in that spirit that we will recommend prompt Congressional action on the two bills before you.

H.R. 15848 is concerned with two major facets of air pollution—motor vehicle and stationary source emissions. Departmental representatives already have appeared before you to discuss the sections of the bill relating to motor vehicles, and so I will concentrate today on stationary sources.

But first we want to cover one issue relating to motor vehicles of particular concern to members of this subcommittee.

As you know, on February 10, 1970, we published in the Federal Register notice of our intention to prescribe substantially more stringent emission standards for 1975 model year motor vehicles, with the first Federal emission standard for nitrogen oxides applicable to the 1973 model year.

The 1975 standards were presented informally to representatives of the automobile and petroleum industries at the November 20, 1969 meeting of the President's Environmental Quality Council.

Since that meeting, and particularly since February 10, there has been a great deal of discussion about attainment of these standards. Much of it has revolved around the issue of the lead additive now found in almost all gasoline sold for use in motor vehicles.

As the President said in his Message on Environment: “What goes into a car's fuel has a major effect on what comes out of its exhaust, and also on what kinds of pollution-control devices can effec-

tively be employed." The proposed 1975 standards call for major reductions in emissions of carbon monoxide, hydrocarbons, and nitrogen oxides. They also require, for the first time, control of particulate emissions. Much of the particulate matter ejected from a car's exhaust into the atmosphere is lead, and it appears unlikely that the 1975 standard for particulates can be met without the removal or major reduction of lead in gasoline. Moreover, devices that the automobile manufacturers plan to use in order to achieve the 1975 standards for gaseous emissions cannot be used with leaded gasolines.

Most firms in both the automobile and petroleum industries have recognized that lead must be removed from gasoline, and soon. Automobile manufacturers are preparing to market 1971 cars that can operate satisfactorily on low-octane unleaded fuel. A number of major oil companies either have plans or have indicated a willingness to make unleaded gasoline available for those vehicles.

There are still many questions to be resolved—such as the timing of the removal of lead from gasoline, and the number and types of fuels to be marketed. And the answers will have a significant impact both on consumers' pocketbooks and on the quality of the air we breathe.

Members of the industries involved have recognized the need for Federal leadership in suggesting the answers. In our proposed amendments to the Clean Air Act, we have requested that the Secretary of Health, Education, and Welfare be given authority to regulate and, if necessary, prohibit the use of additives in fuels for motor vehicles. We urge the swiftest possible action on this measure.

In the meantime, we must take advantage of the commendable willingness of most petroleum companies to provide unleaded fuels. We also must seek to avoid fragmented and possible counter-productive actions by individual firms. Therefore, the Secretary is sending letters this week to executives in the petroleum industry, requesting their views on the still unresolved issues as well as information on their present plans, resources, and problems.

On the basis of the responses received and the Department's judgment of the most desirable course of action from the public's point of view, the Secretary will then seek the concurrence of members of the industry to a proposed future course.

Throughout this process, we will be consulting with other concerned individuals and organizations both within and outside the Federal Government. We also will be working, of course, with the automobile and lead additive companies. We are confident that responsible voluntary action in the public interest will result from all these efforts.

The staff of Health, Education, and Welfare is consulting with the Department of Justice on a continuing basis to insure that our actions consistent with the antitrust laws.

Now, let me turn to stationary source emissions. The President rightly described the air as our most vital resource and air pollution as our most serious environmental problem. To strengthen and to speed up the Nation's attack on this problem, he proposed a series of amendments to the Clean Air Act. These proposals are before you today in H.R. 15848.

The administration bill represents no radical departure from the present Clean Air Act. Rather, it preserves the best features of that act and provides for necessary change. There would be a high degree of continuity with on-going efforts.

The administration bill does break new ground in its recognition of the fact that the Nation's air resource is invisible. Air, polluted or not, crosses the imaginary lines that divide State from State. Air quality, therefore, is not a matter of purely local or regional concern. It is of national concern. And that national concern must be reflected in the way air quality standards are established.

Under the proposed bill, two other matters of national concern also would be the focus of national effort:

(a) New stationary sources of air pollution that would contribute substantially to endangering public health or welfare; and

(b) Any stationary source emitting pollutants that are extremely hazardous to health. The administration bill would authorize the establishment of national emission standards for these sources.

National air quality standards and stationary source emission standards obviously would have to be applied to many different situations. Thus, the administration bill provides for continued decentralization of the responsibility for implementation and enforcement.

Now, to highlight the specific provisions of H.R. 15848, section 6 would authorize the Department of Health, Education, and Welfare to establish national air quality standards, and section 7 would call upon each State to adopt an implementation plan for each area within the State. Our objective is to insure that air quality standards are put into effect across the entire Nation. We see three principal advantages in the establishment by the Federal Government of nationwide uniform standards:

First, the States cannot be expected to evaluate the total environmental impact of air pollutants, or take it into account in standard-setting.

Second, States would be able to concentrate their resources on the critical tasks of implementation and enforcement.

And third, the process of putting air quality standards into effect would be accelerated, because there would be no time consumed in reviewing and approving standards for each air quality control region.

National air quality standards would be derived from the best available scientific knowledge, developed both within and outside the Federal Government.

Once formulated, such national standards would be published in the Federal Register, and all interested parties, including the general public, would have the opportunity to submit comments for consideration prior to issuance of the standards.

Thus, whereas each State now sets air quality standards for specific pollutants on the basis of Federal air quality criteria documents—which describe effects of pollutants at various concentrations—the Federal Government, under H.R. 15848, would establish uniform standards nationwide—based also, we expect, on criteria documents.

The provisions for national air quality standard-setting would not impair any State's right to establish standards requiring higher

levels of air quality. I want to stress the point—this right is stated as a national policy in the Clean Air Act, and we reaffirm this policy.

Following the promulgation of national standards, each State would have 90 days to signify its intention to adopt an implementation plan, describe the steps it would take to develop such a plan, and indicate which areas of the State would be given priority.

In their implementation plans, the States would have to spell out the measures to be taken to achieve and preserve national air quality standards—or, if the State desires, even higher than national quality levels.

As you know, one of the express purposes of the Clean Air Act is “to protect and enhance the quality of the nation’s air resources”. It will continue to be our view that implementation plans that would permit significant deterioration of air quality in any area would be in conflict with this provision of the Act.

State implementation plans would have to include provisions for intergovernmental cooperation, particularly in dealing with interstate air pollution problems. Under the Administration bill, it would be a Health, Education and Welfare responsibility to designate significant interstate problem areas. We estimate that there are about 50 such areas at present. This number includes 21 of the first 57 areas marked for designation as “air quality control regions” under the provisions of the existing Clean Air Act.

States generally will be expected to submit implementation plans no later than six months after filing letters of intent. If there is good reason why more time should be allowed, for some areas within the State, then an extension would be authorized.

Upon enactment of this bill, States will be expected to begin attacking air pollution in all their cities, counties, and towns. We cannot realistically expect every State to shift gears over night. For our part, we intend to support their efforts with every technical and financial resource at our command.

As a general rule, under the Administration bill, the time span for State action leading to submission of an implementation plan would be 9 months. It would be the 90 days for filing the intent and 6 months for filing the actual implementation plan. Under the present act, the time span is 15 months.

The administration bill requires that States hold public hearings prior to the adoption of implementation plans. Public participation in State hearings on air quality standards has been highly productive. We strongly feel that continued public involvement in the evolution of State air pollution control programs must be encouraged. And participation in hearings on implementation plans will do precisely that.

We come now to the second major element of the administration bill: Authorization for the Department of Health, Education and Welfare to establish national emission standards for certain stationary sources of air pollution. With one important exception, such national emission standards would apply only to new stationary sources, of certain specified types and classes. The exception would involve air pollutants that are extremely hazardous to health; in such cases, national emission standards could be applied to all stationary source emissions.

In general, existing stationary sources of air pollution are so numerous and diverse that the problems they pose can most efficiently be attacked by State and local agencies. Even with air quality standards being set nationally, dealing with existing stationary sources would necessarily vary from one State to another and, within States, from one area to another.

In the years ahead, however, many potentially significant new stationary sources of air pollution will come into being—to meet growing demands for electric power, manufactured goods, and other necessities and amenities of modern life. Large stationary sources, such as electric generating plants, iron and steel mills, and petroleum refineries, cement plants, et cetera, often have adverse effects on air quality over broad geographic areas.

This problem demands national attention. If we are ever to begin preventing air pollution, instead of just attacking it after the fact, then we must at least insure that major new stationary sources, wherever they are located, are designed and equipped to reduce emissions to minimum feasible levels. The application of national emission standards would also tend to minimize the competitive advantage of locating a new facility in an area where emission standards are less rigorous than in other areas. This would eliminate “polluter havens” that have sprung up in this country.

With respect to pollutants that are extremely hazardous to health, national emission standards could be applied to existing, as well as new, stationary sources. Such pollutants might include asbestos, beryllium, cadmium, biological aerosols, and chlorinated hydrocarbons. Under the Administration bill, new sources of extremely hazardous pollutants could not be constructed or operated without a specific exemption from the Department of Health, Education, and Welfare. And such exemptions would be granted only where we are satisfied that emissions would be effectively controlled. Existing sources would be required to take any measures necessary to comply with the applicable standards.

Although States would have primary responsibility for enforcement of air quality and emission standards, the bill provides for effective Federal action in those cases where States fail to get the job done.

Federal enforcement action could be initiated whenever (a) air quality fails to meet the applicable air quality standards, or stationary source emissions are in excess of applicable national emission standards, and (b) this results from a State's failure to carry out its implementation plan. There would be a two-step procedure, rather than the three-step procedure prescribed by the Clean Air Act. A hearing would be the first step. Following such a hearing, the Department would specify the remedial action to be taken and allow a period of not less than 60 days for such action to get underway. Then, if the specified action were not taken, the Department could ask the Attorney General to bring suit to enjoin failure to comply. Federal district courts would be authorized to assess fines up to \$10,000 a day.

In concluding this portion of my statement, I want to emphasize in the strongest possible terms our belief that the Administration bill is essential to the Nation's attack on air pollution. We must intensify

our present efforts. We must have improved weapons and new weapons in the fight against this major component of environmental abuse—a fight required by public health and welfare, and by growing public demand. H.R. 15848 would greatly strengthen our hand in that respect.

Now, Mr. Chairman, I turn to H.R. 15847—the Wastes Reclamation and Recycling Act of 1970. This bill would contribute substantially to another environmental problem of great magnitude and urgency. It would (a) extend for three years the Solid Waste Disposal Act—which provides for research, demonstrations, and development and application of improved disposal methods—and (b) direct the Council on Environmental Quality to take the lead in developing Federal programs to promote waste reclamation and recycling through regulatory measures and economic incentives.

The President, in his February 10 message on environment, spelled out the thinking that has gone into our proposed bill—and I quote at some length from the message because it provides such a thorough overview:

One way to meet the problem of solid wastes is simply to surrender to it: to continue pouring more and more public money into collection and disposal of whatever happens to be privately produced and discarded. This is the old way; it amounts to a public subsidy of waste pollution. If we are ever truly to gain control of the problem, our goal must be broader; to reduce the volume of wastes and the difficulty of their disposal, and to encourage their constructive re-use instead.

* * * * *

As we look toward the long-range future—to 1980, 2000, and beyond—recycling of materials will become increasingly necessary not only for waste disposal but also to conserve resources . . . A great deal of our space research has been directed toward creating self-sustaining environments in which people can live for long periods of time by reprocessing, recycling, and re-using the same materials. We need to apply this kind of thinking more consciously and more broadly to our patterns of use and disposal of materials here on earth.

The outlines of the present Federal solid waste program are undoubtedly familiar to most of you. Our department is responsible for administering much of it and—although the environmental problems of solid waste management are very grave—we feel that our current program is moving in the right direction.

Extension of the Solid Waste Disposal Act is a matter of some urgency since the current authority for appropriations for this activity expires June 30, 1970. The act authorizes research and development, demonstration of new and improved technology, studies and investigations of solid waste problem areas, and training in solid waste management.

It also authorizes financial and technical assistance to State and local agencies and others in the planning and operation of solid waste management systems. Work in all these areas must be continued.

Let me review, very briefly, some on-going programs of genuine promise being conducted by our Bureau of Solid Waste Management.

Prior to the passage of the Solid Waste Disposal Act in 1965, only five States had identifiable organizational units devoted to solid waste management. There was a lack of valid information on prevailing solid waste practices. Since then, planning grants have been awarded to some 46 State and interstate agencies to survey solid waste practices within their jurisdictions and develop comprehensive action plans.

Interim surveys by our staff have produced startling results. This nation is generating approximately 360 million tons of industrial, municipal, and commercial solid waste each year, and this amount is expected to double by 1980. We found that, while we spend 4.5 billion dollars a year to manage this waste, we are not doing a very good job. Of all sites utilizing land disposal practices (the predominant method), only six per cent are adequate; of all municipal incinerators, only 25 per cent are satisfactory. Open dumping is still the most prevalent method for disposing of the nation's solid waste.

Through contract, grant, and in-house mechanisms, we have conducted over 150 studies, investigations, and projects to demonstrate new and improved technology—involving collection technology, composting, special technology for small communities, improvements in land disposal technology, new advances in incineration, and the use of waste for beneficial purposes.

We have supported over 150 research and development projects covering the entire field of solid waste management, from conversion of cellulose into protein to the development of a dissolvable bottle. One contract has completed the basic research leading to a pilot-scale air classifier, capable of separating automatically several materials from waste. Another promising research project is developing a system to convert waste to electric power.

Just as important as the development and demonstration of new technology is use of these techniques by local and State agencies and private organizations. Requests for technical assistance are handled by the Department at the rate of over 500 per year. Information is furnished to cities to help them improve their solid waste management systems. More than 1500 persons have attended our training courses—covering such specific phases of solid waste management as incineration and collection. We also conduct courses for city, State, and industry personnel in the principles of solid waste management. Eleven grants to universities have led to the establishment of solid waste management curricula at these institutions.

We also have the responsibility to communicate the results of our research, demonstration, and investigations to those responsible for doing the job. We carry this out largely through publications, and plan to enlarge our solid waste information storage and retrieval system to serve interested parties everywhere.

The second thrust of the proposed Act is to direct the new Council on Environmental Quality to take the lead in developing necessary programs to promote the reclamation and recycling of wastes. These are important new departures, and they will involve regulatory schemes and also the evolution of effective incentive and disincentive systems.

This effort must proceed on the basis of comprehensive studies of market structures, economic relationships, and new and improved technologies. The Administration bill orders the Council on Environmental Quality to provide over-all direction and coordination for such studies, many of which require important contributions from other Departments and agencies of the Government.

The President has already requested the Council to begin the preliminary work necessary to embark on the effort called for in this legislation, with high priority given to a scheme to promote scrapping and recycling of automobile hulks. With the adoption of H.R. 18547 by

the Congress, we feel that specific proposals to promote reclamation and recycling of waste would soon be developed.

In conclusion, Mr. Chairman, I strongly reaffirm that passage of the Administration bill is essential to the over-all effort. We need it to enable us to continue productive on-going programs that now must be brought to fruition. And we need it to support the Administration's vital new emphasis on reducing the volume of wastes and resultant disposal problems by their reclamation and recycling—and thus on the creation of a valuable addition to the nation's total store of resources.

We will be pleased to take your questions, on all the subjects I have covered in this statement, and to provide you with greater detail.

I realize this is a rather lengthy statement.

I will be pleased at this time to attempt to answer any questions and those I can't respond to we do have the staff available.

(Secretary Finch's statements on H.R. 15847 and H.R. 15848 follow:)

STATEMENT ON H.R. 15847 BY HON. ROBERT H. FINCH, SECRETARY OF HEALTH, EDUCATION, AND WELFARE

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to urge adoption of the President's legislative proposal, H.R. 15847, the Wastes Reclamation and Recycling Act of 1970. This legislation will contribute substantially to the attack on an environmental problem of great magnitude and urgency.

The bill would (a) extend the Solid Waste Disposal Act—which provides for research, demonstrations, and development and application of improved disposal methods—and (b) direct the Council on Environmental Quality to take the lead in developing Federal programs to promote reclamation and recycling of wastes through regulatory and economic incentive measures.

The rationale of the bill is found in the following statement by the President in his February 10 Message to the Congress on Environment:

"One way to meet the problem of solid wastes is simply to surrender to it: to continue pouring more and more public money into collection and disposal of whatever happens to be privately produced and discarded. This is the old way; it amounts to a public subsidy of waste pollution. If we are ever truly to gain control of the problem, our goal must be broader: to reduce the volume of wastes and the difficulty of their disposal, and to encourage their constructive re-use instead.

* * * * *

"As we look toward the long-range future—to 1980, 2000, and beyond—recycling of materials will become increasingly necessary not only for waste disposal but also to conserve resources A great deal of our space research has been directed toward creating self-sustaining environments in which people can live for long periods of time by reprocessing, recycling, and re-using the same materials. We need to apply this kind of thinking more consciously and more broadly to our patterns of use and disposal of materials here on earth."

The outlines of the present Federal solid waste program are undoubtedly familiar to many members of this Committee. My Department, through the Bureau of Solid Waste Management in the Environmental Health Service, is responsible for administering much of this program. Although the environmental problems of solid waste management are very grave, we feel that the current program is moving in the right direction.

Extension of the Solid Waste Disposal Act is a matter of some urgency if work in this field is to continue at the Federal level, since the current authority for appropriations for this activity expires June 30, 1970. The Act provides Federal authority to conduct research and development, demonstration of new and improved technology, studies and investigations of solid waste problem areas, and training in solid waste management. The Act also authorizes the Federal Government to provide financial and technical assistance to State and local agencies and others in the planning and operation of solid waste management systems. Work in these areas must be continued if we hope to be able to cope with the ever increasing volumes of solid waste generated in this country.

The Bureau of Solid Waste Management is engaged in ongoing programs to develop *technology* for more effective waste recycling and disposal, as well as providing assistance for States and local communities. These continuing thrusts, some of which I will review briefly, underscore the necessity for the three year extension of the present legislation so that the efforts we have initiated may be brought to fruition.

State and Interstate Planning. Prior to the passage of the Solid Waste Disposal Act in 1965, only five States had identifiable organizational units devoted to solid waste management. At the same time, the lack of valid information on solid waste practices in the United States presented a major obstacle to the effective assessment of the solid waste problem. Since that time, planning grants have been awarded to 41 State agencies, two Territories, and three interstate agencies to survey solid waste practices within their jurisdictions and develop comprehensive action plans for solid waste management. The results of interim surveys by our staff were startling.

We found that this Nation is generating approximately 360 million tons of industrial, municipal, and commercial solid waste each year, and that this amount is expected to double by 1980. We also found that, while we spend 4.5 billion dollars per year to manage this waste, we are not doing a very good job. Of all sites utilizing land disposal practices (the predominant method), only 6 percent are adequate; of all municipal incinerators, only 25 percent are satisfactory. The survey revealed that open dumping is still the most prevalent method for disposing of the Nation's solid waste.

Studies, Investigations, and Demonstration Projects. Through contract, grant, and in-house mechanisms, we have conducted over 150 studies, investigations, and projects to demonstrate new and improved technology. In various States we are demonstrating improvements in collection technology, composting, special technology for small communities, improvements in land disposal technology, new advances in incineration, and the use of waste for beneficial purposes.

Research and Development. We have supported over 150 research and development projects covering the entire field of solid waste management, from conversion of cellulose into protein to the development of a dissolvable bottle. One research contract has completed the basic research leading to a pilot-scale air classifier capable of separating automatically several materials from waste. Another promising research undertaking by the Department is a project which is developing a system to convert waste to electric power.

Technical Assistance and Training. Equally as important as the development and demonstration of new technology is use of these techniques by local and State agencies and private organizations which share the actual burden of managing the Nation's solid waste. Requests for technical assistance are handled by the Department at the rate of over 500 per year. Information is furnished to cities to help them improve their solid waste management systems. More than 1500 persons have attended our training courses. These courses are designed to cover in a relatively short period of time specific phases of solid waste management, such as incineration or collection. We also conduct courses for city, State, and industry personnel in the principles of solid waste management. It is vital to increase the number of technical personnel in the field of solid waste management through formal academic training. Eleven grants to universities have led to the establishment of solid waste management curricula at these institutions.

We also consider of utmost importance our responsibility to communicate the results of our research, demonstration, and investigations to those responsible for doing the job. We carry this out largely through publications, and plan to enlarge our solid waste information storage and retrieval system to serve interested parties everywhere. I believe that, at last, the public is becoming aware of the magnitude of the solid waste problem and is demanding positive action.

The second thrust of the proposed Act is to direct the new Council on Environmental Quality to take the lead in developing necessary programs to promote the reclamation and recycling of wastes. These new departures will involve regulatory schemes and also the evolution of effective incentive and disincentive systems.

This effort must proceed on the basis of comprehensive studies of market structures, economic relationships, and technologies such as we already are conducting in our Bureau of Solid Waste Management. The Administration bill orders the Council on Environmental Quality to provide overall direction and coordination for such studies, many of which require important contributions from other Departments and agencies of the government.

As indicated in his Message on Environment, the President has already requested the Council to begin the preliminary work necessary to embark on the

effort called for in this legislation, with high priority given to a scheme to promote scrapping and recycling of automobile hulks. With the adoption of H.R. 18547 by the Congress, we feel that specific proposals to promote reclamation and recycling of waste would soon be developed.

In conclusion, Mr. Chairman, I strongly reaffirm that passage of the Administration bill is essential to the overall effort. We need it to enable us to continue productive ongoing programs that now must be brought to fruition. And we need it to support the Administration's vital new emphasis on reducing the volume of wastes and resultant disposal problems by their reclamation and recycling—and thus on the creation of a valuable addition to the Nation's total store of resources.

STATEMENT ON H.R. 15848 BY HON. ROBERT H. FINCH, SECRETARY OF HEALTH, EDUCATION, AND WELFARE

Mr. Chairman and Members of the Subcommittee, in his Message to the Congress on February 10, 1970, the President described the air as our most vital resource and air pollution as our most serious environmental problem. To strengthen and to speed up the Nation's attack on this problem, he proposed a series of amendments to the Clean Air Act. These proposals are before you today in H.R. 15848, and I welcome the opportunity to testify in its support.

Enactment of the Administration bill would enable the Department of Health, Education, and Welfare to extend and accelerate its national program of air pollution research and control. H.R. 15848 does not represent a radical departure from the present Clean Air Act; rather, it preserves the best features of that Act and provides for change where change seems necessary. There would be a high degree of continuity with ongoing efforts.

The Administration bill breaks new ground, however, in its recognition of the fact that the Nation's air resource is indivisible. Air, polluted or not, crosses the imaginary lines that divide State from State. Air quality, therefore, is not a matter of purely local or regional concern but rather of national concern. That national concern must be reflected in the way air quality standards are established—and it is so reflected in the Administration bill.

Under the proposed bill, two other matters of national concern also would be the focus of national effort: (a) *new* stationary sources of air pollution that would contribute substantially to endangering public health or welfare; and (b) *any* stationary source emitting pollutants that are extremely hazardous to health. National leadership in dealing with such sources is essential, and the Administration bill would provide it by authorizing the establishment of national emission standards for these sources.

National standards, however, whether air quality standards or stationary source emission standards, obviously would have to be applied to many different situations. Accordingly, the Administration bill provides for continued decentralization of the responsibility for implementation and enforcement.

The Administration bill also would provide new tolls for dealing with a problem that has long been recognized as national in scope—the problem of motor vehicle pollution. Of particular importance are those provisions dealing with fuels and fuel additives. Motor vehicle engines are not the sole cause of the problem. Engines, fuels, and additives are interrelated causes and must be treated as such.

Now, let me describe the provisions of H.R. 15848 in greater detail. Section 6 would authorize the Department of Health, Education, and Welfare to establish national air quality standards, and Section 7 would call upon each State to adopt an implementation plan for each area within the State. Each standard would, as State standards now do, set maximum permissible concentrations of a pollutant per unit of ambient air.

Our objective is to insure that air quality standards and implementation plans are put into effect across the entire Nation.

In my view, there are three principal advantages in uniform nationwide air quality standards, established by the Federal Government:

First, there would be an opportunity to take into account factors that transcend the boundaries of any single State. States cannot be expected to evaluate the total environmental impact of air pollutants, or take it into account in standard setting.

Second, States would be able to concentrate their resources on the complicated and critical tasks of developing and carrying out implementation and enforcement plans.

And third, the process of putting air quality standards into effect would be accelerated, primarily because there would no longer be any time consumed in reviewing and approving air quality standards for each air quality control region.

For these reasons, I believe that the approach we have proposed is a marked improvement over existing provisions of the Clean Air Act.

National air quality standards would provide for protection of public health and would guard against the environmental and economic effects of air pollution. They would be derived from the best available scientific knowledge and would be developed with the assistance of experts within and outside the Federal Government.

Once formulated, such national standards would be published in the *Federal Register*, and all interested parties, including the general public, would have the opportunity to submit comments for consideration prior to issuance of the standards.

Thus, whereas each State now sets air quality standards for specific pollutants on the basis of Federal air quality criteria documents—which describe effects of pollutants at various concentrations—the Federal Government would under H.R. 15348 establish uniform nationwide standards. We anticipate that these Federal standards would also be based on criteria documents.

The provisions for national air quality standard-setting would not impair any State's right to establish standards requiring higher levels of air quality. This right is stated as a national policy in Section 109 of the Clean Air Act, and there would be no change in this policy.

Following the promulgation of national standards, each State would have 90 days to signify its intention of adopting an implementation plan. Each State would be expected to describe the steps it would take to develop such a plan and to indicate which areas of the State would be given priority.

In their implementation plans, the States would have to spell out the measures to be taken to achieve and preserve national air quality standards. As I have indicated, they would have the option of designing their implementation plans to achieve or preserve higher than national quality levels, if they wished to do so.

As you know, one of the express purposes of the Clean Air Act is "to protect and enhance the quality of the Nation's air resources" (emphasis added). Accordingly, it has been and will continue to be our view that implementation plans that would permit significant deterioration of air quality in any area would be in conflict with this provision of the Act. We shall continue to expect States to maintain air of good quality where it now exists.

State implementation plans would have to include provisions for intergovernmental cooperation, particularly in dealing with interstate air pollution problems. Under the Administration bill, it would be a responsibility of the Department of Health, Education, and Welfare to designate significant interstate problem areas. We estimate that there are about 50 such areas at present. This number includes 21 of the first 57 areas marked for designation as "air quality control regions" under the provisions of the existing Clean Air Act.

Finally, implementation plans would have to include provisions for (a) enforcement; (b) preventing the occurrence of pollution episodes during periods of adverse meteorological conditions; and (c) making modifications to take account of changes in standards or the availability of improved pollution-control techniques.

States generally will be expected to submit their implementation plans to the Department of Health, Education, and Welfare no more than 180 days after filing their letters of intent. If, however, their letters of intent indicate that implementation plans for some areas cannot be developed within this time period, and if there is good reason why more time should be allowed, then the Department would be authorized to grant an extension. If a State does not spell out any such problems in its letter of intent but subsequently requests an extension, one still can be granted, but for no more than 90 days.

Upon enactment of this bill, States will be expected to begin attacking air pollution in all their cities, counties, and towns. Many States, not surprisingly, have not yet been able to mount such a broad effort, and we cannot realistically expect every State to shift gears overnight. For our part, we intend to support their efforts. We will continue and indeed augment our technical and financial assistance.

We expect that implementation plans would be developed on schedule, particularly for areas where air pollution is most serious. For other areas, however, extensions may be necessary indeed, by granting more time for the development

of implementation plans for areas of least urgency, we can encourage the States to allocate their resources most efficiently by focusing initially on areas of greatest immediate concern.

If a State fails to adopt an implementation plan for any area, the Department would be empowered to prepare one and, after a public hearing, to publish it in the *Federal Register*. If the State still had not adopted a plan, the Department would promulgate the one it had developed.

As a general rule, under the Administration bill, the time span for State action leading to submission of an implementation plan would be nine months. Under the present Act, the time span is 15 months.

The Administration bill contains another important provision relating to State implementation plans: a requirement that States hold public hearings prior to adoption of such plans.

Public participation in State hearings on air quality standards has been highly productive. I strongly feel that continued public involvement in the evolution of State air pollution control programs must be encouraged. Participation in hearings on *implementation plans* will give citizens even greater opportunities to influence the course of air pollution control efforts in their States and communities.

I come now to the second major element of the Administration bill: The provisions that would authorize the Department of Health, Education, and Welfare to establish national emission standards for certain stationary sources of air pollution. I refer to our proposed Section 112, in Section 8 of the bill. With one important exception, such national emission standards would apply only to *new* stationary sources, of certain designated classes or types. The exception would involve air pollutants which are extremely hazardous to health; in such cases, national emission standards could be applied to all stationary source emissions.

In general, *existing* stationary sources of air pollution are so numerous and diverse that the problems they pose can most efficiently be attacked by State and local agencies. Even with air quality standards being set nationally, as proposed in the Administration bill, the steps needed to deal with existing stationary sources would necessarily vary from one State to another and, within States, from one area to another.

In the years ahead, however, many potentially significant new stationary sources of air pollution will come into being as a result of the Nation's growing demands for electric power, manufactured goods, and other necessities and amenities of modern life. Large stationary sources, such as electric generating plants, iron and steel mills, and petroleum refineries frequently have adverse effects not only on public health and welfare in their own communities but also on air quality over broad geographic areas. This problem is one that demands national attention. If we are ever to begin preventing air pollution, instead of just attacking it after the fact, then we must at least insure that major *new* stationary sources, wherever they are located, are designed and equipped to reduce emissions to the minimum level consistent with available technology. The application of national emission standards would also tend to minimize the competitive advantage of locating a new facility in an area where emission standards are less rigorous than in other areas. This would eliminate "polluter havens".

With respect to pollutants that are extremely hazardous to health, national emission standards could be applied to existing, as well as new, stationary sources. Among those pollutants that might require application of national emissions standards are asbestos, beryllium, cadmium, biological aerosols, and chlorinated hydrocarbons. Under the Administration bill, new sources of extremely hazardous pollutants could not be constructed or operated without a specific exemption from the Department of Health, Education, and Welfare; such exemptions would be granted only where we are satisfied that emissions would be controlled sufficiently to preclude hazards to public health. Existing sources would be required to take any measures necessary to comply with the applicable national emission standards.

States would be expected to assume the primary responsibility for enforcing national emission standards. Following the adoption of such standards, States would be expected to develop enforcement plans. If a State failed to do so, or if it developed a plan which was inadequate, the Department would be empowered to promulgate such a plan after holding a conference of appropriate Federal and State agencies.

Although States would have primary responsibility for enforcement of air quality and emission standards, the bill provides for effective Federal action in those cases where States fail to get the job done. The scope of Federal enforcement authority would be broadened to cover all air pollution problems, whether interstate or intrastate, and enforcement procedures would be greatly streamlined.

The principal enforcement provisions of the Administration bill are contained in the proposed Section 113. Federal enforcement action could be initiated whenever (a) air quality fails to meet the applicable air quality standards, or stationary source emissions are in excess of applicable national emission standards, and (b) this results from a State's failure to carry out its implementation plan. There would be a two-step procedure, rather than the three-step procedure prescribed by the Clean Air Act. A hearing would be the first step. Following such a hearing, the Department would specify the remedial action to be taken and allow a period of not less than 60 days for such action to get under way. Then, if the specified action were not taken, the Department could ask the Attorney General to bring suit to enjoin continued failure to comply. Federal district courts would be authorized to assess fines of up to \$10,000 a day for failure to take the specified remedial action. This procedure would be more expeditious and more effective than present provisions.

I turn now to the area of motor vehicle pollution control. The establishment and enforcement of national emission standards for new motor vehicles constitute the cornerstone of our program. The Administration bill would improve our enforcement activity in three principal ways: (1) by authorizing assembly line testing of new motor vehicles; (2) by providing for revocation of certificates of conformity when assembly line testing shows that new vehicles do not meet the standards; and (3) by prohibiting importation of motor vehicles that are not equipped to comply with the standards.

Under the existing provisions of the Clean Air Act, testing of prototypes in advance of actual production is the principal means of determining whether new motor vehicles will comply with the standards. If prototype testing indicates that vehicles will comply, the manufacturer is issued a certificate of conformity valid for a period of not less than one year. We are finding, however, that production models do not perform as well as the prototypes.

To help rectify this situation, we intend to make changes in our test procedures under our present statutory authority. But to ensure that motor vehicles are capable of meeting the standards when they come off an assembly line, we must test them at that point. Furthermore, if such testing shows that vehicles are not capable of meeting the standards, we must be able to require that manufacturers make whatever adjustments are necessary. Clear authority to revoke certificates of conformity would enable us to accomplish this.

With regard to importation, the existing provisions of the Clean Air Act require that new automobiles imported for sale in this country must be equipped to comply with our national standards. This means, however, that if the title to a vehicle was transferred to the purchaser before the vehicle was brought in, or if a vehicle is brought in for purposes other than sale or resale, such a vehicle is exempt from compliance with the standards. One effect of this exemption is that persons returning from other countries may legally bring in non-complying motor vehicles. Since all the major foreign manufacturers make vehicles equipped to meet our standards, there appears to be no justification for this exemption.

The Administration bill also would enable us to open a second front in the Nation's fight against air pollution from motor vehicles. I refer to the bill's provisions for registration and regulation of fuels and fuel additives used in transportation. There is great potential for improving the Nation's air quality through modification of motor vehicle fuels, particularly gasoline. By controlling the chemical composition of gasoline and the use of fuel additives, we can significantly reduce motor vehicle emissions.

The problem of motor vehicle pollution is the product of a complex combustion system involving engines, fuels, and fuel additives. Emissions can be reduced to some extent through alterations of any of these elements or through such other means as the use of control devices of one kind or another. But it is necessary to bear in mind that all the elements of the motor vehicle combustion and emission control systems are interrelated; if engines are altered, the fuel may also need to be altered. This means that effective control of motor vehicle pollution requires a capability of dealing not only with engines and control devices but also with fuels and fuel additives. Under the existing provisions of the Clean Air Act, however, Federal action can be taken only with respect to the motor vehicle itself. Fuels are beyond our reach. The Federal Government must be in a position to require fuel modifications and changes in the use of additives. The provisions of the Administration bill are intended to open the way for an effective regulatory program.

I turn briefly to several of our key activities in the area of motor vehicle pollution control, under existing legislative authority.

(1) Under Section 104 of the Clean Air Act, we are greatly increasing our program of research and development in the area of motor vehicle pollution control. A major portion of this increased effort will be focused on development of low-pollution alternatives to the internal combustion engine. Furthermore, to stimulate parallel efforts in the private sector, a program involving the purchase and testing of low-pollution vehicles individually and in fleets is being implemented. In Fiscal 1971, we are proposing to earmark at least \$12 million for these activities, about \$9 million of which would be devoted to the development of unconventional power sources.

(2) I have recently published in the *Federal Register* a notice of new and more stringent standards for motor vehicle emissions which I intend to prescribe for the 1973 and 1975 model years.

The new carbon monoxide standards, proposed for the 1975 model year, represent a reduction of 52 percent below the current standards. The new hydrocarbon standards, also for the 1975 model year, represent a reduction of 77 percent. The proposed nitrogen oxides standards, proposed for the 1973 model year, will reduce nitrogen oxides emissions by 50 percent; a further reduction is proposed for the 1975 model year. Finally, the proposed standards for particulate emissions, to take effect in the 1975 model year, would produce a reduction of 66 percent.

(3) The Department of Health, Education, and Welfare, in conjunction with the Department of Transportation, has taken a major step toward controlling air pollution from aircraft. At a meeting on January 20, 1970, attended by representatives of 31 airlines, we presented our estimate of the shortest feasible schedule for installation of "smokeless" combustors in JT8D engines. These engines account for a major share of the jet aircraft smoke problem. The airlines have agreed to install such combustors in accordance with this schedule, which means that this program will be substantially completed by late 1972. By mid-April, we expect to have detailed action plans from the airlines. The Federal Aviation Administration will furnish us with quarterly reports on the progress of this work.

Smoke is not the only pollutant emitted by aircraft. Accordingly, we are conducting and supporting research to define more precisely all components of aircraft emissions and to explore various means of controlling gaseous emissions, including nitrogen oxides. We will seek prompt application of new knowledge that is obtained. To the extent that enactment of laws and regulations is necessary, we will recommend that approach. But where we can make progress in the absence of legislation, we will do so.

In conclusion, I want to emphasize in the strongest possible terms our belief that the Administration bill is essential to the Nation's attack on air pollution. We must intensify our efforts beyond the existing provisions of the Clean Air Act. We must have improved weapons and new weapons in the fight against this major component of environmental abuse—a fight that is required by public health and welfare, and by growing public demand. H.R. 15848 would greatly strengthen our hand.

(The following letters were subsequently received by the committee for the record:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
OFFICE OF THE SECRETARY,
Washington, D.C., April 14, 1970.

Hon. JOHN JARMAN,
Chairman, Subcommittee on Public Health and Welfare, Committee on Interstate and Foreign Commerce, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: The purpose of this letter is to clarify the intent of section 5 of H.R. 15848, the Administration's bill to amend the Clean Air Act. As you know, section 5 provides for registration and regulation of fuels and fuel additives used in transportation.

The rationale for this proposal was explained by the President in his February 10 message to the Congress on environmental problems, in which he stated: "What goes into a car's fuel has a major effect on what comes out of its exhaust, and also on what kinds of pollution-control devices can effectively be employed. Federal standards for what comes out of a car's engine should be accompanied by standards for what goes into it."

As the President indicated, the basic purpose of regulating fuel composition is to insure that the Nation can look forward to achieving effective control of air pollution arising from motor vehicles. Accordingly, in carrying out section 5, we will be guided by consideration of the measures reasonably necessary to prevent and control motor vehicle emissions in order to protect health and welfare.

Evidently, there is some concern among fuel producers that regulations adopted under section 5 would amount to detailed specifications for fuel composition. This certainly is not our intent. For the purpose of insuring effective control of motor vehicle emissions, it would be sufficient to prescribe maximum and/or minimum limitations on fuel ingredients and fuel additives and on physical and chemical characteristics of fuels insofar as they have a relationship to emissions, either directly or through their interaction with motor vehicle emission control systems. This would lead, in turn, to adoption of regulations prohibiting the manufacture or sale of fuels that did not conform to the established limitations.

I trust that these comments will be of assistance to you in your consideration of this legislation. Please do not hesitate to call on us if we can be of further assistance at any time.

Sincerely yours,

ROGER O. EGERBERG, M.D.
Assistant Secretary for Health and Scientific Affairs.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
OFFICE OF THE SECRETARY,
Washington, D.C., April 28, 1970.

HON. HARLEY D. STAGGERS,
*Chairman, Interstate and Foreign Commerce Committee, House of Representatives,
Washington, D.C.*

DEAR MR. CHAIRMAN: The Department of Health, Education, and Welfare shares with the Congress a concern that the Department's health activities should be evaluated in terms of their impact and effectiveness, response to Congressional intent, and efficiency of operation. To insure that the Department undertake this task, the Congress has provided a 1% set aside for evaluation of various programs authorized under the Public Health Service Act (H.R. 11102, the pending Hospital and Medical Facilities Construction and Modernization Amendments of 1969, as passed by the Senate, makes provision for a general authorization of this nature). The Congress has recently enacted a similar provision applicable to the Department's education programs.

Accordingly, we would appreciate the inclusion of similar authority for programs authorized by the Clean Air Act and the Solid Waste Disposal Act when your committee acts on the proposed legislation pending before it which would amend these statutes. The 1% provision would insure that the programs authorized under this legislation would be evaluated in a systematic fashion with other health programs.

I have enclosed a short paper which spells out in detail the need to evaluate the Department's health programs. I hope that for the reasons stated in this letter and the enclosure, your committee will give favorable consideration to this request.

Sincerely yours,

CREED C. BLACK,
Assistant Secretary for Legislation.

Enclosure.

EVALUATION OF DHEW HEALTH PROGRAMS

THE NEED FOR EVALUATION

Few would deny the need for the Congress to determine whether health programs do in fact impact on the target population, and if so, how much. If judicious decisions are to be made in regard to the future direction of health programs and in regard to future allocation of resources to these programs, we must learn which programs are successful, which are not, and why. To continue year after year to fund programs knowing only the number of grants given, or the numbers of institutions "helped" or the numbers of health personnel exposed to various programs without knowing what actual impact these programs are having, without knowing whether they are attaining their objectives, is at best bad management and at worst an unnecessary waste of funds which are scarce in relation to the needs.

The Congress should encourage the Department of Health, Education, and Welfare to embark on a systematic and thorough evaluation of all programs whose impact is not presently known. The evaluation of social programs is a complex, difficult, and often lengthy and costly process, and one in which instant results are seldom obtained, but yet HEW believes that considered evaluation with regard to new programs will in the end more than justify its cost.

The Congress should insist that a program evaluation be designed concurrently with the development of the new program. Careful definition of program objectives, establishment of success criteria, and collection of necessary base line data at a program's inception will permit much earlier determination of its weaknesses and strengths. As far as old programs are concerned, it is through the feedback of objective data that the Department can make program management more effective at current, and possibly different future levels of funding, and can suggest, for the consideration of the Congress, the likely effects of changes in the current programs.

Setting aside funds for evaluation purposes is not a new departure. However, for the most part the Department's health agencies have attempted to evaluate their programs utilizing meager salaries and expenses money. However, the Congress in recent health legislation has recognized the gap between need and available resources and has linked evaluation funding directly to program funding through the percentage set-aside clause suggested here. (See particularly Sections 262, 304(d), 309(c), 314(d), 797 and 901 of the Public Health Service Act.)

The Congress has expressed its intent that evaluation take place on a wider scale by providing the 1% set aside for all programs authorized by the Public Health Service Act in H.R. 11102, and passed by the Senate, and in similar education legislation. This legislating on across-the-board percentage authority clearly signifies to the Department that Congress expects evaluation to be the rule rather than the exception.

The insertion of the 1% set-aside in this legislation would extend coverage to the Clean Air and Solid Waste Disposal programs. Additional health programs not covered to date are Radiological Health, Food and Drug, Medicare, and Medicaid.

One issue attendant upon the expenditures of these funds is who does the evaluation. It is true that for many State grant programs, the States require an evaluation from local health agencies which have been granted funds. However, while many of the projects which are thus funded are objectively evaluated, most are not. The bulk of the evaluations which are done by program administrators appear to be mainly self-justifying, generally consisting of narrative descriptions of results. Where numerical data are provided it generally proves to be inadequate for determining program impact. For this reason the evaluation efforts funded under the proposed amendment would principally be carried out by the agencies within the framework of an annual evaluation plan approved by the Secretary. However, if in exercising his management responsibilities the Secretary feels it is appropriate to have such evaluations carried out by members of his staff or by other contractually responsible to him, he should be encouraged to do so.

IN SUMMARY

1. Congress needs to know the impact of every health program in order to make decisions on national health policy and the allocation of scarce resources.
2. The need for program evaluation is evident and should be an integral part of every operating health program.
3. The Congress has enacted diverse authorizations for health program evaluation and has under consideration S. 1733 and H.R. 11102 authorization of across-the-board authority for evaluation in the programs authorized under the PHS Act.
4. These amendments, following precedent established in other programs, simplifies the process and would provide the Department with an opportunity to systematically evaluate a major portion of its health programs.
5. Consideration should be given to including the evaluation provision in all existing and future health program authorization.

Mr. ROGERS. Thank you, Mr. Secretary. We appreciate the statement you have given us.

Dr. Carter.

Mr. CARTER. Thank you, Mr. Chairman.

Mr. Secretary, you have made an excellent statement. I have been impressed very much and certainly I, personally, support the efforts of your Department to do something about air and water pollution and solid waste disposal.

I notice you are emphasizing the removal of lead from gasoline. What is the reason for this?

STATEMENT OF HON. JOHN G. VENEMAN, UNDER SECRETARY OF HEW, ET AL.—Resumed

Mr. VENEMAN. I will let Mr. Johnson elaborate. It is rather apparent that lead is probably one of the emissions that is the greatest pollutant from the automobile engine.

Number two, it is my understanding lead has the problem of really making ineffective some of the emission devices that may be placed on the automobiles so that they would not be effective as they should be. These are a couple of the main reasons. Of course lead is, as is well-known, a poison and certainly with all the automobiles we have on the highways now there is a great deal of this being distributed into the air and in the environment.

Mr. JOHNSON. The Under Secretary has covered the broad points but I might point out that lead, first of all, is a health problem. It is perhaps very pervasive in the total environment. We have what we call throughout some of the country lead belts in terms of the health implications.

We know that a heavily air-polluted areas that the people have a heavier body burden of lead. We believe that as a health measure by itself we should take whatever steps we can to reduce the amount of lead in the environment. The automobile perhaps puts more there than any other current means at this particular time.

Mr. CARTER. If it is so bad and so pervasive and so dangerous, what standard have you set for the concentration of lead in the air?

Mr. JOHNSON. We now have our advisory committee working on air quality criteria. We expect to come out with criteria next year on lead, Mr. Carter.

Mr. CARTER. You mean to apply these standards now to industry, require their automobiles to reach these standards next year?

Mr. JOHNSON. That is correct. Right now, we do not have the authority to actually establish fuel additive regulations under the current Air Quality Act. The administration's bill would give us that authority.

Mr. CARTER. Will it be difficult for industry to reduce the amount of lead or take the lead out and then to get the proper octane, to get 90 octane gas?

Mr. JOHNSON. On the basis of the information we now have we have rather good assurances that the petroleum industry can in fact produce the kind of gasoline that would meet our proposed standards for the 1975 model year.

Because of the method of control of air pollution from the internal combustion engine that is the catalytic burner that will burn the effluent gases, this is damaged by the lead in the gasoline.

If we are going to be able to effect the standards for 1975 and if this is one of the methods that can be used, it will be necessary then to remove the lead from the gasoline.

Mr. CARTER. Isn't really one of the basic reasons for the removal of lead the fact that it clogs up the muffler and the mechanisms that remove the other pollutants?

Mr. JOHNSON. That is one of the reasons; yes, sir.

Mr. CARTER. What do you know about the diseases that are caused by lead in the air? This has not been written up too much. I would like you to elaborate on that.

Mr. JOHNSON. The literature does not specifically point to lead in air, but we do know that lead as a disease is a very debilitating type of disease. We know that in New York City, for instance, there are some 750 lead poisoning cases a year.

Mr. CARTER. Is this from ingestion of lead or inhalation of lead?

Mr. JOHNSON. The body does not often differentiate from the way in which we get these toxic poisons into our system.

Mr. CARTER. Do you have any authenticated cases from inhalation of lead?

Mr. JOHNSON. Not from inhalation per se. I only know that there is widespread evidence that the amount of body burden of lead in individuals in highly polluted air is higher than in different or better quality air.

Mr. CARTER. The vast majority of cases of lead poisoning is from ingesting of lead, though?

Mr. JOHNSON. That is what the literature would lead you to believe, Mr. Carter.

Mr. CARTER. Sir?

Mr. JOHNSON. That is what the literature would lead you to believe, but I have actually been on epidemiological investigations in the New York City area in which we were unable to actually identify precisely how the victims actually picked up all the lead that caused the disease.

Mr. CARTER. Most cases that I have seen can be traced to ingestion of paint and to the youngsters that take the paint off the wall and eat it.

What will be your standard for nitrogen oxide? Have you developed a standard for that? In the air?

Mr. JOHNSON. Did you say the proposed standard for nitrous oxide?

Mr. CARTER. Yes, sir.

Mr. JOHNSON. In 1973, we would propose a standard of three grams per vehicle-mile.

Mr. CARTER. Three grams? I notice there has been some writing to the effect that eight-tenths to two parts per million is extremely dangerous. I am reading an article by Joseph F. Boyle in which he states that cancer cells can be found in the sputum of emphysema patients during smoggy periods. Nitrogen oxide—that is one of the pollutants from automobiles, is it not?

Mr. JOHNSON. That is a pollutant both from automobiles and stationary sources, Mr. Carter. In our 1975 proposed standard we would move down to nine-tenths of a gram per vehicle-mile.

Mr. CARTER. I don't know whether you would know this or not, but I have brought out many, many times that our pollution not only causes chest conditions such as emphysema, bronchitis, but it may also cause lung cancer; air pollution may cause it. Most of the

health authorities have concentrated on other causes. I am glad that the good doctor in San Francisco has brought this again to the attention of the people.

We are having a great deal of trouble, of course, from stationary power sources, as I believe you stated, and from the pollution of the air and from thermal pollution from nuclear devices for generation of electricity.

Why can't we use more of our water development for development of electricity? We have a large potential in that area. Would we have any pollution if we did that?

Mr. JOHNSON. Certainly, if it were economically convenient to convert water power to electrical power—

Mr. CARTER. Pardon?

Mr. JOHNSON. If it were economically convenient to do this.

Mr. CARTER. Our figures show that it is certainly less costly than using nuclear reactors.

Mr. VENEMAN. I think that depends, Mr. Carter. Some of the prime sites for hydroelectric power have been taken up. As years go by, it becomes more and more costly.

Mr. CARTER. No; there are many sites for this and it is not as costly at the present time as power generated by nuclear reactors.

Mr. VENEMAN. I can speak from experience in only one State but as the new hydro plants go up each one becomes increasingly more expensive because the good sites were used up a good many years ago.

Mr. CARTER. I assure you that there are some which still have a good cost-benefit ratio that are not being used. I think we should think about this source because the more we continue to use coal and nuclear reactors the more pollution we are going to have.

I must say this, that I am extremely fortunate, in my district we have coal which has less than one per cent of sulfur in it. I am thankful for that.

Mr. JOHNSON. I think you might like to know, Mr. Carter, that the Administration through the Federal Power Commission and through the Office of Science and Technology is making exhaustive studies on how the nation will meet its power requirements over the next 10 years or so. They are considering the economics of all three types of power conversion.

Mr. CARTER. Certainly I think we should consider more hydroelectric possibilities.

Mr. VENEMAN. Dr. Carter, I might point out that Dr. Middleton just informed me that approximately four per cent of all the power generated in the country is hydro electric.

Mr. CARTER. I know that. It is relatively small. I would like to see more of it. One dam I know of in my area could supply electricity for many, many miles and it is not being taken advantage of at the present time. And it would not pollute the air or water, either. I am glad to see that the national standards are to be applied, I note you say, to existing or to the new installations. I don't know whether that is going to control everything if you just apply this to new installations.

Mr. VENEMAN. The second point, of course, is to existing if they are serious hazards to health.

Mr. CARTER. Don't you think many of them that are existing now are hazardous to our health? I go through the country all the time

and I see these vast factories belching out pollutants of all sorts. I don't think we can point to what factories may pollute in the future but we have to take care of those which are polluting today.

Now, solid waste disposal is a great big problem. I support you in this. I feel that we may have to do more in this area. I have seen some of the pilot projects; I have checked on them; I have been with the people who are trying to carry out the directives of the legislation we have. It is very difficult. It is very expensive at the level of application down to the county and multi-county level.

I feel that we should continue our leadership and our funding in this area.

Mr. VENEMAN. Dr. Carter, I think you have pointed out the significant roles that we do have. One is to provide a national leadership role in trying to get coordination and cooperation with the State and local agencies and, secondly, to provide the technical assistance, the research and the demonstrations. Ultimately, the whole arena of solving the problem of solid waste disposal should be one that is either self-financing or financed on the State and local levels when you get down to the actual construction.

Mr. CARTER. I should hope that that would be true. The people on the local level are particularly sensitive to taxes at the present time. Then I hear at the Federal level that there should be some help on taxes to the states, that there should be a division of taxes. I should hope that in the future we could recycle more of our Federal funds to these local areas because it is a great problem.

I don't know whether the States and local areas are going to be able to take care of this without Federal help. We can't be regressive. We have to go forward.

Mr. VENEMAN. This is consistent with what the Administration has attempted to do in other measures, specifically the revenue-sharing proposals and, secondly, in providing States with more discretion in expending their funds that they get from the Federal Government, and, thirdly, by cost savings in the reform proposals that they have proposed.

Mr. CARTER. The funds have not been very much so far. I believe in my area there has been one pilot project, two in Kentucky, one in the local area, a plan for control of air pollution and solid waste conducted by a very, very fine man. I think they have an excellent program. Dr. Tucker of the University of Louisville has done this.

Also, solid waste disposal studies have been done in 16 counties of eastern Kentucky. The Federal funds are very small and I would hope that this leadership, direction and participation at the Federal level would continue.

You mentioned two other methods of controlling solid waste. One of them is by recycling and reclamation. I believe you referred to cars as being recycled. I don't think you meant that. Did you mean reclamation? What did you mean?

Mr. VENEMAN. I think it is a matter of semantics. I will let Mr. Vaughan respond.

Mr. VAUGHAN. We meant taking the cars that were discarded and reclaiming them as steel to make new cars.

Mr. VENEMAN. That would be reclamation or recycling.

Mr. CARTER. What do you call the machines that—

Mr. VAUGHAN. There are several machines that shred or compact.

Mr. CARTER. We have seen so many old used cars all over the countryside.

Mr. VAUGHAN. That is true. It is a great concern of ours.

I might mention that technology is just one phase of this. One of the great problems is to get the cars from the point of abandonment or discard to such a machine and back to the steel industry to make new steel.

Mr. CARTER. That would be a form of reclamation, would it not?

Mr. VAUGHAN. Yes, sir.

Mr. CARTER. How much further would your idea of reclamation go to solid waste? What else would you reclaim?

Mr. VAUGHAN. I think there are many items in solid waste that we could reclaim. One notable example, I think, is paper. The solid waste composition in the ordinary garbage can would be about 50 percent paper. If this could be effectively reclaimed and used again to produce new paper products, it could result not only in economic savings, savings of the cost and of processing and disposal of this material, but also would result in the conservation of trees.

Mr. CARTER. What are our sources of paper?

Mr. VAUGHAN. The sources of paper, the kind of paper you use in your household—

Mr. CARTER. It is wood, is it not?

Mr. VAUGHAN. Yes, sir.

Mr. CARTER. What about reclaiming the scrap wood you throw away and using it for paper, perhaps?

Now let us get on to some other things. You talk about recycling. Let us develop that a little further. What are you going to recycle? Are you going to recycle the water?

Mr. VAUGHAN. The water in solid waste?

Mr. CARTER. It would not be in solid waste.

Mr. VAUGHAN. The people who have the responsibility for this should be recycling more water in areas where this is a problem.

Mr. CARTER. Of course, that would not be under the heading of solid waste. This would be done by distillation more than likely.

Mr. JOHNSON. I might say we recycle our water now. We are only talking about what quality of water do we recycle.

Mr. CARTER. You are recycling water?

Mr. JOHNSON. I say the country is recycling water on any major polluted stream. The water that is discharged as one city's effluent is picked up as another city's domestic supply.

Mr. CARTER. That is quite true but I don't think we should use our rivers for cesspools.

Mr. JOHNSON. We agree with you.

Mr. CARTER. Thank you.

Mr. ROGERS. Mr. Hastings?

Mr. HASTINGS. Thank you, Mr. Chairman.

In relation to clean air first, I have an article in front of me by the Dupont Company, on a thermal exhaust reactor to control carbon oxide emission.

Are you familiar with this?

Mr. VENEMAN. I will let Dr. Middleton respond.

Dr. MIDDLETON. The thermal reactor, Mr. Hastings, is a system that, using somewhat more fuel with extra air combusts the unburned gases outside of the internal combustion chamber. It lowers the emissions coming out of the tailpipe.

Mr. HASTINGS. Is this more of a press release or actual working device? Apparently the Dupont Company this last week in Princeton released information on this device. The Vice President of Dupont states that it is "proven device, not just a research possibility. Our test units required no maintenance, gasoline mileage has not been significantly affected. Because the thermal reactor utilizes no chemical catalysts there is no need for periodic replacement of materials," which answers somewhat the problem of lead which relates to the catalytic devices.

It states that "The thermal reactor is a short-term answer to the auto pollution problems."

It also states that it can be mass-produced for installation in new cars this year.

Do they make more claims here than actually they are able to prove?

Dr. MIDDLETON. Mr. Hastings, this is a system that is available. It is installed on some cars, cars you drive yourself, to see that they work. The Dupont Company has demonstrated this as a realistic possibility.

The thing that is missing is large fleet use to see what its durability is and to see whether lead in fuels causes significant erosion of the thermal reactor, itself. In that regard, it is not perhaps proven for immediate commercial adaptation but it is certainly one that we should investigate.

Mr. HASTINGS. You quote from the article:

We have installed it and tested it for more than 100,000 miles and one reason for our development of this reactor is that it will reduce emissions from conventional fuels including gasoline containing tetraethyl lead. No changes would be needed in gasoline composition or refining processes.

Mr. ROGERS. The Chair might state that we will have Dupont here testifying this week, as well. I know the gentleman will want to go into that with them considerably.

Mr. HASTINGS. Thank you, Mr. Chairman.

My main concern and question is, are you thoroughly aware of what claims they are making?

Dr. MIDDLETON. We are thoroughly aware of the device. I have seen some of the data resulting from its use. We recognize some deficiencies in the system. As I mentioned before in earlier testimony here, Mr. Hastings, we have arranged through a transfer of funds for the National Aeronautics and Space Administration to look into metals and heat resistant films so that a thermal reactor system such as Dupont is advocating can be properly evaluated to see whether it is a significant answer to the pollution from motor vehicles.

Mr. HASTINGS. In other words, at this point you are not willing to accept the fact that it is the complete short-range answer to the automobile emission problem?

Dr. MIDDLETON. I cannot tell you because I do not have sufficient data at hand on a number of vehicles to demonstrate that it is of practical use. I see no reason why it could not be but I think there is too great a vacancy in the information to allow a public agency to

make that determination at this time. I would hope that the automobile manufacturers would use the device and make an evaluation on their part.

Mr. HASTINGS. Thank you.

Mr. Secretary, in both clean air and solid waste, are you satisfied that we are doing enough in the area of providing incentives for industry to make a contribution to the salvation of this problem?

Mr. VENEMAN. I think we are moving in the direction of generating more incentives. More can be done. I think this is really where the ultimate answer lies. I believe that ultimately as I indicated in the testimony, the Secretary proposes to send out letters to representatives of the automotive and petroleum industries for their views on what they are doing, what kind of resources they are utilizing, what their problems are, and ultimately trying to develop a cooperative effort between them in order to get some self-control on some of the problems as well as giving them incentives to move ahead.

Mr. HASTINGS. What do you feel about tax incentives to industries that are polluters who are required to install expensive equipment in order to reduce that pollution factor?

Mr. VENEMAN. Just because somebody is doing a lousy job, I don't think we should give them a tax exemption. I would not buy that route. I am just giving a personal view.

Mr. HASTINGS. There is an economic factor involved in solving pollution, as I understand it. It may be extremely expensive for some smaller industries particularly. You are not prepared to support a fast write-off or tax incentive concept at this point or to recommend it?

Mr. VENEMAN. I am not prepared to really completely respond to your question from a studied point of view, Mr. Hastings. All I can do is react. My reaction is that the very installation of these devices, of course, would be a capital expense that could be written off. Whether or not you want to give them additional incentive or not, I am not convinced it is necessary.

Mr. HASTINGS. I am sure we all share the same desire to cure as much of the pollution problems as we can. I don't know how we can go about doing it quickly, anyway.

This is the type of thing that certainly has to be considered at least.

Mr. VENEMAN. I may be in trouble already. Mr. Saperstein says there is already a five percent write-off provision. Is that correct?

Mr. SAPERSTEIN. The Tax Reform Act that Congress passed recently includes provisions to that effect. Of course, this involves matters of tax policy as well as pollution control.

While this will provide some incentive for industries we feel that other measures provide much greater incentive to industry to control pollution. For example, the regulatory measures are much more effective than the fast write-off. But that provision was included in the Tax Reform Act.

Dr. MIDDLETON. Another way to approach this is to do it through the cost-sharing provisions in the Clean Air Act, the involvement of industry in the demonstration of control techniques so that there is more common knowledge and better understanding of systems that can be used for air pollution control.

Through this cost-sharing mechanism, the private sector can be involved in the development of devices that can have proprietary uses

throughout the country. There are a variety of schemes such as this that Mr. Veneman was illustrating as providing an opportunity to reduce air pollution.

Mr. HASTINGS. In relation to thermal pollution, I read and heard a lot, I am not knowledgeable on this subject, about the possibility of extreme thermal pollution with the oncoming of SST's, for example. I have heard learned professorial types indicate that with 500 SST's flying throughout the world it could only be a matter of years before we have a permanent cloud cover over great parts of the country.

Is there, in the judgment of HEW, any validation to that position? Condensation problems, primarily.

Dr. MIDDLETON. There is no question that the very small, finely divided particulate matter that goes into the air does add to the particulate burden in the atmosphere and it stays aloft for long, long periods of time. It is estimated that the lead released from motor vehicles contributes to about a 10-percent reduction in visibility. These are very small particles and act as condensation nuclei and contribute, perhaps, not to just a cloud cover but perhaps reduction in the amount of heat and radiation received by the earth.

So, one should be very concerned about the addition of particulate matter, be it from aircraft or surface craft provided it is a small size, stays aloft in the 80 percent of the earth's atmosphere which is 10 or 11 kilometers above the earth's surface.

Mr. HASTINGS. You say one should be concerned. Is HEW properly concerned about it? Do you have a position as to the development of the SST by this country?

Mr. JOHNSON. Mr. Hastings, I might add so that we don't get one-sided answers. There are two schools of thought on whether or not we are going to heat up the atmosphere so that we melt the ice caps and have flooding of our land or whether we are going to do the reverse in terms of holding out radiant energy, the carbon dioxide balance might result in the heating up of the atmosphere whereas the reduction of the radiant energy through particulate matter released to the atmosphere might cause reduction in radiation that reaches the earth.

I think we are concerned with that neither of these things happen and yes, in HEW we are concerned about that. We are watching carefully the kind of prognosis, the kind of calculations that the scientists make to look at the continuous balance between heat and cooling of the total earth's atmosphere.

What we are trying to do, however, in terms of our air pollution effort should have a very salutary effect on either of these.

Mr. VENEMAN. I think also it should be pointed out that during the discussions on SST, of course, the Department of Health, Education and Welfare was involved from the standpoint of the impact it may or may not have upon the environment, both noise abatement, air pollution and other factors. The Administration is committed and the President has stated it would not fly until the environmental problems were solved.

Mr. HASTINGS. In relation to solid waste, it seems that for the past 20 years we have been doing a great deal of study on the practical problem of how do we get rid of automobile hulks. I realize, of course, Mr. Secretary, you have only been involved for a year and a quarter, so I don't lay all the blame certainly at your feet for not correcting

it over night. But is there any indication that we are reaching the point in time when rather than just studying the matter that we can actually put something into effect program-wise so that we can really take care of the problem?

Mr. VENEMAN. I think a lot has been done. I will again let Mr. Vaughan speak to it. I would point out that my interest and involvement in getting rid of solid waste goes beyond the year and a half that I have been with Health, Education, and Welfare, having written bills on this subject as a member of the California Legislature and trying to solve some of the local problems.

Mr. HASTINGS. That is what concerns me. I have been doing the same thing in New York for many years, too. We still have not gotten to the point that I have seen a concrete example where nationwide we are in a position to implement some program to solve the problem.

I wonder if we can expect in our future to get to such a point in time where we can really come up with something under our leadership as we talk about and as you did with Dr. Carter, where we can solve this problem.

Mr. VAUGHAN. First, the technology that some of our research and demonstrations have developed, these are being implemented today. I can give you a few examples if you like.

In Seattle, Wash., they are using a new sanitary land fill device that extends the life twofold. In small communities incinerators have been considered impractical. Now, an incinerator is working effectively in Shippensburg, Pa., a community of 17,000 persons. In the rural areas of the southeast where they could not even afford to collect it, now good management systems are being implemented. However, the technology goes just so far.

While we have been fairly successful in this, we don't see complete solving of the problem just by developing new technology to collect and dispose of it. That is why we are so concerned about reclamation and recycling and finding other methods to reduce the amount of waste that we have to handle.

I think part of the problem is that the wastes are increasing so fast that the technology we develop just won't handle it. We have to attack it from another angle. In fact, our own studies of how fast wastes are increasing brought this vividly to our attention when we consider the waste we now have to handle will be doubled in a period of 10 to 12 years. I think this points out this fact. Our biggest problem is not the lack of the technology, to be able to burn waste or bury it a little better or even to perhaps reclaim it, but it is how do you motivate the country to do a better job? What method should you use to stimulate action?

Mr. HASTINGS. As the Secretary mentioned, to provide the necessary amount of money that it takes to do this, I suppose.

Mr. JOHNSON. Mr. Hastings, could I interrupt a second? That last point triggered a thought.

You know, it is not just providing new money to take care of the problem that exists. There is four and a half million dollars now going into a very inefficient, ineffective operation. Any large major industry operating their plant the way we operate our national solid waste collection and disposal efforts would have been bankrupted many, many years ago.

We need to improve even this to take care of today's problems while we are looking further into the future to find new ways of reducing the amount of solid waste as well as better ways of taking care of it.

Mr. HASTINGS. Thank you.

I have no more questions, Mr. Chairman.

Mr. ROGERS. Mr. Secretary, what are the funds that you are asking the administration for in this bill? If you would, break it down as to air pollution and as to solid waste.

Mr. VENEMAN. The congressional request, Mr. Chairman, for 1971 on solid waste was for \$15,336,000 as opposed to \$14,872,000 for the fiscal year 1970. In the area of air pollution control, it would be—well, it is \$106.4 million for fiscal 1971 as opposed to \$93 million for the fiscal year 1970.

Mr. ROGERS. What do you project for 1972 and 1973?

Mr. VENEMAN. I don't have those figures. I will let Mr. Johnson give them.

Mr. JOHNSON. The last time I was here, Mr. Chairman, you asked for those figures. We promised to submit them for the record. We are in the process of doing that.

Mr. ROGERS. You don't have them yet?

Mr. JOHNSON. I don't have them at this time.

Mr. ROGERS. We are going to need those figures if this committee is going to write a bill.

Mr. JOHNSON. That is correct.

Mr. ROGERS. I have already asked for them once. I was hopeful we could get them today.

Mr. JOHNSON. We will get them.

Mr. VENEMAN. We will have them within—

Mr. JOHNSON. We will have them in time for your consideration and use as you hold these hearings.

Mr. ROGERS. I hope so because we hope to wind this up this week

Now, let me ask you this, Mr. Secretary: What have been the budget requests since 1967 and the expenditures since 1967 for air pollution?

Mr. VENEMAN. For air pollution?

Mr. ROGERS. Yes.

Mr. VENEMAN. In 1968, total obligations were \$61,667,000.

In 1969, it was \$80,174,000.

In 1970, it is estimated to be \$102,662,000.

Mr. ROGERS. What were the requests?

Mr. VENEMAN. We will have to supply that apparently because what they have is just the amount obligated. We will supply the budget request.

(The following table was received for the record:)

AIR POLLUTION CONTROL

| Fiscal year | Budget estimate to Congress | Appropriation | Obligations |
|-------------|--------------------------------|---------------|--------------|
| 1967 | \$39,481,000 | \$40,061,000 | \$35,814,000 |
| 1968 | 70,271,000 | 64,185,000 | 61,667,000 |
| 1969 | 106,733,000 | 88,733,000 | 80,174,000 |
| 1970 | 95,800,000 | 108,800,000 | 102,662,000 |

† Estimated.

Mr. ROGERS. For solid waste now.

Mr. VENEMAN. For solid waste, I have a longer period for that one. In 1966—that is not expenditure, either.

Mr. VAUGHAN. I have them here.

Mr. VENEMAN. All right. Why don't you submit them?

Mr. ROGERS. If you have the budget request and the expenditure.

Mr. VAUGHAN. The budget request in 1966 was \$6,500,000. Appropriated, \$4,400,000; and expended, \$4,300,000.

In 1967, the three figures were \$12,400,000 requested; \$12,400,000 appropriated; and \$12,300,000 expended.

In fiscal year 1968, the three corresponding figures were \$15,600,000 requested; \$15,600,000 appropriated; and \$13,400,000 expended.

In fiscal year 1969, the figure was \$17,500,000 requested; \$16,900,000 appropriated; \$15,200,000 expended.

Mr. ROGERS. And 1970?

Mr. VAUGHAN. Fiscal year 1970, which we are now in, the amount requested was \$14,872,000, and appropriated.

We are in the midst of fiscal 1970 so far as expenditures.

Mr. VENEMAN. Mr. Chairman, we just submitted a progress report on the control and prevention of air pollution, the third report of the Secretary to the Congress, in January 1970, which contains on page 18 the authorization, the President's budget, and appropriation for the National Air Pollution Control Administration.

We can submit that for the record.

Mr. ROGERS. Could you read those to me, say, beginning in 1968, the two figures?

Mr. VENEMAN. In 1968, the authorization, \$109.9 million. The budget request was \$70.3 million. The appropriation was \$64.2 million, but it does not give the expenditure.

Mr. ROGERS. Do you have the expenditure figure?

Mr. JOHNSON. We will have to submit that, Mr. Chairman. (See table on p. 302.)

Mr. ROGERS. Dr. Middleton, could you expend that money in 1968?

Mr. VENEMAN. Out of the \$64.2 million that was appropriated, \$61,667,000 was obligated.

In 1969, the authorization was \$185 million. The President's budget was \$106.7 million. The appropriation was \$88.7 million; and the obligations were \$80.2 million.

In 1970, the authorization was \$179.3 million. The budget request was \$95.8 million as originally submitted to the Congress. Based on the original request, the estimate for obligations would be \$93,132,000.

Mr. ROGERS. \$93 million is what you expended?

Mr. VENEMAN. Yes.

Mr. ROGERS. You had appropriated \$108 million?

Mr. VENEMAN. We had a request in the budget for \$95.8 million in 1970.

Mr. ROGERS. The Congress appropriated \$108 million, I believe.

Mr. VENEMAN. That is correct; \$108 million.

Mr. JOHNSON. We have revised that estimated obligation figure for 1970 based on the \$108 million appropriation. The revised figure is \$102,662,000.

Mr. ROGERS. Because the pattern here does not show any undue emphasis placed on the program, I would say. In fact, it seems to be rocking along at about the same rate without any undue emphasis. In fact, your request on solid wastes in 1970 was \$14.8 million; for 1971, it is \$15.3 million. That is \$500,000 more. I don't know if that puts much of a presidential impact or great priority. Would you?

Mr. VENEMAN. Mr. Chairman, this is a kind of standard argument that I find myself having with practically every committee I appear before. That is the question of whether or not the question of priorities is determined on the total amount of the funds appropriated.

Mr. ROGERS. I agree that is not the only indication. What about personnel?

Dr. Middleton, have you increased personnel working on air pollution or decreased them?

Dr. MIDDLETON. Due to the Revenue and Expenditures Control Act, we have had more or less stable or decreasing personnel in air pollution.

Mr. ROGERS. Do you have any increased requests for increased personnel?

Dr. MIDDLETON. We have indicated the kinds of manpower requirements we would need; yes.

Mr. ROGERS. Which are increased?

Dr. MIDDLETON. We have not received an increase at this time but we do anticipate an increase which will allow us to give more manpower to the states effective next year.

Mr. ROGERS. That goes to the states but not in your own operation; is that correct?

Dr. MIDDLETON. That is correct.

Mr. ROGERS. You don't need any more? You are doing all that you can?

Dr. MIDDLETON. Mr. Chairman, we are doing the best we can with the manpower we have.

Mr. ROGERS. So we have had a decrease in the personnel handling air pollution problems, in effect?

Dr. MIDDLETON. We have had an increase in the manpower available to us and an increasing burden of work and we are trying to sharpen up the tasks that we are applying our priorities to.

Mr. VENEMAN. We have had a department-wide decrease in personnel, Mr. Chairman, because of the Revenue and Expenditures Control Act. We are probably 5,000 employees below last year.

Mr. ROGERS. Are there any requests for additional?

Mr. VENEMAN. We all have requests. I can't think of an agency yet that has no request. We have some specific areas where we have requests for additional personnel that I am sure will go through.

Mr. ROGERS. I would like to know the specifics here in these areas because I think these programs should have priority and the President has so indicated.

Mr. JOHNSON. Mr. Chairman, the National Air Pollution Control Administration did get priority even in light of the Revenue and Expenditure Controls Act. In terms of positions as we look at them for 1968, 1969 and 1970, while there is a slight reduction, that reduction is not nearly as great as it had been in other environmental programs within the Department.

Mr. ROGERS. You might submit those figures to show the comparison for the committee.

Mr. VENEMAN. We have that.

Mr. JOHNSON. For instance, in 1968, we had authorized positions of 1,070 in air pollution; in 1969, 1,065; in 1970, 1,055. We have kept at the expense of other programs the position level in air pollution fairly stable.

Mr. ROGERS. What about solid waste?

Mr. VAUGHAN. Our personnel figures have remained relatively stable in the last two years, about 206.

Mr. ROGERS. What did you have before the last two years?

Mr. VAUGHAN. Less than this. It was considerably under this.

Mr. ROGERS. Do you need more personnel?

Mr. VAUGHAN. We had fewer personnel before the last two years than we have now. For the last two years, it has stayed the same.

Mr. ROGERS. Do you need more personnel or not?

Mr. VAUGHAN. We are doing the best we can with the resources we have. We can always use more.

Mr. ROGERS. Let me ask a few questions about current law.

How many air quality regions have been set?

Mr. VENEMAN. Mr. Johnson indicates there are 29 that have actually been established.

Mr. ROGERS. Now, this law was passed when?

Mr. VENEMAN. I am told it was November 1967.

Mr. ROGERS. It was a directive of the Congress that these air quality regions be set up within 18 months. Now, why is it that we have not been able to set up air quality regions?

Dr. MIDDLETON. The Clean Air Act called for the designation of the atmospheric areas forthwith and at one time within a year. That was done. It says to proceed with the designation of the air quality control regions as rapidly as possible, achieving as much as you can in the next 18 months.

Mr. ROGERS. We realize they may change, too. You may want to change regions but the intent was that we should set the basic regions within 18 months. Now, this has not been done. Now, is it lack of personnel? Is it lack of scientific knowledge? Is it lack of money? What is the reason?

Dr. MIDDLETON. The reasons for the rate of designation of air quality control regions are wrapped up in several things.

One is that the rate in the first several months was lower than in the last. I think you can see that we did in the first year only 18 but in the second year we will do more than 30. So that the learning process has taken place.

We have also been able to acquire now the kind of information that we require.

What are the industrial urban complexes, what is the meteorology in that area, the demographic data and other things, so that we can prepare reports for public consultations.

Mr. ROGERS. Does this not hold up local activity and any organized effort until you start setting regions and then set criteria?

Dr. MIDDLETON. No; it does not hold up the local activity. In fact, the consultations we have had with State and local governments and presentation of their reports for their consideration and reaction have

been sought as a way for them to better understand how they can cope with air pollution control on a regional basis.

Mr. ROGERS. The feedback I get is that in effect it has held up the movement forward to doing something about air pollution because they are waiting for the Federal Government to set the regions and set the air quality criteria.

Dr. MIDDLETON. May we stay with the region a moment, Mr. Rogers?

The air quality control regions that will be designated by the end of the summer, 57 of them, will mean that each of the States and each of the Governors in those States will have an opportunity to understand the system, do their particular thing with regard to the development of the implementation plans, adopt the standards required, so that the next series of air quality control regions can be set in an even more rapid and expeditious way.

The amendment before you will ask the States to designate the entire rest of their area into various air quality control regions for the air quality standards to be announced by the Secretary. So that the whole step forward now is a more rapid implementation. In fact, the President in his Message on February 10 indicated he was asking the Secretary of Health, Education and Welfare to designate rapidly the next interstate air quality control regions, which we expect to do.

Mr. ROGERS. We asked you to do it in 18 months but still it has not been done. With the problems mounting as rapidly as they are, we want to try to get something done.

It does not do us much good to put in time element as the intention of Congress unless we get it done.

Mr. VENEMAN. Mr. Chairman, it seems to me that the amendments that we are proposing to the Clean Air Act would expedite the development and establishment of these regions where they would have to file their intentions within 90 days and then file their actual implementation plan within 6 months. So, 9 months after enactment, we would have—

Mr. ROGERS. I hope this will be helpful and I think it should be. Also, it seems to me you are beginning to approach it differently and not relying so much on your air regions but you are going to set a national standard which will be more helpful in moving—

Mr. VENEMAN. I think it should eliminate one step if I see the process properly.

Mr. ROGERS. We may even want to shorten it from that to get something going.

Let me ask you this: How many abatement suits have you brought to stop air pollution?

Mr. VENEMAN. On a Federal level?

Mr. ROGERS. Yes, or initiated by the State.

Mr. VENEMAN. There have been several State actions.

Dr. Middleton indicates that we have had 10.

Mr. ROGERS. You mean there are only 10 situations of a matter that would involve the Federal Government with abatement in the country?

Dr. MIDDLETON. There are 10 areas in which there was a request on the part of Governors or localities for action or on the part of the Secretary. These include events in which the Secretary on his own initiative took abatement conferences.

In keeping with the thrust of the Clean Air Act in 1967 it was the Department's desire that we give the initiative to the States as much as possible so that they could control air pollution themselves. Part of the Clean Air Act stipulates it is the primary responsibility of the States to control air pollution. We are trying to develop the criteria and designate the regions so the States could do it themselves.

Mr. ROGERS. What about where there is imminent danger?

Mr. VENEMAN. Section 108(k) has not been enacted. There is no reason to do this.

Mr. ROGERS. It has been enacted. You mean it has not been used.

Mr. VENEMAN. I beg your pardon. I misused the word. I am sorry.

Mr. ROGERS. I understand your suit over there on the chicken rendering plant—where was that—in Maryland?

Mr. VENEMAN. Selbyville, Md.; yes, sir.

Mr. ROGERS. That has been going on how long now?

Mr. VENEMAN. It was first instituted in 1965. It is before the court in the circuit court of appeals at the present time.

Mr. ROGERS. I understand you have probably spent enough on it to buy the plant. Is that true?

Mr. VENEMAN. I don't know what we would do with a chicken rendering plant.

Mr. ROGERS. We would probably close it down. That would be the effort, I would hope. It is still operating, I understand.

Now, what standards have you set, air quality standards or emission standards?

Dr. MIDDLETON. The Federal Government, of course, has announced its emission standards for motor vehicles effective for 1973 and 1975. Of course, there are standards in effect at the present time for motor vehicles for hydrocarbons and carbon monoxide.

In 1973, we will add nitrogen oxides and in 1975 we will add a further pollutant, particulate matter.

So far as other standards are concerned, you will recognize it is the States that adopt standards based on the criteria published. The Department of Health, Education, and Welfare has published criteria for sulfur oxides and particulate matter and the criteria documents for carbon monoxide, hydrocarbons and photochemical oxidants began being mailed last Friday and there will be an announcement in the Federal Register on Thursday on the part of the Secretary saying the criteria for these materials are released and the States will be expected to establish standards for them.

Mr. ROGERS. Do you have any for asbestos?

Dr. MIDDLETON. The criteria proposed in the next series will be for polynuclear hydrocarbons, lead, fluorides.

Mr. ROGERS. Do you have criteria for lead?

Dr. MIDDLETON. Yes. We are proposing to publish criteria which will then allow the States to adopt the standards for lead.

Mr. ROGERS. If we pass this law, you could go right ahead and do it and not have to wait for the States?

Dr. MIDDLETON. That is right. If the law were to be enacted this summer, we would by the first of next year be in a position to publish national air quality standards for about nine pollutants.

Mr. ROGERS. What has happened with your criteria for sulfur? Has it been applied? Has it done any good, or what?

Dr. MIDDLETON. The criteria for sulfur oxides and particulate matter are the subject of much activity on the part of the States in the air quality control regions that have been designated.

Mr. ROGERS. In the what, the air quality regions that have been designated?

Dr. MIDDLETON. Yes.

Mr. ROGERS. But there are only 27.

Dr. MIDDLETON. There are 29, and there will be 57 by the end of this summer. In other areas, we send to the Governors of the States in which there have not been any air quality control regions designated the same material so that they may be prepared and equipped to move expeditiously when the regions are designated within his States.

But the sulfur oxides criteria and the particular matter criteria have been the subject matter of discussions in the States in which air quality regions have been designated and have been of real assistance in the public hearings in defining what the public wants in the way of protection from these pollutants.

The Secretary, as you know, has approved the standards for the States of New Jersey, Delaware and Pennsylvania, that relate to the Philadelphia metropolitan area. In those regions the values stated in the air quality criteria document were used by the States in developing standards protective of the health and welfare for those two pollutants.

Mr. ROGERS. Actually, the one has really used it; is that what you are telling me?

Dr. MIDDLETON. I am saying that there has been one, that the standards for the Philadelphia metropolitan region, Mr. Chairman, have been approved by the Secretary.

Mr. ROGERS. Have any enforcement actions come about?

Dr. MIDDLETON. The next step would be development, on the part of the States again, of the implementation plan to assure that the standards adopted are attained. Failing to attain those after the Secretary has approved the implementation plan, then there is the opportunity to refer to the Government for action.

Mr. ROGERS. I agree with Mr. Veneman that this is so ponderous we will never get anything done unless we have a change. I know you are recommending some change. I question whether it is even short enough to really begin to get on top of this problem.

Mr. VENEMAN. I think it is a first step in a long walk. You have to have the national standards.

Mr. ROGERS. It is a start. I think it is a beginning.

Let me ask you this, Dr. Middleton: We have what, 30 million cars that have been produced since our law went into effect in 1967, or about 10 million a year.

Mr. MIDDLETON. About.

Mr. ROGERS. You have tested how many on your automotive emissions?

Dr. MIDDLETON. We test the prototypes submitted by the motor vehicle manufacturers in numbers in a proportion to their sales in order to offer them a certificate of compliance. This is a relatively small population of vehicles but it represents about 1,200 prototype vehicles.

Mr. ROGERS. Twelve hundred out of 30 million? They submit a prototype vehicle to you?

Dr. MIDDLETON. Twelve hundred each year, which would mean about 4,000 for the 30 million.

(The following information was received for the record:)

TESTS OF PROTOTYPE VEHICLES

In the three years since national standards for new motor vehicles first went into effect, approximately 7,000 tests of prototype vehicles have been conducted. Approximately 1,000 of these tests have been made by the National Air Pollution Control Administration. The rest have been made by motor vehicle manufacturers in compliance with regulations (45 CFR Part 85) promulgated by the Department of Health, Education, and Welfare.

Mr. ROGERS. Do you think this is a sufficient number or adequate number?

Dr. MIDDLETON. Based on the surveillance data we have made and reported to this committee before, we show that in owner hands the vehicles do not perform as did the prototypes.

The question is not so much, perhaps, is it enough of a population but is the car produced representative of the prototype tested. There may be a mixture of both. Testing more motor vehicles for compliance purposes may not have given us any better vehicles for the public to use. We have to be more certain.

Mr. ROGERS. How can we do that?

Dr. MIDDLETON. We propose to have assembly line testing to be sure that the vehicle produced does match the prototype that was certified.

Mr. ROGERS. You would be able to go ahead and pick one off the assembly line and test it?

Dr. MIDDLETON. Yes.

Mr. ROGERS. At any time?

Dr. MIDDLETON. We would ask that we be able to test any vehicle at any time from the assembly line to be sure it was in compliance. In the event it was not, we would withdraw the certificate of conformity.

Mr. ROGERS. Do you now withdraw certificates?

Dr. MIDDLETON. No.

Mr. ROGERS. You do not now withdraw certificates at all?

Dr. MIDDLETON. We have no basis for withdrawing certificates because they are based on prototype tests and, based on their passing, the certificate is awarded.

Mr. ROGERS. Have you ever had failure of a prototype?

Mr. MIDDLETON. We have never had a failure in the vehicle finally passing the test.

Mr. ROGERS. Is that unusual?

Dr. MIDDLETON. In view of the fact that the cars in the hands of the public don't meet the standards, it would seem unusual.

Mr. ROGERS. How much did you tell me that the cars in the hands of the public do not meet standards? What was the percentage?

Dr. MIDDLETON. It varies from 15 to 25 percent.

Mr. ROGERS. Is that low?

Dr. MIDDLETON. Very often 75 to 80 percent of the cars failed to meet and they missed the target by 15 to 25 percent being above the standards. It is a high percentage of cars that fail.

Mr. ROGERS. That is a greatly different figure than this committee was led to believe. I asked that. I said I heard it was somewhere around 60 to 70 to 80 percent. As I recall, you told me that, oh, no, it is about

15 to 25 percent. Are you meaning it is 15 to 25 percent off what the standard should be, that the public should be expected to receive; is that it?

Dr. MIDDLETON. I think if you look at the data that were submitted for the record you will see that it was our intention to make clear the differentiation. We pointed out, in fact the data show the percent of vehicles that comply with all standards or either one and we do it by the data given you for the four motor vehicle companies and in this case we can show big differences in compliance in General Motors, Ford, and Chrysler with American Motors generally being in better compliance. But the compliance figures range from about 80 percent failing to as little as 15 to 20 percent failing.

Mr. ROGERS. Eighty percent failing the standards?

Dr. MIDDLETON. Eighty percent of the cars tested in public hands failed to be in compliance with the standards for which the prototypes met the standards and were issued a certificate of compliance. In the owners' hands, the produced vehicle does not comply the same as the prototype vehicle did, and a very significant number of them, the data for the record have already been supplied, high percentages.

Mr. ROGERS. I will say that is a high percentage if it goes up to 80 percent.

What are the American people paying for these devices on the automobiles that are supposed to meet the standards up to 80 percent or not, would you estimate? Could you give us a figure?

Dr. MIDDLETON. It is very difficult to give you solid figures.

Mr. ROGERS. I realize they will vary with the automobile manufacturers. What would be the lowest to the highest?

Dr. MIDDLETON. We would estimate that the average cost should not be more than about the \$50 figure.

(The following information was received for the record:)

TYPES OF TECHNIQUES USED TO COMPLY WITH STANDARDS

Two principal techniques have been employed by motor vehicle manufacturers for the purpose of complying with the national standards applicable to exhaust emissions from new passenger cars and light trucks. One is an air-injection emission control system; it is estimated that such a system costs consumers about \$45 per vehicle. The other is an engine modification system; it is estimated that this approach costs consumers about \$20 per vehicle. In addition, every vehicle has a crankcase emission control system; estimated cost of consumers is about \$12 per vehicle. Since engine modification, rather than air-injection, is the technique employed for the great majority of passenger cars and light trucks, average cost to consumers (for exhaust and crankcase emission control) is likely to be closer to \$35 than \$50.

Mr. ROGERS. A \$50 figure? That is 10 million cars a year. That is a half billion dollars there. So, for three years that is a billion and a half dollars or more.

Mr. VENEMAN. Eighty percent of that, would it not be?

Mr. ROGERS. They have expended a billion and a half dollars and 80 percent of them don't meet it. That is incredible. Yet, certificates are given?

Dr. MIDDLETON. Certificates are given based on the fact that the prototype passed. The fact of the way the car is maintained, the way the person drives it, perhaps the nature of the fuels, the composition of the fuel, whether they have adequate or inadequate detergents, a variety of factors such as this do allow the car to fail to meet the test in the owner's hands.

Mr. ROGERS. What about your mythology in testing? Tell me about that. How does that work? You take four automobiles from from one manufacturer? How do you do it? Are they averaged?

Dr. MIDDLETON. There is no mythology here. The procedures we apply are published in the Federal Register and the procedures are clearly understood.

Mr. ROGERS. I saw some figures on some of these steps where they all come out to be exactly the same even though they have different systems, for instance, where you get a six-cylinder or an eight-cylinder engine and you get different devices with them. They all come out to be the same for that automobile manufacturer. Why is that?

Dr. MIDDLETON. We take a—

Mr. ROGERS. The emissions are all the same; would that be true?

Dr. MIDDLETON. The emissions are different and we publish as a matter of public record what emissions are of these tests. They do vary some. Some are cleaner unit. All those that are issued a certificate do in fact pass the emission tests that are published.

Mr. ROGERS. From what I have seen, and I will go into that, I will get the figures, I saw some that varied greatly and yet they all come out to meet the same figure which is very unusual, it seems to me.

Dr. MIDDLETON. The variability may be due to the particular cars and the carburetor and the transmission system. But for all those cars tested, they are issued certificates of compliance only when they meet the requirement, the standards published, together with a durability factor which is added to assure that these devices are lasting for the lifetime of the vehicle.

So that they may have a higher number in one case than in another and the durability factor would show that they would stay in compliance for the lifetime of the car. So they could be different numbers. But the final product of actual testing, 4,000, 50,000 miles, the durability factor injected, will mean in any event that the number, in order to attain a certificate of compliance, must meet all the standard numbers or lower and there are vehicles that meet the lower standards.

Mr. ROGERS. Do you test all the possible combinations of the engine, the carburetor and transmission?

Dr. MIDDLETON. We make a point of testing the carburetor, engine size, transmission combinations for the significant sales proportion.

Mr. ROGERS. So you do not test all the cars?

Dr. MIDDLETON. We do not test all the cars.

Mr. ROGERS. How many do you test from each manufacturer?

Dr. MIDDLETON. As I told you earlier during the year we tested 1200.

Mr. ROGERS. I mean per manufacturer, how do you divide it up?

Dr. MIDDLETON. Depending on the per cent of sales.

Mr. VENEMAN. I really think that this dialogue indicates the real need for the provision of the Act that gives the Secretary the authority to authorize a test of these vehicles which will be found on pages 2, 3 and 4 of the bill which I think really corrects some of the things that have occurred. I think we have the cart ahead of the horse here, to a great extent.

We said we need an emission device and we didn't have a good one and we really did not have good testing procedures.

Now, Dr. Middleton may not subscribe to that. But I do think you have to have the authorization, as stated in the bill, where you find engines or vehicles that do not conform with the regulations, that the certificate of conformity may be revoked.

Mr. ROGERS. I would agree with you. I think this is necessary to have.

Mr. VENEMAN. These are the types of things we are trying to correct with this legislation.

Mr. ROGERS. You can set forth the regulations testing, you have authority under the present law. It does not seem that this is being done too well.

Mr. VENEMAN. The test would be conducted directly by the Secretary or in accordance with conditions specified by the Secretary. Then he would also be given the authority to enter a factory for the purpose of conducting tests to determine whether or not they were in fact testing in accordance with the regulations that were established.

Mr. ROGERS. Presently, the automobile companies just give you these cars? They select the ones they want you to test?

Dr. MIDDLETON. We tell them what kind of cars, what models, combinations we want, and they supply us with vehicles, and the data they have obtained in their test of these vehicles, we corroborate or not.

Mr. ROGERS. What is your present budget, your expenditures in your research as to the breakdown of what you do in research? Can you give us that? Before when we went into this about 3.4 percent of the budget was concerning automobile problems and emissions which was 60 percent of the problem.

Has that changed?

Dr. MIDDLETON. In fiscal 1969, Mr. Chairman?

In fiscal 1969, in the conventional vehicle area, we spent \$2.8 million and in the non-conventional, \$650,000.

In fiscal 1970, the conventional vehicle will be 3.0. The unconventional in 1970 will be \$950,000.

Mr. ROGERS. What is your total research budget?

Dr. MIDDLETON. Our total research, development and demonstration budget for 1970 is \$49.8 million.

Mr. ROGERS. What was it for 1969?

Dr. MIDDLETON. For 1969, it was \$41 million.

Mr. ROGERS. Out of \$49 million, you are spending \$3.1 million, approximately, on automobile emission.

Mr. JOHNSON. Approximately \$4.0 million.

Mr. ROGERS. What is the emission problem for air pollution? Does that constitute between 50 and 60 percent of the problem?

Dr. MIDDLETON. Transportation accounts for about 55 percent of the pollution.

Mr. ROGERS. What about Los Angeles, New York and some of the other areas?

Dr. MIDDLETON. In Los Angeles where they have done a commendable job controlling stationary sources of pollution, the automobile is more important, 65 to 70 percent.

Mr. ROGERS. That would be what in New York, do you think? Of course, the sulfur problem up there is one of their big problems.

Dr. MIDDLETON. They have a considerable pollution problem in New York. I am not sure it would be much different than 50 or 60 percent.

Mr. ROGERS. Nationwide, about 55 percent, you say?

Dr. MIDDLETON. That comes from transportation sources; that is right.

Mr. ROGERS. We are spending three million dollars on research on that out of \$94 million; is that correct?

Dr. MIDDLETON. Do you recognize in the budget figures given to you earlier, perhaps, that in 1971 we are expecting to spend \$12.9 million in the vehicle field, in a year in which the total research budget would be \$63.2 million. So that there is a proportional increase in the research proposed for next year in addition to a change already made for this year.

Mr. VENEMAN. Mr. Chairman, I believe it might be helpful also to look a little farther down the road because the National Air Pollution Control Administration has developed a six-year plan for motor vehicle research and development as it relates to air pollution. The expenditure during this period would be \$89.1 million, they contemplate, of which at least \$7.8 million would be funded by agencies other than NAPCA. That would include the Departments of Transportation, Defense, Interior, General Services, NASA and the Atomic Energy Commission.

This will be divided up into three primary components. About \$25.5 million for conventional motor vehicles R&D aimed at providing new techniques for controlling the emissions of hydrocarbons and so forth. About \$45.4 million would be utilized to develop unconventional motor vehicles, low emission alternatives to the internal combustion engine, and about \$18.2 million would be supporting research which would encompass research in areas that have a bearing on motor vehicle pollution such as atmospheric chemistry, development of needed instrumentation, sampling techniques, and so forth.

I can submit these two pages.

Mr. ROGERS. That will be helpful.

(The document referred to follows:)

MOTOR VEHICLE RESEARCH AND DEVELOPMENT PLAN* OF THE NATIONAL AIR POLLUTION CONTROL ADMINISTRATION

The National Air Pollution Control Administration (NAPCA) has developed a six-year plan (Fiscal 1970-1975) for Federal research and development relating to the prevention and control of motor vehicle pollution. Included in the plan are the current and projected future motor vehicle research and development activities of NAPCA and several other Federal agencies, including the Departments of Transportation, Defense, and the Interior, the General Services Administration, the National Aeronautics and Space Administration, and the Atomic Energy Commission.

Totally, Federal expenditures of \$89.1 million are contemplated; of this sum, at least \$7.8 million would be in funding by agencies other than NAPCA.

Expenditures by agencies other than NAPCA actually may be greater than \$7.8 million, since the plan, in its current form, reflects the Department of Transportation's projected activities only through Fiscal 1970; information on future activities has not been made available to NAPCA.

* This is a plan developed by NAPCA which is being reviewed by H.E.W. and by the Council on Environmental Quality. This long range proposal has not been reviewed by the Bureau of Budget.

There are three major elements to the plan: Research and development relating to control of emissions from conventional motor vehicles; development of unconventional, low-pollution motor vehicles; and necessary supporting research. Following is a brief description of each element: figures in parentheses indicate projected Federal expenditures during the Fiscal 1970-1975 period.

1. *Conventional Motor Vehicles (\$25.5 million)*: Research and development aimed at providing new and improved techniques for controlling emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and particulate matter (including lead) from gasoline-fueled engines; and nitrogen oxides, smoke, and odors from diesel engines. Work relating to abatement of aircraft emissions also is included.

2. *Unconventional Motor Vehicles (\$45.4 million)*: Efforts to develop commercially acceptable, low-emission alternatives to the internal combustion engine. The major emphasis will be in the area of heat engines, particularly the Rankine-cycle (steam) engine, but also including the Brayton-cycle (gas turbine) and Stirling-cycle engines. Also included will be efforts to develop prototypes of electrical engines and to explore the potential of hybrid systems (combinations of two engine systems).

3. *Supporting Research (\$18.2 million)*: This encompasses research in areas that have a bearing on motor vehicle pollution and its prevention and control. Among them are atmospheric chemistry, development of needed instrumentation and sampling techniques, transportation planning and urban design in relation to air quality, and fundamental combustion research.

Mr. ROGERS. That averages \$15 million a year.

Mr. VENEMAN. Yes, sir.

Mr. JOHNSON. This would generate considerably more research particularly through the Administration's incentive plan for the production of low pollution vehicles. So, we are actually trying to stimulate other moneys to come into this research area.

Mr. ROGERS. How do you spend the other \$49 million this coming year if you spend three on 60 percent of the problem? How do you spend the \$46 million?

Dr. MIDDLETON. Within the research for 1970, for example, out of the total that we spoke of earlier, about \$27.5 million are used for grants and contracts which are essentially for the development of control techniques, for the control of sulfur oxides and nitrogen oxides next coming up.

Mr. ROGERS. These are from stationary?

Dr. MIDDLETON. These are largely from stationary sources. The contracts range from cost-sharing ones with industry for development of prototypes for control of sulfur oxide, this being the area of principal concern for the moment, the other kinds are direct operations for research and development concerned with developing the systems approach to controlling sulfur oxides, as an example, from stationary sources, smelting plants which contribute a very significant amount of sulfur oxide to the atmosphere.

Mr. ROGERS. What is the sulfur oxide contribution percentage-wise to the air pollution problem?

Mr. MIDDLETON. What was the specific question?

Mr. ROGERS. What percentage of the over-all air pollution problem is made up of the sulfur oxides?

Dr. MIDDLETON. The sulfur oxides production for 1968 was 32.8 million tons a year, of which 24 millions or 73 percent came from fuel combustion from stationary sources.

Mr. ROGERS. You have not understood my question yet.

Auto pollution is 55 percent. Sulfur is what, over-all? Is it 15 percent, 20 percent, or what?

Dr. MIDDLETON. I think the simplest way to answer your question first would be to suggest that fuel combustion is the most pressing air pollution problem.

Mr. ROGERS. We know that. All I want is what is sulfur now.

Dr. MIDDLETON. Out of the 55 percent, about 90 percent of it comes from fuel combustion; 45 percent comes from motor vehicles, and 45 percent from stationary sources. The bulk of the 45 percent from stationary sources, sulfur oxides are the most important constituent.

Mr. ROGERS. How much?

Dr. MIDDLETON. Of the total tons—we have the problem of semantics here, Mr. Chairman; I am sorry. The motor vehicle puts out particulate matter in small amounts. It puts out sulfur dioxide in extremely low, not important amounts. It puts out significant amounts of carbon monoxide, about two-thirds from the motor vehicle, and hydrocarbons.

Mr. ROGERS. I am talking about stationary sources.

Dr. MIDDLETON. From stationary sources, there are low emissions of carbon monoxide.

Mr. ROGERS. I am asking about sulfur from stationary sources. If you don't know, let me know and maybe we can get the figure for the record. I don't expect you to know the answer to every question we ask you. You could not possibly. I just wondered if you had that figure.

Dr. MIDDLETON. Out of the total tons of material put into the air probably a fifth of it would be sulfur oxides.

Mr. ROGERS. Twenty percent may be sulfur?

Dr. MIDDLETON. About a fifth.

Mr. ROGERS. You are spending \$27.5 million of research on that problem?

Dr. MIDDLETON. Yes, on that and other stationary source problems, for the very obvious reason that there are not available today the control technologies for those sources of pollution and we are spending a significant amount of money for nitrogen oxides because there are not available satisfactory control technologies whereas there are control technologies for motor vehicles and the national emission standard implies the application of that control technology.

Mr. ROGERS. But they are not working. Eighty per cent don't even work. So I don't know how good the emissions control is.

Dr. MIDDLETON. It is not as good as it should be.

As the Under Secretary has said to you, Mr. Chairman, with the proposed amendments we would expect to be able to actually take off the production line vehicles to be assured that the production model meets the prototype model so that the public in buying their cars can be assured of having a clean car as originally tested.

Mr. ROGERS. What is the life of these devices?

Dr. MIDDLETON. They are expected to last the lifetime of the vehicle. That is why we have a durability test at 50,000 miles projected.

Mr. ROGERS. Is that what the prototypes proved?

Dr. MIDDLETON. The certificates given for the prototypes and the durability tests that we use for them indicate that the system on the prototype will last within the standard for the lifetime of the vehicle. In actuality, they do not.

Mr. ROGERS. Have you tested any prototype to 50,000 miles?

Dr. MIDDLETON. Yes; we have.

Mr. ROGERS. How many?

Dr. MIDDLETON. As a condition for issuing the certificate of conformity, out of the 1200 vehicles that are tested there must be a durability test as a part of that performance test.

Mr. ROGERS. On each car that you test?

Dr. MIDDLETON. The durability fleet has to be operated in a way that will show that during the 50,000 miles that it is within or without the standard and accordingly adjusted.

Mr. ROGERS. You don't test each one at 50,000 miles?

Dr. MIDDLETON. No. We take a representative sample as we did before.

Mr. ROGERS. In other words, if you have four from an automobile manufacturer you may test one out of that; is that right?

Dr. MIDDLETON. I don't have the hard number out of the 1200 but it is less than half of them.

Mr. ROGERS. I would like to know that. Of course, that would be very important to the public, too, and that ought to be considered in the certification, I would think.

Dr. MIDDLETON. It is considered in the certification, Mr. Chairman.

Mr. ROGERS. But it is not working, is it?

Dr. MIDDLETON. In considering the prototypes, it works in the prototypes. It does not work when it comes to public use; you are quite correct.

Mr. ROGERS. So it does not do the public much good. In other words, if a manufacturer is going to put out a prototype that is great but if none of his cars or 80 per cent of them don't work the public is not being protected much by certification.

I recognize you now ask for a change where you go in and grab cars and revoke certification. I just want a record here of what happened and how we are operating.

Dr. MIDDLETON. I hope the record has been made clear.

Mr. ROGERS. Well, it has been made clear to me that it is very inefficient in testing for the public and I want a change and I think this committee will want a change.

Dr. MIDDLETON. I think this is what the bill wants.

Mr. ROGERS. Mr. Secretary, would you be able to come back this afternoon?

Mr. VENEMAN. I am at your disposal, Mr. Chairman.

Mr. ROGERS. If you could because we will have to go into a number of other questions. I have a number of other questions. Would you like to ask some questions now, Mr. Kyros?

Mr. KYROS. No.

Mr. ROGERS. Mr. Secretary, you are from California and we put in the bill that California could set higher standards. I notice you maintain this is a good thing, too, to continue.

Mr. VENEMAN. That is correct.

Mr. ROGERS. For the state to have high standards.

Mr. VENEMAN. We set the national standards which they may exceed.

Mr. ROGERS. As a matter of fact, it has appeared to me that California really has borne the brunt of this whole area of air pollution

problem so far as automobiles are concerned and I think even in other fields and they seem to be far ahead of the Federal Government.

Mr. VENEMAN. By necessity to a really great extent.

Mr. ROGERS. Perhaps.

But I wonder since we passed the law some years ago why the Federal Government is not asserting the lead even over California?

Don't you think it is time for us to do this?

Mr. VENEMAN. I think essentially what we suggest in the new vehicles emission standards is that they would be equal to California and that the 1975 standard would exceed the existing California standard, so we are moving ahead.

Mr. ROGERS. I should think we should assert leadership and not have to depend on a constituent to show us the way. I think it is time for us to assert some leadership.

Mr. VENEMAN. I think they may have turned on the light, but we will be moving ahead of them by 1975.

Mr. ROGERS. I hope so. I was not too encouraged because a month ago I wired the Secretary suggesting that he get automobile companies and oil companies together and I have not yet heard from him.

I realize he is busy. I notice Governor Reagan has already called those companies together in spite of the concern about the anti-trust laws and had a meeting out there. What were the results of those meetings?

Mr. ROGERS. Have we had a report yet on what happened?

Mr. VENEMAN. I cannot specifically speak to the results. I was aware of the meetings and some of the complications that surround those meetings. I can do no less than apologize for not responding to your telegram if it has been there for that length of time.

Let me suggest, as I did in the testimony, what the Secretary is proposing to do is to write to the companies and ask them what they are doing specifically, what their resources are and what they consider are the problems. Then it would be our intention to assimilate that information, come up with a game plan and then at that point suggest that the companies come in and review whatever plan then we have established.

I think it would be a much more effective confrontation between the two segments of the industry than to just have them in. I think it is a better utilization of their time and the federal government's time.

Mr. ROGERS. How long will it take us to do that? What is your time frame?

Mr. VENEMAN. I will let Mr. Johnson speak to it but I don't see this as a prolonged type of operation.

Mr. JOHNSON. We expect to go out with letters this week over the Secretary's signature to get the kind of information that the Undersecretary referred to from the industry. We would take that, review it in terms of their interest and the Department's need and the public interest.

We would develop on the basis of this a recommended plan for implementing the requirements for getting the two industries together. That is the petroleum and the automobile industry.

On the basis of that we would then look into the possibility of calling them and explaining what would be done on the part of the government

so that there would be no misunderstanding as to how we would propose to proceed.

Mr. VENEMAN. I can assure you, Mr. Chairman, that the letter that will go out this week will request a prompt reply from those involved.

Within 45 days we should be able to hold a meeting, 30 to 45 days.

Mr. ROGERS. What I really was getting at, what I am concerned with, I wondered about the delegation of authority in this area. I know with the department you have it is difficult for the Secretary and the Undersecretary to be on top of every problem.

I understand that.

Mr. VENEMAN. That is an understatement.

Mr. ROGERS. Yes, I understand that. For instance I don't know why Mr. Johnson or Dr. Middleton, if they have such delegation of authority, could not move in these areas where they know action needs to be taken. But there seems to be a feeling that they can't do anything until the Secretary—I realize that you must have some internal control where you don't want to have everybody going off on a tangent.

For instance, the Food and Drug administration seems in some areas to have greater jurisdiction to move on emergency problems on problems with great priority than we do over here in the environmental area. I wondered if you could give that some attention to see that they do have sufficient authority to move within certain guidelines that you would put down but I would think that this would be an area where you want them to go ahead and move quickly, certainly when it is being done by states and everybody else.

Mr. VENEMAN. I think, Mr. Chairman, that NAPCA and the Environmental Health Service have the authority to move on almost a comparable basis as the Food and Drug Administration when it comes to making administrative decisions.

When you are dealing with something that involves making or breaking into areas of new policy, then, of course, this discussion is conducted both on the Secretary's level with Dr. Egeberg, who is, of course, responsible for the Environmental Health Service, and with Mr. Johnson, who is the Administrator of the Environmental Health Service.

Mr. ROGERS. Just as an example and that is the only reason I brought it out, not to embarrass anyone, but simply the fact that suggested—suggestions don't seem to get much reaction and generally it is supposedly waiting on the Secretary.

Mr. VENEMAN. I will let Mr. Johnson respond. He indicates they have been in touch on an individual basis.

Mr. JOHNSON. On an individual basis, recognizing the problem, Mr. Chairman, Dr. Middleton and myself both have been in discussions with the petroleum industry. We have been in discussions with members and representatives of the automobile industry.

We are not totally isolated in this situation. When it comes down to real departmental administrative policy questions I have made it incumbent on myself to discuss this with the Secretary.

Mr. ROGERS. Would you have the authority to send out such letters?

Mr. JOHNSON. Had we understood clearly that to be the policy of the administration, yes, we would have had that authority. In this

particular instance I chose to discuss with the Secretary because I thought it would be broader than the precise authority that we had in this situation.

Mr. ROGERS. Now getting to making administration policy, you help make it I hope.

Mr. VENEMAN. He certainly does.

Mr. JOHNSON. Could I amplify that for just a moment?

Mr. ROGERS. Yes.

Mr. JOHNSON. In this instance, we are dealing not just with the Department of HEW. I think it is clear we are dealing with the Department of Justice. It is also quite clear that we are dealing with the total fuel policy of the Federal Government.

There is more involved than just my particular special interest in terms of air pollution control, and as important as that is in the terms of the Federal Government.

Mr. ROGERS. Now let me ask you this again talking about that and justice, should there be a provision in this law when ever the government or department requests—initiates a request for conference with the oil people, with the automobile people, as long as it is at the initiative of the government in getting them together, that they will be exempt from antitrust laws?

Mr. SAPERSTEIN. This is the reason we have been discussing with Justice the problems that may arise if we do get them together.

Mr. ROGERS. We get that answer so much that Justice seems to be the one fighting against our doing anything for air pollution or for automobile devices or anything else. I realize that there is some concern. What I am saying is should we have in this law a provision giving an exemption to companies under coverage of the anti-trust law on those specific issues that they are called in to discuss where it is at the initiative of the governmental agency trying to solve the problem given to it under the law?

Mr. SAPERSTEIN. I can see considerable merit to that, Mr. Chairman.

Mr. ROGERS. Will you let us have some language to that effect?

Mr. SAPERSTEIN. I think we would like to get the advice of the experts from Justice.

Mr. ROGERS. You are a lawyer, aren't you?

Mr. SAPERSTEIN. I don't know all there is to know about the law, Mr. Chairman, particularly this, in a field like this.

Mr. VENEMAN. I have the greatest confidence in Mr. Saperstein but I think we have to recognize that Justice—

Mr. ROGERS. I have no objection to your talking to Justice. Could you do that and let us have your thinking?

It seems to me that if we could really get the experts together, and sit down and go over all the problems it may take quite a number of conferences to move ahead in some areas. This probably would be helpful to you in administering the law and it would be helpful to the companies coming up with specific devices to meet the problem.

Mr. JOHNSON. May I clear the way a bit on this?

Mr. ROGERS. Yes.

Mr. JOHNSON. I think it would be wrong to leave the implication that the Justice Department has been a hindrance. As a matter of fact they have been very much of a help in this situation. They don't tell us what we can't do. They tell us how we can do what we need

to do to get our job done. They were very helpful in terms of the meetings we had with the airline industry, with the electronic product industry; so they do make it possible for us to do this within the interpretation of the act.

Mr. ROGERS. As long as they think this is not a bad idea, to do it, I think maybe we ought to give you the authority where you don't have to go begging over to Justice to get some people together to solve a problem.

So if you could consider this and let the committee know I think it would be helpful.

(The following letter was received for the record:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
OFFICE OF ASSISTANT SECRETARY FOR LEGISLATION,
Washington, D.C., April 27, 1970.

HON. HARLEY O. STAGGERS,
*Chairman, Committee on Interstate and Foreign Commerce, House of Representatives,
Washington, D.C.*

DEAR MR. CHAIRMAN: During the course of the March 16, 1970, hearing on the proposed Clean Air Act Amendments (H.R. 15848) before the Subcommittee on Public Health and Welfare at which representatives of this Department appeared, the question arose as to the exemption of fuel and auto manufacturers from the operation of the antitrust laws when called together by an agency of Government to cooperate in solving problems relating to air pollution.

At the hearing this Department took the position that exemption from the antitrust laws was not necessary for an effective pollution control effort. We believed then, and we continue to believe, that the antitrust laws do not impede our efforts in this respect.

Our belief is strengthened by the views of the Justice Department on this matter. On April 9, 1970, Mr. Richard W. McLaren, Assistant Attorney General in charge of the Antitrust Division, spoke before the Antitrust Section of the American Bar Association. Mr. McLaren stated that this Administration "believes that useful action in the private sector calls for a measure of cooperation among the firms in an industry, and that these cooperative efforts can be useful without requiring an abandonment of fundamental antitrust principles."

The Justice Department has further indicated its willingness to provide advance opinions on the applicability of antitrust laws to propose cooperative efforts to combat pollution. Particularly, in view of this willingness, this Department does not feel that an exemption from the antitrust laws is desirable or necessary. If, nevertheless, the Committee or Subcommittee should wish to include a specific statutory exemption from the antitrust laws, we suggest that a request be addressed to the Department of Justice to provide the necessary language or, preferably, to review language prepared by the Legislative Counsel's office, since that Department, and not the Department of Health, Education, and Welfare, has the necessary expertise in this field.

Sincerely,

CREED C. BLACK, *Assistant Secretary.*

Mr. ROGERS. Now as to the airline problem, could you let us know what results you have had?

Mr. VENEMAN. With the combusters?

Mr. ROGERS. Yes.

Mr. JOHNSON. Well we will give you a status report. I think it is too early to speak much too off hand. I believe the understanding was that somewhere in the next 90 days we would get these plans into operation. We will give you what we have.

Mr. ROGERS. That will be helpful.

(The following statement was received for the record:)

STATEMENT BY CREED C. BLACK, ASSISTANT SECRETARY FOR LEGISLATIVE AFFAIRS, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—FEBRUARY 4, 1970

[Presented at a joint hearing before the Subcommittee on Aviation of the Committee on Commerce and subcommittee on Air and Water Pollution of the Committee on Public Works, United States Senate]

Mr. Chairman and members of the Committees, I welcome this opportunity to discuss with you the progress we have made in dealing with the air pollution problems arising from commercial and general aviation activities.

Aircraft, particularly jet aircraft, certainly are among the most conspicuous of the Nation's many sources of air pollution. In the course of their operations, jet aircraft emit several types of gaseous and particulate air pollutants.

One of them, of course, is smoke. In a report to the Congress in January 1969, the DHEW pointed out that a practical and effective method of dealing with the smoke problem had been devised and would be available early in the 1970's for application to the approximately 3,000 engines now in use on the airline industry's medium-range jet planes.

The new combustors developed by Pratt and Whitney for their JT8D engines are essentially smokeless. They have been thoroughly tested and have been certified for safety by the Federal Aviation Administration. New JT8D engines manufactured from now on will be equipped with the new combustors.

Futhermore, beginning this month, it is expected that Pratt and Whitney will produce new combustor sets at a rate of about 45 per month. This number will be sufficient to meet only normal replacement requirements. In less than a year, however, the Company could increase production to a rate of about 200 combustor sets per month.

With this knowledge in hand several months ago, the Department of Health, Education, and Welfare initiated an effort to have the Nation's commercial air carriers purchase and install new combustors at the fastest practicable rate, which means, as far as we are concerned, that they ought to be installed during the next major overhaul or hot section inspection of each JT8D engine now in use.

The Department's intention of undertaking such an effort was spelled out in the January 1969 report to which I have already referred. That report noted the availability of the new combustors and stated: "Accordingly, it is the intention of this Department to encourage such action by engine manufacturers and airline operators and to keep close watch on their progress. If, at any time, it appears that progress is inadequate or that completion of the work will be unduly prolonged, or that the concern of the industry lags the Department will recommend regulatory action to the Congress (and ask) that statutory authority for such action be provided."

As you know, the airline industry's initial response to our proposal was disappointing. Nonetheless, we felt that a further effort was in order, particularly since very few airlines were individually represented at the initial meeting.

Accordingly, in cooperation with the Department of Transportation and the Federal Aviation Administration, a meeting with airline representatives was held on January 20. Thirty-one airlines were individually represented. Together, their fleets account for all but about 100 of the approximately 3,000 JT8D engines now in use.

At the meeting on January 20, we emphasized our view that it is practicable to have the new combustors installed on nearly all JT8D engines by late 1972, provided that Pratt and Whitney implements its current plan for increased production of the new combustors.

As a result of that meeting, it is our understanding that the airlines will have installation of the new combustors substantially completed by late 1972. We fully expect the airlines to carry out this program.

Nevertheless, the Department of Health, Education, and Welfare and the Department of Transportation clearly have an obligation to monitor the progress of this effort very closely, and we certainly intend to do so.

To help us in this task, the Federal Aviation Administration will assemble and furnish us detailed information on the various airline companies' plans for instal-

lation of new combustors. As Secretary Finch indicated on January 20, we expect to have that information within 90 days from the day on which the meeting was held. In addition, the Federal Aviation Administration will furnish us quarterly reports on actual installation work.

If we find that the airline companies' plans or their progress in implementing the plans are unsatisfactory, it is our intention to make such a finding known immediately—not only to the industry but also to the public. And we will not hesitate to name the companies involved.

I want to note, at this point, that the participants in the January 20 meeting included the Attorney General of the State of Illinois and the Deputy Attorney General of the State of New Jersey. New Jersey and Illinois both have initiated legal action to compel the airlines to install smokeless combustors. Both of these State officials expressed their support of the proposed program.

I believe that that program represents a significant step forward in the Nation's efforts to restore clean air to our cities and towns. The fact that it is a step taken in the absence of a statutory mandate is, to us, an encouraging sign.

To us, it means that the progress we can make through enactment and enforcement of laws and regulations can be supplemented very significantly by voluntary action.

A number of other steps to abate aircraft smoke also have been taken by engine manufacturers and airlines. The JT9D engine, now in use of the Boeing 747, is essentially smokeless. General Electric has reported that its CF6 engine, which will come into use on the DC-10 airbus early in 1972, will be equipped with a combustor that produces virtually no visible smoke. General Electric also is developing a low-smoke combustor for the J79 engine used in military aircraft.

But smoke certainly is not the only problem. Nor is smoke abatement our only objective. Plans for defining and dealing with other aspects of the aircraft problem were outlined in the Department's report to the Congress in January 1969. Again, I will quote from that report:

"Further research is needed to define more precisely the present and probable future nature and magnitude of all other air pollution problems associate with aircraft activity in the United States and to identify needs for control measures. Emphasis must be placed particularly on assessment of air pollutant levels in the air terminal environment and their effects on health and safety and on evaluation of possible long-term effects of upper atmospheric pollution resulting from aircraft flight activity."

In accordance with that summary of research needs, the Department of Health, Education, and Welfare currently has several projects underway. In a project being supported by the National Air Pollution Control Administration, the Los Angeles County Air Pollution Control District is engaged in a study of the extent to which aircraft emissions affect air quality in and around airports, particularly during periods of heavy air traffic, and, among other things, to define the impact of such emissions on air quality inside aircraft cabins. Other research projects now underway include studies of methods of controlling gaseous pollutants emissions from jet and piston-engine aircraft. Some of the studies now in progress are being conducted in cooperation with the Federal Aviation Administration.

We are, in short, concerned very broadly with the impact of aircraft emissions on the Nation's air quality and on public health and welfare. As we succeed in defining specific aspects of the problem and identifying practical means of dealing with them, we intend to seek prompt application of that knowledge.

To the extent that enactment of laws and regulations is necessary at any point in this effort, we will recommend that approach. But wherever there are opportunities for progress, even in the absence of specific legislation, we will encourage the private sector to take the initiative in preventing and controlling problems of air pollution.

The national problem of air pollution certainly is too serious and too complex for any level of government or any segment of industry to solve by itself. Obviously, there must be cooperative efforts directed toward the goal set forth in the Clean Air Act—that goal being "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." The Department of Health, Education, and Welfare not only welcomes but also encourages the involvement of all who subscribe to that goal.

Mr. ROGERS. Also I believe the law required a report on that. Then has that report been filed with the Congress?

Mr. JOHNSON. What was that again, sir?

Mr. ROGERS. I think it asked for a report on the air pollution problem in jets. Was that report filed?

Dr. MIDDLETON. That was filed and filed on time. It is before the Congress.

Mr. ROGERS. Basically what did that report show?

Dr. MIDDLETON. It showed that the jet aircraft produced smoke. In addition they produce some hydrocarbons, carbon monoxide, nitrous oxide. The total tonnage in this country is comparatively small but despite the small size and numbers it is an important problem in urban areas where there are airports such as Washington, D.C.

Mr. ROGERS. Do you have the necessary authority you need to bring about the solution to that problem?

Dr. MIDDLETON. As Mr. Veneman indicated, the Secretary having met together with Secretary Volpe and having learned of the progress that could be made with the Pratt & Whitney combustors that are available, it is expected the large majority of all of the airlines will be converted to smokeless combustors by the end of 1972.

Mr. ROGERS. You will let us have for the record the discussions and commitments made.

Mr. VENEMAN. We will give you a report of the meeting and a report of the—

(The following press release was received for the record:)

[Press release, Tuesday, Jan. 20, 1970]

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OFFICE OF THE SECRETARY

The Departments of Transportation and Health, Education, & Welfare today announced that representatives of virtually all the Nation's airlines have agreed to a program of sharply reducing smoke emissions from aircraft jet engines.

Secretaries John A. Volpe of Transportation and Robert H. Finch of HEW said top officials of 31 carriers represented have agreed to begin within 90 days the installation of smoke reduction devices on the affected aircraft.

Depending upon the availability of the devices, improvement is expected to be noticeable within the next few months, and the program substantially completed by late 1972.

Under the plan, the devices will be installed on engines as they are "down" for routine overhaul—after about 5,000 flying hours each on the average.

An estimated 3,000 Pratt & Whitney JT8D engines, mostly on Boeing 727, 737 and McDonnell Douglas DC9 short haul craft, will require modification.

The devices are improved combustors (the chambers in which the fuel is ignited) and are manufactured by Pratt & Whitney.

Spokesmen for the departments said they are advised that manufacture of the combustors is running about 50 a month and will reach 200 monthly by the end of this year.

It was pointed out that the new generation of jet engines—such as those going on aircraft now being built—are designed to be virtually smokeless.

"We are pleased at this step in the public interest that is being taken by the airlines," the Secretaries said in a joint statement. "We are moving ahead to improve the quality of the environment, and this is an important step towards cleaner air."

Mr. ROGERS. Do you have the actual authority to bring this about if it is not done by voluntary agreement?

Mr. VENEMAN. The answer from both sides tells me that no, we do not.

Mr. ROGERS. If this bill is passed, will you? Will it allow you to set standards nationwide?

Wouldn't that do it?

Mr. JOHNSON. In this particular instance we have no reason at this particular time to doubt that we are going to accomplish what is required without any type of legislation. We have the firm commitment of the airlines, the 31 that were present.

At the end of 1972 we think this will be a problem of the past.

Mr. ROGERS. I hope so.

I am encouraged too and I think getting them together would be very helpful, like I thought you would get oil and the autos together.

Mr. VENEMAN. It is a matter of timing and basis on which we get the groups together. It is not our intention not get the two together. It is a question of who is going to have the trump card.

Mr. ROGERS. I understand.

I would like to have language that will give you the necessary authority in the airline situations as well. If you could submit us language that will give you the necessary authority.

(The information requested was not available to the Committee at the time of printing.)

Mr. ROGERS. Now what is your relationship with the Commerce Department which has its panel out on automotive fuels and air pollution?

How do each of you work here?

Mr. VENEMAN. I will let Dr. Middleton handle that one.

Dr. MIDDLETON. The Commerce Technical Advisory Board was asked if it would undertake this study, by discussions between Myron Tribus, Assistant Secretary assigned to technology, and me. As a result of that he made a proposal to this board. They are interested in doing the work.

The National Air Pollution Control Administration is contributing half the amount of money to support that study. This study is to provide information, as I reported to you earlier, Mr. Chairman, on what the economic and sociological impacts will be of the removal of lead from gasoline and development of a higher octane fuel than can be normally obtained without lead.

Mr. ROGERS. Let me ask you this. Have you registered any fuel additives under the authority given in the 1967 Act.

Dr. MIDDLETON. No, we have not.

Mr. ROGERS. Why not?

Dr. MIDDLETON. We have not been able to conclude the regulations in a fashion that would meet the requirements of the Department of Health, Education and Welfare. The language in the committee reports suggests that we are to obtain information on the health effects of additives but the specific language in section 210 does not so speak.

Mr. ROGERS. Well, the language says that you may require them to tell you the composition of the additives, is that right?

As soon as they tell you the chemical make up you may then give them a registration. Isn't that what the law says?

It does not say that they have to test what the health factors are, I know that. But it would enable you to do it to know what the chemical composition of the additives is.

Isn't that correct?

Dr. MIDDLETON. It would do that but to register a fuel additive that was believed to have an adverse effect just on the basis of some-

thing of its composition presented a problem to the Department. This problem could be met by the new amendments being sought for the regulation of additives and fuel composition.

Mr. ROGERS. At least you would know what was going in. I could not understand why this part of the law has not been administered. It is simple you say because you would not be allowed to set standards for the fuel so you did not ask that additives be registered.

Dr. MIDDLETON. We were unable to learn from the system of registration sufficiently of the possible health impact of the additives the Secretary would be obliged to register.

Mr. ROGERS. You could determine that if you knew what chemical it was, could you not? With your research department you could tell what health factors were with the experts in HEW just as much as an automobile company could?

Dr. MIDDLETON. I need to disabuse you very quickly of any thoughts that we could undertake that kind of research with the research budget available to us.

Mr. ROGERS. Then why have you not asked for sufficient budget? I have not seen any request for an increased budget to cover that activity.

In other words, we put into the law a provision giving you the opportunity to find out the chemical make ups of additives.

If they are not safe this could be determined I presume. It may not be able to be determined on your budget but I have seen no request to give you that authority.

Now I understand what you want to do is to require the automobile companies to require the automotive companies I presume to make the necessary test to show that any additive put in affects health some way or the other.

Would that be correct?

Dr. MIDDLETON. We would need to have some information, whether it be from the manufacture of the additive or the fuel user, the manufacturer using the fuel additive, on what the impact would be from the additive.

Mr. ROGERS. Either the oil company or the additive manufacturer?

Dr. MIDDLETON. Yes, sir, either party. This information was the point of difficulty between the advisory committee and the administration and the interpretation by the General Counsel of what we could ask for.

At the present time this is where the regulation sits. We have not been able to resolve that particular part of the proposed regulations that were published as last summer.

Mr. ROGERS. Where do they stand now? Our principal thrust now is to—I am saying where do the published proposed regulations stand? No action has been taken?

Dr. MIDDLETON. We have not taken any action based on the difference in legislative committee reports and the language in the section which seems to preclude our asking for the health impact of the chemical composition of the additives as reported for registration purposes.

Mr. ROGERS. I agree under the law you could not ask for the health effect but you could ask for the chemical make up could you not?

Dr. MIDDLETON. That is correct, sir.

Mr. ROGERS. But this you are not doing and have not proposed that, is that right?

Dr. MIDDLETON. There may be some continuing discussions but this is the impasse which the Department has reached at the present time.

Mr. ROGERS. Now does the request that is in this legislation put the burden of determining the health aspect of additives upon either the oil or automobile companies?

Dr. MIDDLETON. It puts it on to the petroleum or additive manufacturer, yes, sir.

Mr. ROGERS. You feel that this is essential before any additives are registered?

Dr. MIDDLETON. We feel this is the best possible route to take.

Mr. ROGERS. The subcommittee will now stand in recess until 2 o'clock.

(Whereupon, at 12:25 p.m. the subcommittee recessed, to reconvene at 2 p.m. the same day.)

AFTER RECESS

(The subcommittee reconvened at 2 p.m., Hon. Paul G. Rogers presiding.)

Mr. ROGERS. The subcommittee will come to order. We will continue our hearings on the air pollution and solid waste disposal acts. It is my understanding you have a statement you would like to make, Mr. Johnson.

Mr. JOHNSON. Yes, Mr. Chairman.

We would like to try to clarify for the committee the Department's position on anti-trust laws and their relationship to our ability to work effectively with the petroleum and their involved industries to getting lead out of gasoline.

Mr. ROGERS. Yes.

All right.

Mr. JOHNSON. The anti-trust laws seek to insure that competitors come in and compete rather than collaborate. The desirable objective of competition is not inconsistent with our interest in having members of the petroleum industry work in the most effective manner, in the public interest, to remove lead from gasoline. Rather, competition in this endeavor is most likely to serve the public interest. We believe that the best course for HEW to follow is to contact individual firms on an individual basis first, to determine their plans, resources, and problems now in connection with the removal of lead.

As soon as we obtain sufficient information from these contacts and through other consultation to enable us to propose a course of action and seek the industry's concurrence we expect to do so.

This plan, we believe, is thoroughly consistent with the anti-trust laws. We should like to make it clear also that the Department of Justice has in no way dictated our course of action.

We have chosen this course after consultation with the Department on the provisions and effect of the anti-trust laws. The anti-trust laws do not hamper but rather support our efforts.

We therefore do not advocate any amendment of those laws or of the laws relating to air pollution control to provide any exemptions from anti-trust in dealing with the air pollution control matters.

Mr. ROGERS. As I understand it, you say you would contact the individual companies first and then call them together.

Mr. JOHNSON. That is right. We would like to consider their views as the Department develops its own recommendations and program for carrying out this particular control aspect.

Mr. ROGERS. Is there any anti-trust problem when you call them together?

Mr. JOHNSON. No, sir.

Mr. ROGERS. So there is none then? You can call them together now?

Mr. JOHNSON. Not under the conditions that I have described to you.

Mr. ROGERS. When would it be a problem of calling them together?

Mr. JOHNSON. There may be a question, if, for instance, we were calling them together so that we could seek collaborative action to develop a program for the government. We would not do it in this way. We would seek their consultation as individuals. We would then use that information in developing the government's program and we would really propose this government program to them collectively.

Mr. ROGERS. Suppose they say, "Your program won't work and we have experience that if we got together we think we would work it out."

Mr. JOHNSON. We believe on the basis of the information that we now have in hand that the program will work. On the other hand the legislation that we are seeking for modification of the Clean Air Act would give us authority to make it work regardless.

Mr. ROGERS. In what degree?

Mr. JOHNSON. To the degree that we could regulate fuels and fuel additives.

Mr. ROGERS. And devices?

Mr. JOHNSON. And devices in the air pollution control activities with motor vehicles.

Mr. ROGERS. I understand your position. I am not sure but what it would make more rapid solutions often if you could call people together in the first instance rather than going through a ceremony of saying you give me your views except separately and I don't want anybody else to hear it. And you give me your views separately. This is a legalistic position that you are not getting them together, but what you are really doing is getting them together.

I am not sure this is being very realistic on modern day technology because I would doubt if one company has all the solutions.

Perhaps by getting together and having a discussion this could advance the program more quickly.

Mr. JOHNSON. Certainly that is one approach to it you can take.

Mr. ROGERS. But I understand your position. The committee will have to take their position and decide whether we want to put it in the law. I would want language submitted if you would.

Mr. JOHNSON. We will be glad to have technical consultations with the understanding, of course, that might not be our position.

Mr. ROGERS. Yes, you have made your position on the record. I would like language to enable the committee to give this authority if it deems necessary.

Mr. JOHNSON. Yes, sir.

(See letter dated April 27, 1970, on p. 320, this hearing.)

Mr. ROGERS. Mr. Preyer, do you have any questions at this time?

Mr. PREYER. No questions at this time, Mr. Chairman.

Mr. ROGERS. On your Hertz test that you used how many cars did you use on the test?

Dr. MIDDLETON. Mr. Chairman, I am sorry, I do not have that information before me. But it was a limited number. In the neighborhood of perhaps a thousand.

Mr. ROGERS. I asked for some of those results but the ones I got showed only 487.

Dr. MIDDLETON. That may have been the number at that time.

Mr. ROGERS. Could I have all of the tests?

Dr. MIDDLETON. We would be pleased to give you the most recent information.

(The following interim report was received for the record:)

RENTAL CAR SURVEILLANCE PROGRAM, MARCH 1968-NOVEMBER 1969—
INTERIM REPORT

Division of Motor Vehicle Pollution Control, Bureau of Abatement and
Control, National Air Pollution Control Administration

THE RENTAL CAR EXHAUST EMISSION SURVEILLANCE PROGRAM

I. Introduction

This is an interim report on the rental car motor vehicle exhaust emission surveillance program conducted by the Inspection and Surveillance Branch of the Division of Motor Vehicle Pollution Control.

As of November 12, 1969, 600 exhaust emission tests representing 26 different engine-transmission combinations have been performed at the Los Angeles, California and Ypsilanti, Michigan test facilities. The purpose of these tests is to provide background information necessary to efficiently plan surveillance programs on privately owned vehicles and to give the DMVPC some indication of whether or not vehicles in general use are emitting pollutants at a higher level than that at which they were certified to meet.

Vehicles for this program were obtained from the Hertz and Airways rental companies in Los Angeles and Hertz and Avis in Detroit. When interpreting data from these vehicles it must be kept in mind that these vehicles generally differ from "normal" owner driven vehicles by the care which they are driven, the maintenance they receive, and the type and rate of mileage accumulated. Since the effects of these parameters on motor vehicle emissions are not known with certainty, one should avoid unqualified generalization of these data to vehicles driven by the motoring public at large. Nonetheless, the data generated by this program provides important information on the effectiveness of air pollution control devices operating in vehicles driven under conditions quite different than those under which certification vehicles are driven.

II. Program operation

This program was initiated in March of 1968 and is scheduled to end in December of 1969. A final report, including a detailed evaluation of this program, will be issued in the Spring of 1970. At the onset of the program it was intended to start with a basic fleet of 138 1968-model vehicles which would be retested at three to four thousand mile intervals throughout the life of the various contracts. These vehicles were chosen so as to represent many of the high production vehicles sold in the United States.

Within a short period of time, however, it was found that the rental companies could not deliver the vehicles at the required intervals for repetitive testing. In addition, policy changes at the rental companies resulted in the retention of most rental vehicles for less than one year of operation, thereby eliminating any possibility of obtaining large samples of vehicles with more than twenty thousand accumulated miles. Hence it was necessary to reorganize the program to reflect nonrepetitive testing of vehicles and the inclusion of low mileage, 1969 model vehicles in the test fleet.

All vehicles, except Volkswagens, were equipped with automatic transmissions and all vehicles except Cadillacs had engine modification emission control systems. The Cadillacs used an air injection emission control system.

All vehicles were tested by the standard Federal 7-mode, 7-cycle cold start test procedure as described in the *Federal Register*, Vol 31, No. 51, Part II, Paragraph 85.70-85.83 inclusive. In addition, if it was found that a vehicle was not within the manufacturer's specifications by ± 75 RPM or $\pm 2^\circ$ basis timing, these items were reset to specifications and the vehicle was hot cycle tested (two additional seven mode cycles) for hydrocarbons (HC), carbon monoxide (CO), and carbon dioxide (CO₂). The purpose of these additional cycles was to ascertain the effect, if any, of minor engine adjustment on vehicle exhaust emissions. Analysis of these data will appear in the final report on the contract rental program.

For data analysis purposes all test results for a manufacturer were grouped and analyzed by engine displacement, even if the same displacement was used in a variety of body styles. Hence, all tests on Ford Motor Company 302 CID engine were lumped together even though the last fleet for this engine included a mix of Mercury Cougars, Ford Galaxies, and Ford Mustangs. Similarly, data on Chrysler Motor Corporation's 318 CID engine was obtained by testing both Plymouths and Dodges.

All engines of a given displacement used in this study constituted a homogeneous population in that only one version of a given engine displacement was tested. Hence, even though Ford Motor Company's 390 CID engine comes in both a two barrel and a four barrel carbureted version, all test data are from the two barrel model (see Table 1).

The only exception to the rule whereby all data for a given manufacturer is segregated by displacement, occurred in the analysis of data from General Motors Corporation's 350 CID engine. The 350 CID engines used by GM's Buick, Chevrolet, Oldsmobile and Pontiac Divisions were significantly dissimilar in design so as to warrant a separate analysis for each of the division's engines.

Except for the Chevrolet 327 CID engine. 1969 versions of the engines tested differ little from 1968 versions of the same displacement. Hence, except for the Chevrolet 327 CID engine, data from 1968 and 1969 vehicles were combined.

III. Test Results

Test results are grouped and analyzed by engine displacement, as explained above. Of the twenty-six engine displacements included in the test program, only twelve contain data from fifteen or more complete exhaust emission tests. Data from the remaining fourteen engine displacement groups will not be treated in this interim report, but will be included in the final report project; 1968-69 rental vehicle surveillance program. These 14 displacements are listed in Appendix A.

A summary of test results is given in Table 1 for those twelve engine displacement groups which contain data from fifteen or more exhaust emission tests. This table includes all tests performed on vehicles of a given displacement regardless of accumulated mileage.

A similar analysis of data is given in Table II, but all test performed on vehicles with less than 3,500 accumulated miles have been eliminated. This was done for two reasons. First, because low mileage tests tend to bias a data sample, as explained earlier. Second, because low mileage tests were performed on vehicles from some displacement groups, but not others. Hence, their elimination tends to normalize the average odometer readings for each engine displacement group, making comparisons of emission data between displacement groups more meaningful.

For convenience in data presentation, the column headings in Table 1 and 11 are abbreviated and explained below.

Column A "Engine"

This column gives the manufacturer and the cubic inch displacement of the engines tested. In the case of General Motors Corporation, engines are listed by automotive divisions within the General Motors family. If more than one version of an engine displacement is manufactured, the carburetion and compression ratio of the version tested is listed.

Column B "No. of Cars Tested"

This column gives the number of vehicles of each displacement tested. Each car was tested once only.

Column C "Avg. Odo."

This column lists the average odometer reading for vehicles of a given displacement at the time of test.

Columns D and E "Avg. of Min. 3 Odo." and "Avg. of Max. 3 Odo."

These columns give the averages of the three lowest and three highest test odometer readings for vehicles of a given displacement. This gives information as to the mileage range of vehicles tested.

Column F "Avg. Emissions"

This column displays the average 7-cycle composite emissions for HC and CO.

Column G "95% Conf. Interval"

This column lists the 95% confidence interval for the "average emissions" given in Column F.

Column H "% Vehicles Failing HC, CO, Both, Either"

This column gives the percentage of test vehicles failing the Federal Emission Standards for HC, CO, both HC and CO, and either HC or CO.

Table III is a listing of the sales figures for the twelve different engines listed in Tables I and II. These figures were taken from the various manufacturers' applications for certification and show the projected new car engine sales of all engines which are similar to those tested in the rental car program. An engine is considered similar to a rental car test engine if its displacement, carburetion, compression ratio, and emission control system are identical to that of the corresponding engine in the test program. As can be seen from the totals at the bottom of Table III, these twelve engines represent approximately 40% of new engine sales in this country during the 1968 and 1969 model years. The fourteen engines listed in Appendix A of this report represent an additional 10% of engine sales, bringing to slightly over 50% the percentage of new car sales represented in this test program.

An explanation of the column headings used in Table III is as follows:

Column marked "Sales"

This column gives the projected new car sales of engines similar to the engine specified in the column marked "Engine".

Column marked "% Mfg. Sales"

This column lists the approximate percentage of the manufacturer's total engine production represented by the engine given in the left hand column. The manufacturer's total engine production includes all engines for which Federal certification was requested.

Column marked "% Total National Sales"

This column gives the approximate percentage of new car engine sales in this country represented by the engines used in the test program. The national new car engine sales includes the sales figures of both foreign and domestic engines.

IV. Conclusions

As mentioned in the introduction to this interim report, the purpose of this program was to gather information on the effectiveness of air pollution control devices operating on vehicles driven under conditions quite different than those under which certification vehicles are driven. From these data the following conclusions can be drawn:

(1) Many vehicles in rental car fleet type of operation are producing exhaust emissions at a higher level than that which they were certified to meet.

(2) Average levels of exhaust emission vary considerably not only between engines produced by different automotive manufacturers, but between different engines produced by the same manufacturer.

APPENDIX A.—ENGINE-DISPLACEMENT GROUPS WITH LESS THAN 15 TESTS AS OF NOV. 12, 1969

| Manufacturer | Engine CID | Number of tests | Manufacturer | Engine CID | Number of tests |
|---------------------------|------------|-----------------|--------------------|------------|-----------------|
| Ford Motor Co..... | 200 | 11 | Ford Motor Co..... | 428 | 4 |
| Chevrolet..... | 230 | 5 | Do..... | 429 | 8 |
| American Motors Corp..... | 343 | 12 | Chrysler Corp..... | 440 | 3 |
| Chevrolet..... | 350 | 4 | Oldsmobile..... | 455 | 8 |
| Oldsmobile..... | 350 | 4 | Ford Motor Co..... | 460 | 8 |
| Ford Motor Co..... | 351 | 13 | Do..... | 462 | 5 |
| Chrysler Corp..... | 383 | 7 | Cadillac..... | 472 | 8 |

TABLE I.—DATA SUMMARY—ALL DISPLACEMENT GROUPS WITH 15 DR MORE TESTS

| Engine | A | B | C | D | E | F | | G | H | | | |
|---|-----|--------|-------|--------|-----|---|---|-------|-------------------------------|-------------------------------|--|--|
| | | | | | | Average of minimum of 3 odometer readings | Average of maximum of 3 odometer readings | | Average emissions HC (p.p.m.) | Average emissions CO (p.p.m.) | 95 percent confidence interval HC (p.p.m.) | 95 percent confidence interval CO (p.p.m.) |
| AMC, 290 CID 2 bbl. 9.0 C.R. | 32 | 5,133 | 263 | 10,709 | 213 | 1.13 | ±11 | ±0.13 | 0 | 13 | 0 | 13 |
| Chrysler Motor Corp., 225 CID 1 bbl. | 18 | 12,280 | 4,272 | 19,334 | 203 | 1.49 | ±14 | ±0.27 | 6 | 39 | 6 | 39 |
| Chrysler Motor Corp., 318 CID 2 bbl. 9.2 C.R. | 49 | 4,991 | 34 | 14,265 | 230 | 1.09 | ±13 | ±0.16 | 12 | 10 | 4 | 18 |
| Ford Motor Co., 289 CID 2 bbl. 8.1 C.R. | 45 | 10,994 | 4,050 | 21,397 | 319 | 1.39 | ±38 | ±0.27 | 62 | 22 | 20 | 64 |
| Ford Motor Co., 302 CID 2 bbl. 9.5 C.R. | 110 | 8,953 | 940 | 21,821 | 305 | 1.19 | ±19 | ±0.15 | 58 | 19 | 19 | 58 |
| Ford Motor Co., 390 CID 2 bbl. 9.5 C.R. | 116 | 7,979 | 34 | 24,199 | 227 | 1.08 | ±20 | ±0.19 | 16 | 16 | 7 | 25 |
| Chevrolet, 307 CID 2 bbl. 9.0 C.R. | 44 | 9,944 | 1,068 | 20,311 | 331 | 1.48 | ±50 | ±0.17 | 64 | 50 | 43 | 71 |
| Chevrolet, 327 (1968) 4 bbl. 10.0 C.R. | 48 | 16,960 | 6,525 | 25,991 | 289 | 1.76 | ±21 | ±0.18 | 42 | 58 | 29 | 71 |
| Chevrolet, 327 (1969) 2 bbl. 9.0 C.R. | 52 | 5,326 | 44 | 21,822 | 229 | 1.52 | ±14 | ±0.14 | 10 | 46 | 4 | 52 |
| Pontiac, 350 CID 2 bbl. | 25 | 9,631 | 486 | 17,187 | 218 | 1.55 | ±18 | ±0.25 | 16 | 56 | 8 | 64 |
| Pontiac, 400 CID 4 bbl. | 23 | 6,492 | 1,550 | 12,042 | 176 | 1.46 | ±15 | ±0.19 | 0 | 48 | 0 | 48 |
| VW, 91.6 CID | 31 | 9,152 | 53 | 15,150 | 371 | 2.17 | ±39 | ±0.49 | 32 | 16 | 16 | 32 |

TABLE II.—DATA SUMMARY—ALL DISPLACEMENT GROUPS WITH 15 OR MORE TESTS, TESTS ON VEHICLES WITH LESS THAN 3,500 MILES ELIMINATED

| Engine | A | B | C | D | E | F | | G | H | | | |
|---|----|--------|-------|--------|-----|---|---|-------|-------------------------------|-------------------------------|--|--|
| | | | | | | Average of minimum of 3 odometer readings | Average of maximum of 3 odometer readings | | Average emissions HC (p.p.m.) | Average emissions CO (p.p.m.) | 95 percent confidence interval HC (p.p.m.) | 95 percent confidence interval CO (p.p.m.) |
| AMC, 290 CID | 24 | 6,157 | 3,690 | 10,709 | 218 | 1.12 | ±11 | ±0.14 | 0 | 8 | 0 | 8 |
| Chrysler Motor Corp., 225 CID 1 bbl. | 17 | 12,922 | 6,739 | 19,334 | 203 | 1.48 | ±15 | ±0.23 | 6 | 35 | 6 | 35 |
| Chrysler Motor Corp., 318 CID | 28 | 8,125 | 3,661 | 14,265 | 240 | 1.18 | ±21 | ±0.28 | 18 | 14 | 7 | 25 |
| Ford Motor Co., 289 CID 2 bbl. 9.2 C.R. | 44 | 11,191 | 4,902 | 21,397 | 323 | 1.40 | ±38 | ±0.28 | 62 | 23 | 20 | 65 |
| Ford Motor Co., 302 CID 2 bbl. 9.5 C.R. | 95 | 10,038 | 4,827 | 21,821 | 314 | 1.23 | ±21 | ±0.18 | 63 | 20 | 20 | 63 |
| Ford Motor Co., 390 CID 2 bbl. 9.5 C.R. | 70 | 12,479 | 4,384 | 24,199 | 251 | 1.31 | ±21 | ±0.29 | 24 | 23 | 11 | 36 |
| Chevrolet, 307 CID 2 bbl. 9.0 C.R. | 33 | 12,560 | 5,616 | 20,311 | 366 | 1.53 | ±62 | ±0.21 | 82 | 52 | 52 | 82 |
| Chevrolet, 327 (1968) 4 bbl. 10.0 C.R. | 48 | 16,960 | 6,525 | 25,991 | 289 | 1.76 | ±21 | ±0.18 | 42 | 58 | 29 | 71 |
| Chevrolet, 327 (1969) 2 bbl. 9.0 C.R. | 31 | 6,965 | 3,817 | 21,882 | 250 | 1.52 | ±17 | ±0.17 | 16 | 42 | 6 | 52 |
| Pontiac, 350 CID 2 bbl. | 20 | 11,620 | 6,576 | 17,187 | 217 | 1.63 | ±19 | ±0.27 | 15 | 60 | 10 | 65 |
| Pontiac, 400 CID 4 bbl. | 21 | 7,060 | 3,703 | 12,042 | 175 | 1.50 | ±15 | ±0.18 | 0 | 48 | 0 | 48 |
| VW 91.6 CID | 26 | 10,877 | 5,531 | 15,150 | 393 | 2.20 | ±41 | ±0.58 | 38 | 19 | 15 | 42 |

TABLE III.—DOMESTIC SALES OF ENGINES LISTED IN TABLES I AND II

| Engine | 1968 model year | | | 1969 model year | | |
|-------------------------------|------------------|--------------------------------|---------------------------------|------------------|--------------------------------|---------------------------------|
| | Sales | Percent of manufacturing sales | Percent of total national sales | Sales | Percent of manufacturing sales | Percent of total national sales |
| AMC: 298 CID..... | 34, 000 | 12. 0 | 0. 3 | 60, 000 | 20. 0 | 0. 6 |
| Chrysler Corp.: | | | | | | |
| 318 CID..... | 409, 000 | 24. 0 | 3. 8 | 554, 000 | 36. 0 | 5. 6 |
| 225 CID..... | 364, 200 | 21. 0 | 3. 3 | 281, 300 | 25. 0 | 3. 9 |
| General Motors: | | | | | | |
| Chevrolet 307 CID..... | 946, 700 | 18. 0 | 8. 7 | 250, 000 | 5. 0 | 2. 5 |
| Chevrolet 327 CID (1968)..... | 320, 400 | 6. 0 | 2. 9 | (¹) | (¹) | (¹) |
| Chevrolet 327 CID (1969)..... | (¹) | (¹) | (¹) | 550, 000 | 12. 0 | 5. 6 |
| Pontiac 350 CID..... | 161, 100 | 3. 1 | 1. 5 | 189, 000 | 4. 1 | 1. 9 |
| Pontiac 400 CID..... | 278, 900 | 5. 2 | 2. 6 | 154, 000 | 3. 4 | 1. 6 |
| Ford Motor Co.: | | | | | | |
| 289 CID..... | 335, 453 | 12. 0 | 3. 1 | (¹) | (¹) | (¹) |
| 302 CID..... | 554, 000 | 19. 0 | 5. 1 | 796, 800 | 30. 0 | 8. 1 |
| 390 CID..... | 493, 112 | 17. 0 | 4. 5 | 491, 800 | 18. 0 | 5. 0 |
| Volkswagen: 91.6 CID..... | 329, 000 | 73. 0 | 3. 0 | 360, 000 | 75. 0 | 3. 7 |
| Total..... | | | 38. 6 | | | 38. 5 |

¹ Not manufactured.

Mr. ROGERS. Now we were at the point of discussing the divisions of research funds. \$3 million for the auto problem and \$46 million for the standing polluters. My question was, is this a proper division of research funds vis-a-vis the problem that they bring in air pollution?

Dr. MIDDLETON. We are indicating to you, Mr. Chairman, that since there was a real paucity or lack of control systems available for pollutants that are important, such as sulfur oxides, and even though they may not be as large totally as the motor vehicle pollution, and such as the oxides of nitrogen, where they come in large measure from both stationary sources and motor vehicles, we need to have control technology developed to abate those pollutants, that we were being certain in those areas where the Federal Government publishes criteria demanding that the states establish standards, in turn there were control technologies available then so that the states in fact would be able to develop suitable implementation plans.

I think, then, you recognize that since the motor vehicle companies do have the expertise available, as announced by them, to meet the standards published in the Federal Register on February 10th by the Secretary of Health, Education and Welfare, that, if, in fact, this technology is resident within the manufacturing companies, we felt that a dedication of funds in those areas where air pollution was not being controlled adequately was a proper rationale for this distribution.

Then you may recall that the Undersecretary called your attention to a report on a motor vehicle and research development plan which was a six or seven year plan in which there was a very significant upgrading in the expenditure of funds in this area.

May I say, Mr. Chairman, this is advanced in this way to be assured that, in the event the internal combustion engine is not able to meet the standards required after 1975, that there will in fact be an alternative propulsion system that will meet those requirements?

And in that area where we do not have information today indicating that the future standard, possibly 1980, can be met, there is a significant research and development funding proposed by the government.

Mr. ROGERS. How much of those funds will go to the development of a new power system?

Dr. MIDDLETON. Of the total Federal expenditures expected to be \$87.6 million, for the unconventional motor vehicle system, this propulsion system that will be a low pollution or pollution free system, is \$44 million.

So half of that money is for the purpose of assuring that we will have some other source of propulsion that will be more pollution free than the internal combustion engine.

Mr. ROGERS. The conventional is some \$43 million?

Dr. MIDDLETON. The conventional motor vehicle is about \$26 million.

Mr. ROGERS. What is the other?

Dr. MIDDLETON. The balance is for the supporting research which is largely dedicated to those things that talk about urban planning, transportation systems, trying to make a systems manager approach to transportation.

That amounts to then roughly \$18 million.

Mr. ROGERS. How much have you spent all together to tackle the automotive problem of the conventional power system?

Dr. MIDDLETON. I would have to develop that information for the record.

I do not have it for the existence of the differences of air pollution and its subsequent organization, what it is now. How far back would you like to have that developed?

Mr. ROGERS. When you first got funds for it.

Dr. MIDDLETON. The emphasis of course was given to the motor vehicle by the Congress some years ago. From that date forward there has been an accelerating interest in that.

Mr. ROGERS. If you could give us a chronology of what has been accomplished it would be helpful.

Mr. JOHNSON. The figures that Dr. Middleton was speaking to in terms of the research and development program are a research and development plan being advanced by the Department and which is being reviewed by the Council on Environmental Quality but it has not been reviewed by the Bureau of the Budget at this point.

(The following information was received for the record:)

The following portions of annual reports submitted to the Congress under section 306 of the Clean Air Act, as amended, describe the progress that has been made in recent years in dealing with the problem of motor vehicle pollution:

1. First Report: Chapter II, Part A.
2. Second Report: Chapter VII.
3. Third Report: Chapter II, Parts H and I.

Excerpts from the reports are attached.

Information on progress in earlier years was provided in a series of six semi-annual reports, entitled *Automotive Air Pollution*, submitted to the Congress between January 1965 and August 1967.

Excerpt from Senate Document No. 92, dated June 28, 1968, entitled "Progress in the Prevention and Control of Air Pollution"--First Report of the Secretary of Health, Education, and Welfare to the United States Congress pursuant to Public Law 90-148 The Air Quality Act of 1967

Chapter II. PROGRESS TOWARD EFFECTIVE CONTROL OF AIR POLLUTION

This chapter covers three major areas of activity in which progress is being made toward effective air pollution control. Part A describes the problem of automotive air pollution and the efforts that are being made to cope with it. It discusses the Federal emission standards that have been adopted and the ones that are proposed; it outlines current research and development efforts directed toward improved control technology; and it describes the efforts being made to assure compliance with the Federal standards. Part B emphasizes the control of air pollution from stationary sources, a broad category including all sources except motor vehicles. It includes a description of State, interstate, and local air pollution control programs, their history of development and current status, as well as Federal abatement activities authorized under the act, and it also describes much of the current research and development work aimed at developing the technology to control these sources. Finally, part C describes the surveillance and data gathering activities that are essential to provide a sound basis for regulatory efforts. It includes a summary and review of air monitoring systems nationwide, a description of activities underway to collect emission data and information on fuel additives, and a brief discussion of measuring techniques.

PART A. AUTOMOTIVE AIR POLLUTION

As required by the Clean Air Act of 1963, the Secretary has submitted semiannual reports to Congress describing the continuing efforts being made to cope with the problem of air pollution from motor vehicles. This series of reports, entitled "Automotive Air Pollution," provides a detailed summary of progress over the last 4 years, and the final report in the series was submitted in August 1967.

This chapter is intended as an overview of the problem of automotive air pollution as it exists today, rather than a description of the details of specific studies undertaken since the August report. The emphasis is on the dimensions and current status of the problem, the progress that is being made, and the prospects for the future.

In terms of the total quantity of pollutants, the automobile represents the most important single source of air pollution in the United States today.¹ The nationwide contribution of the motor vehicle to five major air contaminants is shown in figure 4. It is the prime source of two of these pollutants, carbon monoxide and hydrocarbons, and it produces nearly half the total nitrogen oxides released. Carbon monoxide, which impairs the oxygen-carrying ability of the blood, can reduce visual acuity and motor ability in small concentrations and is fatal in large doses. Many of the hydrocarbons react with nitrogen oxides in the presence of sunlight to form secondary products which

¹ It should be pointed out, however, that the total quantity of pollutant emissions does not tell the whole story; some pollutants (for example, sulfur dioxide) are chemically

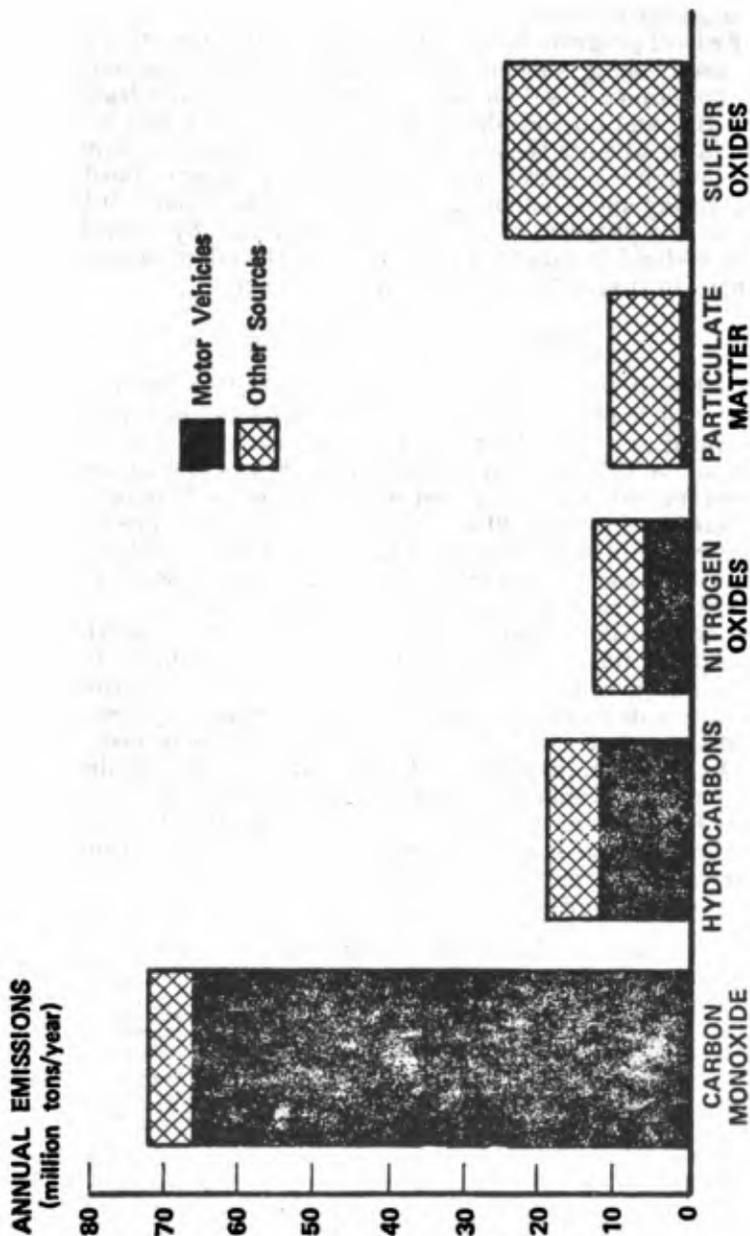


Figure 4. The motor vehicle's contribution to five major air contaminants

irritate the eyes and throat and can alter physical function and enhance respiratory disease.

The Federal program has sought to cope with automotive air pollution by establishing nationwide standards limiting the emissions of various pollutants, based on the technical and economic feasibility of their control and on considerations of public health and welfare. It has sought to advance the state of the art of automotive control technology through a research and development program aimed both at complementing and stimulating industry's efforts. Finally, it has initiated an active program to certify the compliance by manufacturers with the Federal standards and to examine the effectiveness of emission control devices as the vehicles acquire mileage.

FEDERAL EMISSION STANDARDS

In October of 1965, when it became apparent that national control of motor vehicle pollution was technically feasible, the Clean Air Act was amended to enable the Secretary to prescribe emission standards for new motor vehicles sold in the United States. Two months later the Secretary published proposed standards in the Federal Register, giving interested parties 30 days to suggest changes. The standards, which were adopted in March 1966, apply to new gasoline-powered passenger cars and light trucks, beginning with the 1968 model year, and cover both American-made and imported vehicles.

These standards are derived from considerations of what is technologically feasible and economically realistic as well as from considerations of benefit to health and welfare. The limits they set on carbon monoxide and hydrocarbons from the exhaust system tailpipe, which is the major source of motor vehicle pollution, are shown in table 1. In addition, they require 100-percent control of hydrocarbons emitted from the crankcase.² Separate exhaust emission categories are provided for smaller engines since they emit less total volume of exhaust. These standards represent average reductions of about 50 percent for carbon monoxide and 70 percent for hydrocarbons when compared with uncontrolled vehicles.

TABLE 1.—1968 MOTOR VEHICLE EXHAUST EMISSION STANDARDS

| Engine displacement (cubic inches) | Carbon monoxide (percent) | Hydrocarbons (parts per million) |
|------------------------------------|---------------------------|----------------------------------|
| Below 50 | (¹) | (¹) |
| 50 to 100 | 2.3 | 410 |
| 101 to 140 | 2.0 | 350 |
| Above 140 | 1.5 | 275 |

¹ Unrestricted.

The manufacturers of motor vehicles are not required to use any particular techniques or devices for complying with the standards; they may use any approach capable of reducing emissions to the prescribed levels. They are required, however, to test representative models before offering them for sale and to make the test results available for

² In an uncontrolled vehicle, about 80 percent of the hydrocarbon emissions come from the crankcase and about 10 percent are evaporative losses from the fuel tank and carburetor.

inspection by officials of the National Center. They are also required to furnish representative motor vehicles for testing and certification by the Center.

The Air Quality Act of 1967 (sec. 208) recognizes that "compelling and extraordinary conditions" might warrant State vehicular emission standards that are more stringent than the Federal standards. Therefore, the act provides that Federal regulations will be waived in any State which has adopted vehicle emission standards (other than crankcase emission standards) prior to March 30, 1966, unless the Secretary finds that the State does not require stricter standards or that the State standards and accompanying enforcement procedures are not consistent with the act. California is the only State that has applied for a waiver, and on January 15, 1968, the Secretary opened a public hearing in San Francisco to provide an opportunity for all views to be expressed. Presentations were made by members of the State of California, the automotive industry, and other interested parties. At the request of the State, the hearing record is being kept open until May 16, 1968, to allow the submittal of additional information.

Although the Federal standards calling for reduced pollutant emissions beginning with 1968 vehicles constitute a substantial step forward in controlling air pollution, their impact on pollution levels will be gradual. This is because the new, controlled vehicles sold each year are only a portion of the total vehicles in use, which presently number about 90 million, and it will take time for the new vehicles to comprise a substantial proportion of the total population of vehicles. The increasing dependence upon the motor vehicle as a way of life and the anticipated increases in traffic, combined with the delay in the replacement of old vehicles with new ones, will tend to offset somewhat the gains from such standards. Consequently, the standards will be revised as the technology permits to make further progress toward the goal of improved air quality.

In January 1968 the Secretary proposed revised standards for application to 1970 model-year vehicles. The newer standards would limit emissions on a total mass basis (grams per vehicle-mile), whereas the standards for 1968 vehicles express emissions as a fraction of total exhaust. Table 2 shows the proposed 1970 exhaust standards that would apply to new automobiles and light trucks, along with the 1968 standards expressed in the same units for comparison. Specifying pollutant emissions on a mass basis would provide for a more equitable distribution of the degree of control required on individual vehicles, and it would eliminate the need for separate categories for smaller cars. The proposed 1970 standards also would require 90 percent control of hydrocarbons evaporating from gas tanks and carburetors and would cover exhaust emissions from heavy duty trucks and buses, requiring 35 percent control of hydrocarbons and 37 percent control of carbon monoxide from such vehicles. In addition, the proposed standards place limitations on visible smoke emissions from diesel-powered trucks and buses.

TABLE 2.—PROPOSED 1970 MOTOR VEHICLE EXHAUST EMISSION STANDARDS

[Grams per vehicle mile]

| Pollutant | Typical uncontrolled vehicle | 1968 standard ¹ | Proposed 1970 standard |
|----------------------|------------------------------|----------------------------|------------------------|
| Carbon monoxide..... | 71.0 | 33.0 | 23.0 |
| Hydrocarbons..... | 9.7 | 3.2 | 2.2 |

¹ Approximate equivalent of the 1968 standard when expressed in terms of mass emissions per mile.

It should be pointed out that if more stringent national control is not imposed after 1970, vehicular pollution levels will reach a minimum during the late 1970's and then begin to rise in response to the ever-expanding numbers of motor vehicles. Consequently, the current and proposed standards do more to keep the problem from getting worse than to solve it. More effective standards can be established only as the technology is developed to adequately cope with automotive emissions. Consequently, the Center has underway an active research and development program to seek out new control approaches and to help industry continue its aggressive role in developing improved control technology.

Some recent estimates suggest that in future years substantial reductions in emissions from internal combustion engines can be achieved. (2) It is probable, however, that ultimately a limit will be reached beyond which further reductions are technically or economically out of the question. If so, the current use of control systems to meet specified standards is only an intermediate step, and it may be necessary to look to some innovative vehicle to replace today's gasoline-powered automobile. Such approaches as the turbine, the steam-powered vehicle, the electric car, and other combinations of various energy and power sources may hold much promise but are in need of further study. Major changes in the planning of cities, including greater use of mass transit and other substitutes for the automobile as a mode of transportation, may warrant consideration as the need increases to find a truly long-run solution to the problem.

CONTROL TECHNOLOGY RESEARCH AND DEVELOPMENT

The responsibility for developing control systems and methods for meeting the Federal emission standards lies with the vehicle manufacturers and fuel suppliers. The private sector has the means, the capability, and the practical knowledge to develop usable control devices and systems, and this effort is closely tied to a number of manufacturing, marketing, and maintenance factors.

The Federal program in automotive research and development has three primary objectives: (1) to stimulate optimum activity by the private sector in developing control technology, (2) to fill the research gap areas that are not receiving attention elsewhere, and (3) to develop the technical base for establishing future Federal emission standards. To achieve these objectives, the National Center plans to conduct or is conducting a variety of research and development activities:

Conceptual studies to determine the feasibility of new and more advanced control approaches.

Developmental studies to produce practical prototype devices.
Fundamental research to obtain the information needed to develop and evaluate new approaches.

Laboratory tests to determine the effectiveness of various control systems.

Studies to provide uniform procedures for evaluating the effectiveness of control systems.

Development of improved measuring and testing techniques.

Development of test instruments for simple, inexpensive measurement of exhaust emissions.

Detailed chemical analyses of the composition of emissions from various categories of vehicles (such as diesel-powered trucks, unconventional vehicles).

Studies of the feasibility of controlling pollutants not already covered by Federal standards.

Studies of the feasibility of new propulsion systems with low pollution potential.

Projects to stimulate new ideas and to generate new concepts for control approaches.

Studies to determine the maximum hydrocarbon and carbon monoxide control that can be economically attained with present internal combustion engines.

Individual projects, of course, may overlap into more than one of these study areas and may satisfy several objectives. Work supported by the Center at the Petroleum Research Center of the Bureau of Mines, for example, is studying the manner in which selected design parameters, engine operating variables, emission control techniques, and fuel factors influence the quantity and composition of automotive exhaust emissions. Such work, which is being complemented by efforts within the Center's own laboratories, provides basic knowledge that is useful in developing new control approaches, establishing the feasibility of controlling various pollutants, and determining the maximum degree to which certain pollutants can be controlled. Thus it provides basic information to help industry develop and improve control systems and it provides knowledge that is of use in establishing future standards.

The Federal Government's research and development program on automotive air pollution includes (1) projects conducted within the National Center's laboratories, (2) Federal contracts with private engineering and consulting organizations, and (3) interagency efforts within the Federal Government. Most of the projects carried out by other Federal agencies are funded by the Center; some are not, however, such as research by the Department of Housing and Urban Development on vehicles having low pollution potential. By far the greatest share of the National Center's work is done on a contract basis.

Cooperative research programs jointly funded by the Federal Government and private industry groups are another way in which control technology is being developed. The National Center has joined with the Automobile Manufacturers Association and the American Petroleum Institute in a 3-year, \$10 million research program aimed at gaining more knowledge on the control of automotive air pollution. The program will be directed by the Coordinating Research Council, an independent, nonprofit organization devoted to improving engines

and petroleum products. The Center will support those research projects that meet its specific needs, and generally will contribute one-third of their cost. The 30 projects currently planned are in five categories: (1) interactions between petroleum products and vehicle control systems; (2) instrumentation and test procedures for exhaust emission measurement; (3) atmospheric chemistry studies, which include the measurement of photochemical reactivity of hydrocarbons and nitric oxide, the evaluation of plant damage caused by pollutants, the development of a mathematical model of the diffusion of pollutants in urban areas, and the study of the ultimate fate of carbon monoxide in the atmosphere; (4) surveillance, inspection, and maintenance of automotive equipment to insure the most effective and economical control of exhaust emissions; and (5) studies on the health effects of selected automotive air pollutants.

The research activities underway in the private sector are of considerable magnitude. The automobile and petroleum industries are spending large sums to privately develop improved control techniques. In addition to these individual corporate research programs, six petroleum firms and one automobile manufacturer have joined forces in establishing the interindustry emissions control program. The goal of this \$7 million program is to achieve a low-pollution, gasoline-powered vehicle which can be sold at a reasonable price. Within 2½ years, the group seeks to achieve the following exhaust emission control levels in the laboratory: (1) carbon monoxide emissions at 0.3 percent; (2) hydrocarbon emissions at 65 parts per million (p.p.m.), and (3) emissions of nitrogen oxides at 175 parts per million. These values represent sizable reductions over the Federal standards that currently apply to 1968 model-year vehicles (see table 1). Another research program is underway between several firms to achieve similar goals.

The following discussion provides an outline of some of the research areas that are receiving attention, and it describes briefly the control systems and approaches under study, indicating the problems involved and the efforts being made to solve them. It is divided into three major sections: gasoline engines, diesel engines, and unconventional propulsion systems.

Gasoline engines

Although diesel-powered trucks and buses are noted for their unpleasant smoke and odor, gasoline-powered vehicles are far more numerous than any other kind of vehicle and emit more types and quantities of pollutants. Therefore, they deserve the highest research and development priority.

i. Control of exhaust emissions

In a gasoline-powered vehicle, virtually all of the carbon monoxide, nitrogen oxides, and about 60 percent of the hydrocarbons come from the engine exhaust; most of the remaining hydrocarbons come from the crankcase and about 10 percent evaporate from the fuel tank and the carburetor.

Carbon monoxide and hydrocarbons.—The motor vehicle manufacturers have attempted to meet the exhaust emission standards for carbon monoxide and hydrocarbons by using two basically different control approaches: (1) air is injected into the exhaust manifold near the exhaust valves at the point of peak exhaust temperatures, thus

producing further combustion of the pollutants remaining in the gas mixture, and (2) various modifications are carried out on the engine ignition system and carburetor. These methods have proved reasonably successful and are constantly undergoing further development and improvement.

To stimulate the development of advanced control methods, the National Center is funding various projects to provide a more comprehensive understanding of engine combustion. One such project is the evaluation of induction system variables such as fuel atomization, fuel vaporization, air-fuel mixing, and carburetor temperature.

Nitrogen oxides.—Federal standards do not yet require the control of nitrogen oxides emissions. However, there is increasing interest in approaches that will reduce nitrogen oxides emissions without sacrificing the control of carbon monoxide and hydrocarbons.

One approach under study is the exhaust gas recirculating system, which requires a controlled amount of the exhaust gas stream to recirculate back through the engine intake system. This dilutes the combustible mixture admitted to the engine cylinders and reduces the peak temperature, resulting in reduced formation of nitrogen oxides. This is usually accompanied, however, by some reduction in engine performance. The National Center is studying this approach in its own laboratories and by contract with ESSO Research & Engineering Corp. The work in the Center's laboratories has produced an exhaust gas recirculation system which reduces nitrogen oxides emissions by 75 percent, although there is some impairment in acceleration, deceleration, and other drivability characteristics. The work at ESSO has established the relationships between nitrogen oxide emissions, odor, air-fuel ratios, and spark advance—all of which are influenced by the rate at which the gas is recycled for various engine speeds and engine loads. Also receiving careful attention is the effect of nitrogen oxides control on overall performance and economy. During the later phases of this contract investigation, an automatic recirculation system will be installed on different passenger cars for road evaluation.

The information generated by this research, along with parallel developments in private industrial laboratories, will help determine the technical and economic feasibility of meeting any needed Federal standards for the control of nitrogen oxides emissions.

ii. Control of evaporative losses

Systems for the control of hydrocarbons that evaporate from the fuel tank and carburetor have been developed independently by ESSO Research & Engineering Corp. and by the Atlantic Richfield Corp. The ESSO system employs a small charcoal canister which is attached to the fuel system vents and which selectively absorbs hydrocarbon emissions during the critical portions of the driving cycle. During other periods, a control allows these vapors to be readmitted into the engine. The system developed by Atlantic Richfield represents a similar approach; instead of a charcoal filter, however, the engine crankcase is used as a storage reservoir for the fuel vapors. Other approaches under study by the motor vehicle industry include pressurized fuel tanks, as well as variations of the charcoal canister and crankcase storage systems.

Progress in this field of technology has enabled the Secretary to propose Federal standards limiting evaporative losses on 1970 model-year vehicles.

iii. Development of measuring techniques

To achieve an effective reduction in vehicle emissions, it is necessary to have meaningful ways to measure these emissions under realistic operating conditions. The promulgation of Federal vehicular emission standards makes necessary a continuing review and updating of compliance and inspection test procedures. Thus, the Center seeks to improve compliance and inspection procedures to better assess vehicle emission levels, vehicle operation, and the control systems themselves. Currently, there are three major areas in which the engineering activities are concentrated: (1) the development of simple dynamometer test cycles which better simulate urban driving conditions, (2) the development of inexpensive but effective instrumentation for State inspection stations, and (3) the simplification and improvement of certification procedures.

In its research to improve the measuring approaches that are used during testing, the Center's primary emphasis is on (1) increasing the speed of response of measuring instruments, particularly those using chromatographic methods (for example, for hydrocarbons), to permit immediate recognition of the effects of engine parameter variations; (2) developing chromatographic methods that will have the ability to classify hydrocarbon emissions in terms of their photochemical reactivity; (3) developing measuring techniques for hydrocarbon oxygenates; and (4) evaluating substitutes for wet-chemical methods for measuring nitrogen oxides.

An important recent advance has been the development of a simplified sampling system which gives an accurate indication of the total mass of pollutant emissions from all sizes and types of vehicles and engines. The development of this system paved the way for the currently proposed 1970 Federal standards, which express emissions on a total mass basis.

Diesel engines

i. Control of exhaust emissions

Diesel-powered vehicles account for only a small share of the total pollution contributed for motor vehicles in urban areas. However, the extensive complaints by private citizens about diesel vehicles result from the characteristic smoke and odor. Consequently, much of the research in Federal and private laboratories is directed toward better control of smoke and odor and the concomitant need to measure these pollutants. Under the sponsorship of the National Center and the Coordinating Research Council, Scott Research Laboratories in 1961 began to examine the relationship between diesel exhaust odors and the chemical composition of the emissions. This was followed in 1962 by Center-sponsored studies at the U.S. Bureau of Mines to define more broadly the nature of diesel emissions and by contract work at Southwest Research Institute in 1966 to evaluate existing methods for the control of diesel smoke and odor.

Smoke control.—There are several well-recognized approaches for controlling the smoke emissions from diesel engines; these include

(1) careful maintenance of engines, (2) operation of engines below rated power capabilities, and (3) the use of certain fuel additives. To permit careful study of these methods and other pertinent factors, the National Center developed operating cycles using chassis dynamometers which simulate the normal driving conditions of diesel-powered trucks and buses in highway service. The information generated from the use of this technique helped provide the basis for the proposed 1970 Federal standard limiting smoke emissions from diesel-powered vehicles.

Odor control.—Research on the control of diesel exhaust odor is at a much earlier stage of development. Recently, research sponsored by the National Center has reaffirmed the ability of certain catalytic reactors, when substituted for the muffler, to reduce both exhaust odor and some gaseous pollutants. Fuel additives designed to suppress or eliminate odors have produced somewhat less encouraging results. By contract, the National Center will continue to examine the relationship between various pollution levels and human responses to odor, a necessary step if Federal odor standards are to be established. The Center is also studying the technical and economic factors associated with odor control approaches.

Carbon monoxide and hydrocarbons.—The emission of gaseous pollutants from diesel engines is much less than that emitted from gasoline engines. For example, carbon monoxide emissions from diesel engines of both the two-cycle and four-cycle types are roughly one-tenth of those emitted from gasoline engines of equivalent power. Studies supported by the Center at the Bureau of Mines suggest that hydrocarbon emissions from four-cycle diesel engines are much lower than that from comparable gasoline engines, although emissions from two-cycle engines may approach those of gasoline engines. When one adds to these findings the fact that diesel-powered vehicles are much less numerous than other vehicles, accounting for only about 3 to 5 percent of the total automotive fuel consumed nationwide, it is clear that they account for an extremely small share of the total gaseous pollutants in most cities. Therefore, Federal standards for carbon monoxide and hydrocarbons emitted from diesel engines are of secondary importance at this time.

ii. Development of measuring techniques

As in the case of gasoline-powered vehicles, improved measuring techniques for diesels are essential for establishing meaningful Federal standards.

Odor measurement.—Since odors are extremely difficult to measure by normal quantitative procedures, research of the National Center is attempting to establish the relationship between human perception of diesel exhaust odor and its chemical composition. At present, the human nose is the only detector which is sufficiently discriminating to be used as a basis for measurement. To make this evaluation as quantitative as possible, a Center-supported project has developed an odorating technique using a trained judging panel. The panel compares odors generated by test engines with 28 chemical standards of known composition. The odors are rated both in terms of intensity and chosen qualities. All Center contracts on diesel emission control use the same basic sensory system to evaluate odor control effectiveness.

Smoke measurement.—To make the necessary measurement of smoke emissions from diesel engines, the National Center has developed a suitable smoke meter in its own laboratories. This meter passes light from a controlled source through the smoke plume emitted by the diesel engine, and the degree of light obscuration is measured directly. This meter passes light from a controlled source through the smoke plume emitted by the diesel engine, and the degree of light obscuration is measured directly. This provides an exact and quantitative way of measuring smoke emissions that are visible to the eye and constitute a public nuisance. The meter was a prerequisite to the promulgation of the 1970 Federal standard limiting diesel smoke emissions.

Hydrocarbons measurement.—Hydrocarbon emissions from diesels are measured by various techniques, but these are usually complicated by the tendency of hydrocarbons of high molecular weight to condense in the sampling system before they can reach the analyzer. The National Center is now studying various techniques involving high system temperatures and gaseous dilution to assure that a representative sample of the exhaust gets to the analyzer. Investigators at the Bureau of Mines, working under the Center's sponsorship, have developed techniques to analyze the nature of gaseous emissions from diesels by the use of gas-liquid chromatography.

Unconventional propulsion systems

Although it is possible to obtain further reductions in pollutant emissions from internal combustion engines, the ever-increasing population of motor vehicles dictates that work must also be directed toward alternative low-pollution propulsion systems. The National Center has supported several studies to examine the state of the art and future potential for low-emission unconventional vehicles. Under contracts with the Center, Battelle Memorial Institute has been looking at various chemical, thermal, and mechanical propulsion systems, and Arthur D. Little has been conducting an extensive evaluation of electrically powered vehicles. The purpose of this work, which is nearing completion, is to define gap areas of knowledge, research, and technical development for power systems that have promise. These efforts will provide guidelines for the optimum allocation of Federal and private research and development resources in this new field.

Gas turbine.—In one study, the National Center examined the emission characteristics of a gas turbine made available by the Chrysler Corp. The analysis indicated that emissions of carbon monoxide and hydrocarbons were much lower than from conventional, uncontrolled gasoline engines. However, high manufacturing costs and poor fuel economy represent problems that must be overcome before gas turbines can be used effectively in vehicles other than heavy-duty trucks and buses.

Steam engine.—Recently, steam engines using the latest technology have been built and tested and have shown hydrocarbon and carbon monoxide levels even lower than those measured with gas turbines. These modern cars appear to have overcome most of the drawbacks of the early Stanley Steamer type of vehicle, which was plagued by slow warmup time, high water consumption, and explosion hazards. However, there are still significant cost and engineering problems to be solved.

Of all the systems that the Center has studied, preliminary estimates indicates that systems using continuous-flow combustion, such as steam engines and gas turbines, may hold the greatest promise for achieving the low pollutant emission levels that will be necessary in the period from mid-1970 to the mid-1980's.

Electric vehicle.—In the late 1980's and beyond, the electric vehicle may be the most promising candidate. Even now, electric propulsion is practical for limited applications and, with further advancements in the technology of batteries, controls, and small motors, the family car could one day be battery powered. During this future period, the fuel cell, with its obvious attractiveness in terms of ease of reenergizing and inherent high efficiency, also may be successfully adapted for vehicle propulsion.

COMPLIANCE AND INSPECTION

To actually achieve improved air quality, it is not enough to establish standards and conduct research on control techniques. There must be a workable plan to insure implementation of motor vehicle control systems which meet the designated emission standards. The National Center conducts three major activities in this area: (1) It tests prototypes of new motor vehicles and certifies that they are in compliance with the standards, (2) it surveys groups of vehicles in normal service to determine the effectiveness of control systems under actual operating conditions, and (3) it assists in the development of methods and techniques for State inspection programs.

i. Certification

To certify new motor vehicles which meet the Federal emission standards, the National Center has established an emission compliance laboratory near Detroit, Mich. Here tests are conducted on new vehicles submitted by manufacturers prior to production. These tests, which include exhaust gas sampling and analysis, are conducted in accord with procedures established by the National Center to enable the Federal emission standards to be effectively implemented. The laboratory, which became operative on November 1, 1966, confirms test measurements made by the manufacturers and collects the necessary data to establish the eligibility of the vehicle manufacturers' products for certification in advance of production. The laboratory is equipped to perform 16 certification tests per day.

The program for certification of 1968 model passenger cars and light commercial vehicles required the review of applications from 44 companies located in seven countries. The laboratory performed 730 emission tests to establish eligibility for certification. Test scheduling was somewhat irregular to allow time for the vehicles to acquire mileage and to enable the manufacturers to conduct their own emission test programs. Scheduling was a particular problem during the spring and early summer of 1967, when an extremely large number of prototype models were submitted by domestic manufacturers for certification. The certification of prototypes of foreign vehicles, on the other hand, was carried out at a relatively constant level, and some certification testing for 1968 sales was done as late as this spring. On the whole, the laboratory facilities proved generally adequate for the certification of 1968 model vehicles.

At present, certification activities are involved with changes in current models, the introduction of any new midyear models, and new applications from foreign manufacturers. In addition, testing is increasing for the certification of 1969 models that have different engines or control systems from those currently in use.

i. Surveillance

The certification testing of prototype vehicles under conditions where they must rapidly accumulate mileage may or may not accurately reflect the emission levels of vehicles in normal use. Disparities may develop when the vehicles go into mass production; also, variations in the driving habits of motorists and differences in vehicle maintenance may have a major effect on emissions. The Center is attempting to determine the relationships between the test results of prototype vehicles and the emission characteristics of vehicles under normal use. Studies include the continued testing of the prototype vehicles which were part of the 1968 certification fleets. Unlike the original testing, which used accelerated mileage schedules, these studies make use of a typical driving schedule.

The center is also studying the changes, with age and use, of emission characteristics of motor vehicles operated in actual service. Since 1965, the center has supported a California-based surveillance program of vehicles equipped with emission control systems and owned and operated by the public. Because the 1966 California standards are equivalent to the 1968 Federal standards, this study has provided valuable information on the performance of emission control systems. The control systems used on the 1967 model automobiles showed a marked improvement over the 1966 models in controlling exhaust emissions over long-term use. The control systems of both model years, however, tended to decrease in effectiveness as mileage accumulated. Since the control technology employed on the 1967 California vehicles does not differ substantially from the systems currently in use, data on these vehicles provide some indication of the levels of emission control that can be expected for 1968 model vehicles under the present standards.

A second study by the Center examined 300 passenger cars in five cities. Each of the cities was selected to represent different climatic and driving conditions. The pollutant emission characteristics of vehicles with and without control systems were compared as the vehicles accumulated mileage. The results indicated that the controlled vehicles emitted roughly half as much hydrocarbons and carbon monoxide as the uncontrolled vehicles. Emission levels for both types increased with increasing mileage.

Another study, initiated in March 1968, is examining the emissions of vehicles from rental agencies in the Detroit and Los Angeles areas. The vehicles under study were selected from the rental vehicle fleets so as to be representative of the projected 1968 sales of the major domestic manufacturers. To allow accurate comparisons with the manufacturers' test results, careful adjustments of idle speed, idle mixture, and basic ignition timing will be made during each emission test.

iii. Inspection programs

One possible way to achieve and maintain effective emission control is through periodic inspections. Under the Air Quality Act sec. 209, Federal grants may be made to appropriate State air pollution control

agencies in an amount up to two-thirds of the cost of developing meaningful uniform inspection and testing programs for motor vehicle emissions and emission control devices. The National Center has underway several projects to aid in the development of inspection procedures and test instrumentation for State programs.

Thus far, two schemes have been proposed for periodic emission inspections undertaken at the State level. One of these, developed under a Federal grant to the State of New Jersey, involves the operation and testing of vehicles according to an abbreviated test cycle. The second, offered for consideration by an industrial firm, comprises three different modes capable of showing consistent results upon repetition. Within the limitations imposed by time and facilities, the National Center is examining these two techniques with the use of prototype emission-controlled vehicles. The tests attempt to determine if the cycles accurately indicate control system malfunction and if they correlate with Federal test procedure. The Center also is evaluating a number of experimental analytical instruments which have been submitted by private sources. In addition, several systems studies are underway to analyze the cost effectiveness of a variety of possible inspection and maintenance schemes.

At this early date, the evaluations being conducted by the Center have not progressed far enough to recommend the adoption of any one test instrument or inspection procedure.

Excerpt from Senate Document 91-11, dated March 4, 1969, entitled "Progress in the Prevention and Control of Air Pollution"-- Second Report of the Secretary of Health, Education, and Welfare to the Congress of the United States in compliance with Public Law 90-148 The Air Quality Act of 1967.

VII. AUTOMOTIVE AIR POLLUTION, EMISSION STANDARDS AND RELATED ACTIVITIES

A. AUTOMOTIVE AIR POLLUTION CONTROL

This section covers progress in three areas: The setting of national emission standards, the research and development of improved emission controls, and the assurance of compliance with Federal standards.

Automotive sources continue to emit more pollutants than all stationary sources combined. The automobile is responsible for over 90 percent of all carbon monoxide, 60 percent of the hydrocarbons, 50 percent of the oxides of nitrogen, and virtually all of the lead emitted into the Nation's air.

The Federal program has sought to cope with automotive air pollution by establishing nationwide standards that limit the emissions of carbon monoxide and hydrocarbons, based on the technical and economic feasibility of their control. It has sought to advance the state-of-the-art of automotive control technology through a research and development program aimed both at complementing and stimulating industry's efforts. Finally, it has initiated an active program to examine the effectiveness of emission control devices as the vehicles acquire mileage.

1. NATIONAL EMISSION STANDARDS

The Federal automotive emission standards, adopted in March 1966, apply to new gasoline-powered passenger cars and light trucks beginning with the 1968 model year. These standards were set on the basis of the maximum degree of control possible consistent with considerations of technological feasibility and economic costs, as well as on evaluation of the need for control from the standpoint of protection of public health and welfare.

Although the national emission standards for 1968 and 1969 model year vehicles were expressed in terms of concentrations, i.e., p.p.m. of hydrocarbons and percent of carbon monoxide, an improved and more informative expression of the standard is in grams per vehicle mile. The 1968 and 1969 national standards are equivalent to 33 grams per vehicle mile of carbon monoxide and 3.2 grams of hydrocarbons for the average vehicle.

In June of 1968 the Secretary issued revised standards applicable to 1970 and 1971 model year vehicles. These standards represent the second step in the battle with the ubiquitous automobile for clean air. Although the 1968 and 1969 models are lower emitters, pollution is not expected to be reduced because the total vehicle population continues to grow.

The new standards are expressed in terms of grams per vehicle mile. Table 2 shows the effect of both standards on typical vehicles. It shows the reduction in allowable emissions permitted from new gasoline-powered motor vehicles. Not shown in the table, but also of significance, is that the 1970 regulations for the first time set performance standards for smoke emissions from diesel-powered trucks and buses.

The expected achievements of control measures now required can be seen in table 3, also the estimated effectiveness of these standards on the total national pollution burden from motor vehicles. The estimated results of controls called for by both the initial and revised national emission standards are shown.

It should be noted that due to the increasing use of motor vehicles there is a timelag before any noticeable change occurs in total national automotive emissions. Thus in table 3, the 1968 and 1970 standards do not reduce total emissions from all motor vehicles to below 1966 levels until 1971.

TABLE 2.—PRESENT AND FUTURE AUTOMOTIVE POLLUTANT EMISSIONS

| | Pre-1968 uncontrolled vehicles | | | 1968 National standards | | | 1970 National standards | | | 1971 National standards | | |
|-------------------------------------|---|--|---|--|---|--|---|--|-------------------|---|--|-------------------|
| | Typical emissions, 1963 car, grams per vehicle-mile | Estimated pollution, pounds per car per year | Typical emissions, 1968 car, grams per vehicle-mile | Estimated pollution, pounds per car per year | Typical emissions, 1970 car, grams per vehicle-mile | Estimated pollution, pounds per car per year | Typical emissions, 1971 car, grams per vehicle-mile | Estimated pollution, pounds per car per year | Percent reduction | Typical emissions, 1971 car, grams per vehicle-mile | Estimated pollution, pounds per car per year | Percent reduction |
| Exhaust: | | | | | | | | | | | | |
| Hydrocarbons..... | 9.7 | 215 | 3.2 | 70 | 2.2 | 50 | 2.2 | 50 | 78 | 2.2 | 50 | 78 |
| Carbon monoxide..... | 71.0 | 1,575 | 33.0 | 725 | 23.0 | 500 | 23.0 | 500 | 68 | 23.0 | 500 | 68 |
| Crankcase blowby: Hydrocarbons..... | 4.8 | 105 | 0 | (1) | 0 | (1) | 0 | 0 | 100 | 0 | 0 | 100 |
| Evaporation: Hydrocarbons..... | 3.9 | 85 | 3.9 | 85 | 3.9 | 85 | 3.9 | 85 | 0 | 3.9 | 85 | 0 |
| Total: | | | | | | | | | | | | |
| Hydrocarbons..... | 18.4 | 405 | 7.1 | 155 | 6.1 | 135 | 6.1 | 135 | 67 | 6.1 | 135 | 67 |
| Carbon monoxide..... | 71.0 | 1,575 | 33.0 | 725 | 23.0 | 500 | 23.0 | 500 | 53 | 23.0 | 500 | 68 |

facturers will provide evaporation control nationwide since it is required in California under HEW waiver of sec. 208(b) of the Clean Air Act.

¹ None.

² Evaporation control is optional under Federal regulations in 1970 model year; but some manu-

TABLE 3.—NATIONAL CONTROL OF MOTOR VEHICLE EMISSIONS

| | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|------|------|------|------|------|------|
| Total emissions prevented by controls (millions of tons) (cumulative reductions): | | | | | | |
| Hydrocarbons..... | 1.3 | 1.8 | 2.8 | 3.9 | 15.2 | 16.9 |
| Carbon monoxide..... | .4 | .9 | 5.8 | 11.2 | 18.1 | 25.0 |
| Total national auto emissions (millions of tons per year): | | | | | | |
| Hydrocarbons..... | 10.3 | 10.5 | 10.7 | 10.7 | 10.1 | 19.6 |
| Carbon monoxide..... | 61.9 | 65.3 | 66.5 | 67.2 | 66.4 | 58.8 |

¹ The effect of California's 1970 evaporative control standard is not included.

In the years after 1971 the 1968 and 1970 standards will achieve a sharp downturn in national emissions. This downturn, however, will unfortunately be short lived. The increases in vehicle population and vehicle usage, will again begin a rise in pollution levels by the mid-seventies.

Consequently the current standards will only improve the situation in the short run. To solve the problem will require improved emission control systems and more restrictive standards. To this end, NAPCA is expanding its research and development efforts.

2. AUTOMOTIVE EMISSION CONTROL—RESEARCH AND DEVELOPMENT

Although the primary responsibility for developing emission control systems lies with the vehicle manufacturers and fuel producers, the purpose of the Federal program is to stimulate, complement, and assist in furthering the development of improved control systems. NAPCA has undertaken a variety of research and development projects to carry out its responsibilities. Projects are conducted (1) within NAPCA laboratories, (2) in other Government agencies at the Federal and State levels, (3) under contract with corporations and universities, and (4) by cooperative research jointly funded by the Federal Government and private industry groups.

(a) *Conventional engines*

Plans have been set to organize a study on the control of particulate emissions from motor vehicle engines. This research and development will be directed toward gap areas in the control technology for particulate emissions, with the goals of developing a simple, long-lived, exhaust system device for eliminating a substantial portion of the lead particulates which otherwise are emitted to the atmosphere. Consideration will also be given in this study to the control of diesel exhaust smoke.

The first national symposium on heterogeneous catalysis for control of air pollution, cosponsored by NAPCA and the Franklin Institute, was held during the reporting period. A synopsis of the proceedings of this symposium will be published early in 1969. The symposium served to bring forth considerable information concerning research activities in this field with application to motor vehicle emissions control. This information will serve to guide NAPCA in planning research which will complement the efforts presently going on in industry and continue to stimulate such efforts.

In a continuing study on human responses to diesel exhaust odor, Southwest Research Institute is designing and constructing mobile

odor presentation facilities suitable for use by selected human subjects, utilizing a high production diesel engine. A suitable questionnaire will be designed to elicit responses denoting the reactions, adverse or otherwise, of these subjects to odors. This information will assist in establishing a basis for Federal odor standards. Additional NAPCA sponsored research involving odor and other aspects of diesel emissions is in progress at the Bureau of Mines Petroleum Research Center, and Arthur D. Little Laboratories. The latter project is cosponsored with private industry through the Coordinating Research Council. In addition, increasing evidence of research by private industry on odorant identification has appeared through press releases and technical papers. Through all these means, it is believed that identification of certain classes of odorous materials in diesel exhaust will be made during the coming year. The information generated by these parallel studies should prove applicable to characterization of odors generated by turbine engines and other continuous flow combustion systems as well.

A project is now in progress with Battelle Memorial Institute to conduct analytical studies of fuel atomization, vaporization and mixing, and to evaluate the applicability of different fuel atomization methods to motor vehicle powerplants. The results of this work will be applied to decisions concerning future research aimed at emissions reductions by means of fuel induction system changes.

Plans have also been formulated for initiation of research directed toward materials of construction having suitable high temperature properties for exhaust manifold reactors designed to thermally oxidize carbon monoxide and hydrocarbons. This work will be done through the National Aeronautics and Space Administration, Lewis Flight Propulsion Center.

As was noted in the first report the Automobile Manufacturers Association and the American Petroleum Institute are funding through the Coordinating Research Council a 3-year research program to generate knowledge on factors influencing automotive air pollution. Many of these projects are cosponsored by NAPCA. Some of these which relate to emissions control research are: (1) a study on the influence of gasoline volatility on exhaust and evaporative emissions in which NAPCA is cooperating in funding the part which considers the influence of gasoline volatility on vehicle driveability; (2) a study on the relationship between sensory measurements of diesel exhaust odor and exhaust composition, referred to earlier; and (3) a study on the kinetics of oxidation and quenching of combustibles in gasoline engines, the objective of which is to improve knowledge of the burning processes which lead to pollutant origins and disappearance under conditions typical of gasoline engine combustion and exhaust systems.

(b) Alternate low-emission power plants

A study by Arthur D. Little has been completed in which various types of electric propulsion systems were evaluated. It was determined that a propulsion system with sufficient power to weight ratio and energy storage capacity for family car use could be developed within 10 years under a properly organized research program.

A project was completed under contract to gather information on emissions from aircraft. The work served as the basis for the report to

Congress required by section 211(b) of the Air Quality Act of 1967. The report is to be published in early 1969.

In addition, participation in aircraft industry committee groups sponsored both by the Society of Automotive Engineers and the Coordinating Research Council has produced the impression that intensive efforts are in progress to eliminate visible smoke emitted by all new powerplants (and certain existing powerplants as well) by combustor design. Hydrocarbons and carbon monoxide emissions from aircraft gas turbines are a problem at idle and taxi power settings, which may constitute local problems in certain terminal areas. Control of these emissions by combustion system design is also believed feasible.

3. CERTIFICATION

NAPCA maintains an emission compliance laboratory near Detroit, Mich., to certify new motor vehicles which meet the Federal emission standards. Here tests are conducted on prototype vehicles submitted by manufacturers prior to production. These tests which include exhaust gas sampling and analysis, are conducted in accordance with procedures established by NAPCA to determine compliance with the Federal emission standards.

The program for certification of 1968 and 1969 model passenger cars and light commercial vehicles required the review of applications from approximately 50 companies located in seven countries. The laboratory performed 730 and 1,083 emission tests for 1968 and 1969 vehicles, respectively, to establish eligibility for certification. Test scheduling was somewhat irregular to allow time for the vehicles to acquire mileage and to enable the manufacturers to conduct their own emission test programs. Scheduling was a particular problem during the spring and early summer of 1967, and again in 1968, when an extremely large number of prototype models were submitted by domestic manufacturers for certification. The certification of prototypes of foreign vehicles, on the other hand, was carried out at a relatively constant level. Some certification testing for 1969 sales was done as late as the summer of 1968. On the whole, the laboratory facilities proved generally adequate for the certification of 1969 model vehicles.

At present, certification activities are involved with changes in current models, the introduction of new midyear models, and new applications from manufacturers. Test requirements are greater, however, for the certification of 1970 models that have different engines and control systems from those currently in use. Enlarged facilities will be necessary to carry out the more complicated tests required by the 1970 regulations.

4. SURVEILLANCE

NAPCA is attempting to determine the relationships between the test results of prototype vehicles and the emission characteristics of vehicles under normal use. Studies include testing of representative mass production vehicles. NAPCA is also studying the changes, with age and use, of emission characteristics of motor vehicles operated in actual service.

A national surveillance study has been initiated to determine whether vehicles actually comply with the Federal regulations. The study will provide statistically gathered information to evaluate the

air pollution emission control performance of certified production model vehicles. Motor vehicle exhaust missions may vary in different parts of the country due to such factors as climate, topography, or urban development, so it is necessary to determine whether previously certified vehicles are conforming to the Federal standards in all areas of the country. The United States has been divided into eight atmospheric areas. Ultimately, it is desired to obtain motor vehicle emission exhaust data from each area. The purpose of the first portion of the national surveillance study is to obtain exhaust emission data from that geographic region designated as "Great Plains Area." One-hundred and sixty statistically selected vehicles will be tested, three times each, for a total of 480 tests.

Surveillance studies are being conducted in the Los Angeles area by the west coast laboratory, and in the Detroit area by the laboratory at Willow Run Airport. In each area, vehicles are procured through commercial rental agencies. Approximately 1,900 vehicles from these sources are being tested. Tests are also being conducted on approximately 60 vehicles provided by car manufacturers for the Willow Run surveillance fleet.

5. INSPECTION PROGRAMS

One possible way to assure that vehicles in the hands of the public continue to effectively control emissions over the years is through periodic inspections. Under the Air Quality Act (sec. 209), Federal grants may be made to appropriate State air pollution control agencies in an amount up to two-thirds of the cost of developing meaningful uniform inspection and testing programs for motor vehicle emissions and emission control devices. No such grants have been funded to date. NAPCA has underway several projects to aid in the development of inspection procedures and test instrumentation for State programs.

Thus far, two schemes have been proposed for periodic emission inspections to be undertaken at the State level. One of these, developed under a Federal grant to the State of New Jersey, involves the operation and testing of vehicles according to an abbreviated test cycle. The second, offered for consideration by an industrial firm, comprises three different models capable of showing consistent results upon repetition. Within the limitations imposed by time, personnel, and facilities, NAPCA is examining these two techniques with the use of prototype emission-controlled vehicles. The tests attempt to determine if the cycles accurately indicate control system malfunction and if they correlate with Federal test procedures. A number of experimental analytical instruments which have been submitted by private sources are also being evaluated. In addition, several systems studies are underway to analyze the cost-effectiveness of a variety of possible inspection and maintenance schemes.

At this early date, the evaluations being conducted by the NAPCA have not progressed far enough to recommend to the States the adoption of any one test instrument or inspection procedure.

6. EMISSION CONTROL SYSTEM EVALUATION (GASOLINE ENGINES)

(a) Carbon monoxide and hydrocarbon control

Efforts are continuing to achieve greater control of these two pollutants which are presently regulated to levels approximately one-third of the average of uncontrolled vehicles. Fuel injection and high efficiency carburetion systems show promise for improved distribution and cleaner air-fuel mixtures resulting in further emission reduction. Some improvements are also obtainable from modifications of engine design features such as combustion chamber geometry, piston ring configuration, and valve timing. These emission control techniques are under study either in-house or by contract.

(b) Nitrogen oxide control

Studies of various control techniques are in progress. A study by Esso Research and Engineering Corp. has progressed from an engine dynamometer optimization phase to fully automated vehicle installations of exhaust gas recirculation systems. These systems, achieving 80 percent reduction of oxides of nitrogen, are compatible with commercially available hydrocarbon and carbon monoxide control. A followup study is being negotiated to evaluate durability of the system.

A parallel evaluation of another oxides of nitrogen control system design is being supported in California by a NAPCA grant. In that too, emphasis is on durability and compatibility with hydrocarbon and carbon monoxide control systems.

7. EMISSION TEST PROCEDURES

To achieve an effective reduction in vehicle emissions, it is necessary to have accurate methods of measuring emissions under realistic operating conditions. Improved measurement systems are actively being sought.

Currently, there are five major areas in which engineering activities are concentrated: (1) development of simple dynamometer test cycles which better simulate urban driving conditions for light duty vehicles (less than 6,000 lbs.) and three classes of heavy duty vehicles; (2) development of a simplified sampling system which gives an accurate measure of the total mass of pollutant emissions from the exhaust of all sizes and types of vehicles and engines; (3) development of a simplified fuel evaporative loss measuring system which measures all fuel losses from a nonoperating vehicle including those due to ambient temperature changes and those due to residual engine heat when turned off; (4) development of inexpensive but effective instrumentation and test cycles for State inspection stations; and (5) evaluation of measuring techniques for exhaust pollutants not currently regulated, such as oxides of nitrogen and hydrocarbon oxygenates.

The major accomplishments in the area to date by NAPCA personnel include: (1) development of a dynamometer cycle for light-duty vehicles which simulate road conditions with respect to emissions; (2) development of a variable dilution proportional sampling system which measures the mass of emissions; (3) development of a simplified ex-

haust sampling collection method which allows for greatly reduced instrumentation requirements for multiple dynamometer test facilities; and (4) demonstration that complex dynamometer cycles may be used with the simplified sampling system without appreciable increases in test cost or manpower requirements.

In addition, accomplishments by others, either under contract or by encouragement, include development of; (1) nondispersive infrared analyzers for the measurement of nitric oxide; (2) an ultraviolet instrument for the detection of nitrogen dioxide; (3) inexpensive instruments for the measurement of carbon monoxide and hydrocarbons; (4) inexpensive engine adjustment procedures; (5) a short dynamometer cycle for inspection procedures; (6) a key-mode dynamometer procedure which determines if the vehicle engine is operating as it was intended; and (7) dynamometer test cycle for heavy-duty trucks.

8. CALIFORNIA EMISSION CONTROL STANDARDS

The Clean Air Act as amended (sec. 208), recognizes that compelling and extraordinary conditions might warrant State vehicular emission standards that are more stringent than the Federal standards. Therefore, the act provides that Federal regulations will be waived in any State which had adopted vehicle emission standards (other than crankcase emission standards) prior to March 30, 1966, unless the Secretary finds that the State does not require stricter standards, or that the State standards and accompanying enforcement procedures are not consistent with the act. California is the only State thus far that has applied for a waiver. On January 15-17, 1968, and on June 5, 1968, the Secretary held public hearings in California to provide an opportunity for all views to be expressed. Presentations were made by members of the State of California, the automotive industry, and other interested parties.

On July 16, 1968, the Secretary found that: (1) California had, prior to March 30, 1966, adopted standards (other than crankcase emission standards) for the control of emissions from new motor vehicles and new motor vehicle engines; (2) California requires standards more stringent than applicable Federal standards to meet compelling and extraordinary conditions; (3) California State standards and related enforcement procedures are more stringent than the applicable Federal standards, and are required to meet such compelling and extraordinary conditions; and (4) such State standards and procedures are consistent with section 208(a) of the Clean Air Act, as amended.

Based on these findings the Secretary waived the application of section 208(a) to the State of California with respect to the following identified State standards and test procedures: (1) California exhaust emission standards and test procedures for 1969 model heavy-duty vehicles; (2) California exhaust emission standards and test procedures for 1969 model passenger cars (light duty vehicles); and (3) California fuel evaporative emission standards and test procedures for 1970 model light duty vehicles.

The waiver is applicable only with respect to the model years specified above.

On September 27, 1968, the Secretary received another request for a waiver from the State of California. This second request was prompted

by the enactment of the California Legislature of the Pure Air Act of 1968. This act establishes a number of increasingly stringent motor vehicle emission standards applicable to 1970, 1971, 1972, 1973, and 1974 model years vehicles as shown in table 4.

Emission standards and test procedures to implement the law were adopted on November 20, 1968, by the California Air Resources Board. Public hearings will be scheduled promptly to provide the Secretary with information on which to base a decision on whether this waiver may be granted.

TABLE 4. *California vehicle emission standards*

I. Gasoline-powered motor vehicles under 6,001 pounds manufacturer's maximum gross vehicle weight having an engine displacement of 50 cubic inches or greater—

A. Exhaust emissions:

| | |
|---------------------------------------|---|
| 1. 1970 model year----- | 2.2 grams per mile hydrocarbons. 23 grams per mile carbon monoxide. |
| 2. 1971 model year----- | 2.2 grams per mile hydrocarbons 23 grams per mile carbon monoxide 4.0 grams per mile oxides of nitrogen |
| 3. 1972 and 1973 model years----- | 1.5 grams per mile hydrocarbon 23 grams per mile carbon monoxide 3.0 grams per mile oxides of nitrogen |
| 4. 1974 and later model years----- | 1.5 grams per mile hydrocarbons 23 grams per mile carbon monoxide 1.3 grams per mile oxides of nitrogen |

B. Evaporative loss:

| | |
|------------------------------------|-------------------------------|
| 1970 and later model years----- | 6 grams hydrocarbons per test |
|------------------------------------|-------------------------------|

II. Gasoline-powered truck-tractor or bus over 6,001 pounds, manufacturer's gross vehicle weight—

A. Exhaust emissions:

| | |
|----------------------------------|---|
| 1. 1970 and 1971 model years---- | 275 ppm of hydrocarbons 1.5 per cent carbon monoxide |
| 2. 1972 and later model years-- | 180 ppm of hydrocarbons 1 percent carbon monoxide |

9. UNCONTROLLED FOREIGN AUTOMOBILES

NAPCA is increasingly concerned about the importation of foreign-built motor vehicles not equipped to control emissions in accordance with the national emission standards applicable to new vehicles sold in this country. The entry of such vehicles is legal under the provisions of the Clean Air Act if the vehicles are not "new" as defined by the act. Thus, slightly used, uncontrolled 1968 and 1969 model year foreign-built vehicles may legally be imported for resale in large numbers. The extent of this activity is presently being investigated by NAPCA. No accurate figures have been obtained yet, but it is estimated that thousands of such vehicles are entering each year.

Furthermore, any individual who presently wishes to, may import an uncontrolled vehicle for his own personal use or in the words of the act, for purposes other than sale or resale. No accurate figures are available on this type of importation either. It is believed, however, that thousands of uncontrolled vehicles are also entering each year under this provision of the Clean Air Act.

Although an individual vehicle may not create an air pollution problem, the combined emissions from large numbers of uncontrolled vehicles will add a significant burden to the air quality of major metropolitan areas.

10. REGISTRATION AND EVALUATION OF FUEL ADDITIVES

Progress in fuel additives registration has taken place on two broad fronts: the gathering of information and the design of procedures. The two activities have usually been carried out simultaneously.

(a) Information gathering

Information on fuel additive usage has been accumulated from both public and private sources. A survey of fuel and fuel additive manufacturers has been completed by an outside contractor. The summary report for this survey provides the following listings: (1) all domestic fuel producers; (2) all domestic fuel additive producers; (3) all fuel or fuel additive importers; (4) State by State fuel and fuel additive procedures; and (5) generic types of fuels and fuel additives being produced domestically, and the companies which produce each type.

NAPCA personnel gathered additional information in meetings with industrial representatives. The first meeting of the National Fuel Additives Advisory Committee was held in October. A large part of this meeting was devoted to a discussion of industry practices. In November administrative representatives attended a meeting of the American Petroleum Institute's Subcommittee on Environmental Standards. Fuel and additive company representatives at this meeting presented summary reports on each of the generic types of additives presently used in petroleum fuels. Both of these meetings provided NAPCA with a better understanding of the fuel additives problem.

(b) Design of registration procedures

The design of registration procedures and regulations has proceeded well since the first report. Formal definitions have been drawn up for various terms used in the act. Registration forms are being designed to handle the flow of information between NAPCA and the companies involved. A computerized system is being devised to handle the vast amount of information which will be gathered during the registration process.

Regulations describing the registration procedures are presently being drafted. The notice of proposed rulemaking should be published early in 1969. The first fuel to be designated will be motor vehicle gasoline.

EXCERPT FROM
PROGRESS IN THE PREVENTION
AND
CONTROL OF AIR POLLUTION

THIRD REPORT
OF THE
SECRETARY OF HEALTH, EDUCATION
AND WELFARE
TO THE
CONGRESS OF THE UNITED STATES
IN COMPLIANCE WITH
PUBLIC LAW 90-148
THE CLEAN AIR ACT, AS AMENDED

MARCH 1970

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Environmental Health Service
National Air Pollution Control Administration

CHAPTER II--Control and Compliance

* * * * *

H. To establish and, as necessary, to revise national standards for the control of air pollution from new motor vehicles and to insure compliance with existing standards.

Automobiles, primarily passenger cars, are by far the Nation's largest source of carbon monoxide, and they are a major source of hydrocarbons and nitrogen oxides, the two types of air pollutants most involved in the formation of photochemical smog. To deal with the motor vehicle pollution problem, the Department of Health, Education, and Welfare is authorized to establish and enforce national standards applicable to new motor vehicles at the time of their original sale.

National standards applicable to carbon monoxide and hydrocarbon emissions from new passenger cars and light trucks first went into effect in the 1968 model year. Tighter restrictions went into effect at the beginning of the 1970 model year. Figure 12 compares the revised standards with those that had been in effect in the 1968-69 model years. As shown in Figure 12, an additional reduction of hydrocarbon emissions will be required in the 1971 model year as a result of the application of standards providing for limitations on hydrocarbon evaporation from automobile fuel tanks and carburetors.

On January 1, 1970, national standards applicable to heavy-duty motor vehicles will go into effect for the first time. Figure 13 shows the standards that will be applicable to new, gasoline-fueled, heavy-duty vehicles. New diesel-powered, heavy-duty vehicles also will be affected. They will have to be equipped to comply with limitations on smoke emissions.

Though the standards already established will reverse the upward trend in total emissions of carbon monoxide and hydrocarbons from motor vehicles, this effect will be relatively short-lived. The number of motor vehicles in use in the Nation is increasing; so is the use made of each one. In another decade, these trends will more than offset the effect of the national standards established thus far. Then, total emissions of carbon monoxide and hydrocarbons will again begin to rise.

To prevent this from happening, further tightening of the standards will be necessary; in addition, standards will have to be set for motor vehicle pollutants not already covered, such as nitrogen oxides and particulate matter. Accordingly, NAPCA is in the process of establishing long-term emission reduction goals, as well as intermediate goals to be reached by the mid-1970's.

In regard to compliance with the motor vehicle emission standards, two significant problem areas have been identified on the basis of experience to date:

First, the current program for determining whether new motor vehicles will comply with applicable standards rests mainly on testing of prototype vehicles in advance of actual production. Typically, the prototypes

Figure 12: Light Duty Vehicle (LDV)¹ Emissions

| | 1963 Model Year Car (2,3) | | 1968 National Standards | | 1970 National Standards | | 1971 National Standards | |
|-----------------|---------------------------|-----------------------|-------------------------|-----------------------|-------------------------|-----------------------|-------------------------|-----------------------|
| | Grams per Vehicle Mile | Percent Reduction (%) | Grams per Vehicle Mile | Percent Reduction (%) | Grams per Vehicle Mile | Percent Reduction (%) | Grams per Vehicle Mile | Percent Reduction (%) |
| Exhaust: | | | | | | | | |
| Hydrocarbons | 5.7 | 42.2 | 3.3 | | 2.2 | 61.4 | 2.2 | 61.4 |
| Carbon Monoxide | 87.2 | 61.0 | 34.0 | | 23.0 | 73.6 | 23.0 | 73.6 |
| Crankcase: | | | | | | | | |
| Hydrocarbons | 3.2 | 100.0 | 0 | | 0 | 100.0 | 0 | 100.0 |
| Evaporation: | | | | | | | | |
| Hydrocarbons | 2.8 | 0 | 2.8 ⁽⁵⁾ | | 2.8 ⁽⁵⁾ | 0 | 0.5 | 82.1 |
| Total: | | | | | | | | |
| Hydrocarbons | 11.7 | 48.2 | 6.1 | | 5.0 | 57.3 | 2.7 | 76.9 |
| Carbon Monoxide | 87.2 | 55.9 | 34.0 | | 23.0 | 73.6 | 23.0 | 73.6 |

(1) Vehicles with a gross weight of 6000 pounds or less

(2) Tested according to Federal LDV test procedures

(3) At 2000 miles

(4) Percent reduction below 1963 emissions

(5) No standard in effect; number represents uncontrolled emissions.

FIGURE 13
HEAVY DUTY VEHICLE (HDV) ^{1/} POLLUTANT EMISSIONS

| | 1963 Model ^{2/} Year Truck | 1970 National Standards | |
|--------------------------|--|---------------------------|----------------------|
| | Grams Per Vehicle Mile | Grams Per Vehicle Mile | Percent Reduction |
| <u>Exhaust:</u> | | | |
| Hydrocarbons | 6.5 | 5.4 | 16.9 |
| Carbon Monoxide | 79.2 | 50.0 | 36.9 |
| <u>Crankcase blowby:</u> | | | |
| Hydrocarbons | 3.2 | 0.0 | 100.0 |

1/ Vehicle with a gross vehicle weight greater than 6000 pounds.

2/ Tested according to Federal HDV test procedures.

meet the standards, often by a substantial margin. On the basis of prototype testing, manufacturers are entitled to receive certificates which are valid for at least one year and which carry with them a presumption that production vehicles which are of substantially the same construction as prototypes will perform like the prototypes, insofar as air pollution control is concerned. There is evidence, however, that this is not entirely true, but rather, that air pollution control systems installed in mass-produced vehicles often lose some of their effectiveness more rapidly than prototype systems do. Evidence of such deterioration has come from testing of more than 4,000 cars by the California Air Resources Board and limited testing conducted by NAPCA in the Los Angeles and Detroit areas. NAPCA has initiated additional testing in other urban areas. In the meantime, consideration is being given to various ways of obtaining greater assurance that the air pollution control capabilities demonstrated by prototype systems will be matched by assembly-line products.

The second significant problem involves importation of motor vehicles not equipped to meet applicable national standards for air pollution control. The national standards established under the Clean Air Act can be and are applied to imported, as well as American-made, vehicles. For the most part, imported cars are equipped to comply with the standards. Under the law, however, cars are not subject to the standards if they are not being imported for sale or resale or if they are not new, i.e., title to them was transferred to the ultimate purchaser before their entry into the country. These exemptions permit returning tourists and military personnel to import non-conforming cars legally. In addition, an unknown, but undoubtedly significant, number of cars is brought in illegally. Though it is difficult to identify such violations, some were identified during the past year and prosecution was initiated. A massive enforcement program would be necessary, however, to stop all illegal entries; even then, non-conforming cars still could be imported legally under existing law. An amendment to the Clean Air Act will be necessary to deal with this problem.

California Standards

The Clean Air Act prohibits State governments from adopting or enforcing air pollution control standards applicable to new motor vehicles, but it permits the Secretary of Health, Education, and Welfare to waive this prohibition under certain circumstances. A State may obtain such a waiver if it had adopted motor vehicle emission standards (other than crankcase standards) prior to March 30, 1966, and if compelling and extraordinary conditions in the State require standards more stringent than the national standards. California is the only State which meets both criteria.

In September 1968, California requested a waiver to permit enforcement of a series of increasingly stringent emission standards in the 1970-74

and later model years. A waiver applicable to 1968-69 model year standards had been granted previously. Public hearings on the new request were held March 4-6, 1969. Testimony was presented by State officials, representatives of automobile manufacturers, and other interested parties. Following examination of the hearing record, the Secretary granted a waiver applicable to the emission standards shown in Figure 14.

I. To insure the development and demonstration of new or improved techniques for reducing motor vehicle pollution, including the development and demonstration of low-pollution engines.

NAPCA conducts and supports research and development relating to the prevention and control of air pollution from motor vehicles. This activity includes research on fuels, investigation of emission control techniques applicable to the internal combustion engine, and developmental studies of other types of engines suitable for use in motor vehicles. NAPCA's work in these areas is intended to stimulate and supplement research and development by organizations in the private sector. In addition, it provides knowledge needed to comply with the statutory requirement that "technological feasibility and economic costs" be taken into account in the establishment of national standards for motor vehicle pollution control.

In collaboration with the National Aeronautics and Space Administration (NASA), NAPCA is investigating high temperature resistant materials and coating for application in the development of an exhaust manifold reactor that would permit high-temperature oxidation of hydrocarbons and carbon monoxide. Various metallic and ceramic materials are to be tested for their ability to withstand the high temperatures necessary for such oxidation; testing is scheduled to begin in mid-1970.

Two projects are underway to test the feasibility of exhaust gas recirculation systems for controlling nitrogen oxides emissions. In one of the projects, the performance of the system is being tested under normal driving conditions. In the other, its durability is being evaluated at NAPCA's laboratory facilities.

The feasibility of three techniques for controlling particulate emissions, including lead, from motor vehicles is being investigated. One of the techniques is sonic agglomeration; a small sound generator induces particles in the exhaust gas stream to form clumps which can be trapped and thus prevented from escaping into the air. The second is thermal precipitation, by which hot particles are attracted to a cool surface. The third is molten carbonate scrubbing; a chemical reaction removes particles from the exhaust gas stream. The scrubbing techniques may also reduce nitrogen oxides emissions. If the studies now in progress suggest that such techniques are practical, development and demonstration of the necessary hardware would follow.

Figure 14. California Vehicle Emission Standards

- I. Gasoline-powered motor vehicles under 6,001 pounds manufacturer's maximum gross vehicle weight having an engine displacement of 50 cubic inches or greater--

Exhaust Emissions:

1. 1971 model year. . . . 2.2 grams per mile hydrocarbons
23 grams per mile carbon monoxide
4.0 grams per mile oxides of nitrogen
2. 1972 and 1973 model
years 1.5 grams per mile hydrocarbons
23 grams per mile carbon monoxide
3.0 grams per mile oxides of nitrogen
3. 1974 and later model
years 1.5 grams per mile hydrocarbons
23 grams per mile carbon monoxide
1.3 grams per mile oxides of nitrogen

- II. Gasoline-powered truck-tractor or bus over 6,001 pounds, manufacturer's gross vehicle weight--

Exhaust Emissions:

- 1972 and later model
years 180 ppm of hydrocarbons
1 percent carbon monoxide

NAPCA is continuing to participate in motor vehicle pollution-related research projects sponsored by the Coordinating Research Council. NAPCA participates in those projects which are deemed relevant to its program objectives; currently, it is participating in about 20 projects. Among them are studies of adverse effects of carbon monoxide, fate of carbon monoxide in the atmosphere, relationship of fuel composition and volatility exhaust emissions, diesel odors, urban driving patterns, and surveillance, inspection, and maintenance procedures for minimizing motor vehicle emissions. NAPCA is independently conducting and supporting additional studies in some of these areas.

In the area of fuels research, NAPCA is supporting research by the Bureau of Mines on fuel volatility in relation to hydrocarbon evaporation. The objective is to identify gasoline mixtures that would have low-evaporation characteristics but still be acceptable from the standpoint of price and performance. The advantage of this approach--or any other fuel change--is that it would reduce hydrocarbon emissions from all motor vehicles, regardless of whether they were subject to pollution control standards.

The feasibility of using liquid natural gas (LNG) as a motor vehicle fuel also is being investigated. Through the cooperation of the General Services Administration, 12 cars have been equipped to use LNG. Emissions are being measured every 4,000 miles. This project will be completed in 1970. Though LNG probably is not suitable for routine use in family cars, it may well be practical for use in fleet operations. In many urban areas, motor vehicle fleets account for as much as 10 percent of the total motor vehicle population.

In the area of diesel emissions, NAPCA is conducting tests of a privately developed catalytic reactor designed to reduce diesel odors. Also being investigated is the reactor's effect on gaseous emissions from diesel engines.

In addition to work on air pollution control techniques applicable to the internal combustion engine, NAPCA has begun moving toward the development and demonstration of unconventional, low-pollution engines. Two projects relating to the design and development of a Rankine-cycle engine for use in passenger cars were initiated during the past year. One of the projects is intended to produce a conceptual design of a Rankine-cycle engine comparable to the internal combustion engine insofar as performance, weight, and price are concerned. The other project is a study of the combustion characteristics of the heat-generating portion of a Rankine-cycle engine. Rankine-cycle engines can be designed to operate on water vapor (steam) or vapor arising from other fluids. The steam car is, of course, the best known example of an automobile powered by a Rankine-cycle engine.

No matter what engines and fuels are in use, the impact of motor vehicle pollution can be reduced through proper highway design and traffic handling. In collaboration with the Bureau of the Public Roads of the Department of Transportation and the City of New York, NAPCA is engaged in an effort to identify highway configurations that will offer the greatest possibility of minimizing exposure to air pollution from motor vehicles.

Finally, in keeping with its role as the lead agency in the Federal government's air pollution research and development efforts, NAPCA has been working on the development of a five-year plan for Federal efforts relating to motor vehicle pollution control. This plan will encompass all Federal activities in this problem area and will serve to place the total Federal effort in perspective with non-governmental activities. Private sector efforts are particularly important. If the private sector engages in productive research and development in the area of motor vehicle pollution control, the Federal effort can be reduced to some extent. The five-year plan being developed by NAPCA will include work on both the internal combustion engine and alternative systems, hardware and fuels, instrumentation, and environmental planning.

Mr. ROGERS. It is necessary for you on all environmental programs to get the Council on Environmental Quality to approve them?

Mr. JOHNSON. I would not think it is necessary to get all environmental programs approved but I think it is important where these programs impact on other departments that we go to the Council so that proper coordination can be obtained and particularly is this true when we would seek the help and maybe funds from other departments to complement and supplement the funds within the Department of HEW.

Mr. ROGERS. Are there any environmental programs that you think of that you would not go to the Environmental Council to obtain their approval?

Mr. JOHNSON. Off the top of my head their probably is not but I am sure if I thought long enough and did a review that there would be some.

Mr. ROGERS. We would like to know the different programs so that we can differentiate between those where the decision can be made in your Department and those that must go through the Council.

Mr. JOHNSON. I don't think it is always a question, Mr. Chairman, as to a decision as to make sure that we are coordinating our respective activities so that we get the most effective impact that we can from the total federal program.

Mr. ROGERS. I would like to know how the council works with you and how you coordinate it and with the other departments. If you could set that forth for us briefly.

Mr. JOHNSON. Well, to attempt to do so, you recognize the council has not been in being very long but we will do the best we can.

(The following material was received for the record:)

DIRECTION UNDER WHICH THE COUNCIL ON ENVIRONMENTAL QUALITY AND THE FEDERAL AGENCIES FUNCTION

Public Law 91-190, the National Environmental Policy Act of 1969, established the Council on Environmental Quality. In furtherance of the purpose and policy of the Act the President issued Executive Order 11514 on March 5, 1970, which outlines the respective responsibilities of the Federal Agencies and of the Council on Environmental Quality. I believe that the Act and the Executive Order provides sufficient direction under which the Council and the Federal Agencies can work. I do not believe that it is possible at this time to list the specific matters that will be handled by the Council or the Agencies. This will have to be determined as each individual case arises. As the Council is just getting established we have little experience at this time in working with it to report but we believe that that the leadership and coordination that it will provide will greatly assist in the national effort to protect the environment. P. L. 91-190 and Executive Order 11514 above referred to are submitted for the record.

Public Law 91-190
91st Congress, S. 1075
January 1, 1970

AN ACT To establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy of 1969".

PURPOSE

SEC. 2. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

SEC. 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, program, and resources to the end that the Nation may—

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

SEC. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact

involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(E) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(H) assist the Council on Environmental Quality established by title II of this Act.

SEC. 103. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

SEC. 104. Nothing in Section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

SEC. 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

TITLE II

COUNCIL ON ENVIRONMENTAL QUALITY

SEC. 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

SEC. 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, esthetic, and

cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

Sec. 203. The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

Sec. 204. It shall be the duty and function of the Council—

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

Sec. 205. In exercising its powers, functions, and duties under this Act, the Council shall—

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

(2) utilize, to the fullest extent possible, the services, facilities, and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

Sec. 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be compensated at the rate provided for Level IV or the Executive Schedule Pay Rates (5 U.S.C. 5315).

Sec. 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.

Approved January 1, 1970.

PROTECTION AND ENHANCEMENT OF ENVIRONMENTAL QUALITY

EXECUTIVE ORDER 11514. MARCH 5, 1970

By virtue of the authority vested in me as President of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (Public Law No. 91-190, approved January 1, 1970), it is ordered as follows:

SECTION 1. Policy. The Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals. The Council on Environmental Quality, through the Chairman, shall advise and assist the President in leading this national effort.

Sec. 2. Responsibilities of Federal agencies. Consonant with Title I of the National Environmental Policy Act of 1969, hereafter referred to as the "Act", the heads of Federal agencies shall:

(a) Monitor, evaluate, and control on a continuing basis their agencies' activities so as to protect and enhance the quality of the environment. Such activities shall include those directed to controlling pollution and enhancing the environment and those designed to accomplish other program objectives which may affect the quality of the environment. Agencies shall develop programs and measures to protect and enhance environmental quality and shall assess progress in meeting the specific objectives of such activities, Heads of agencies shall consult with appropriate Federal, State and local agencies in carrying out their activities as they affect the quality of the environment.

(b) Develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact in order to obtain the views of interested parties. These procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action. Federal agencies shall also encourage State and local agencies to adopt similar procedures for informing the public concerning their activities affecting the quality of the environment.

(c) Insure that information regarding existing or potential environmental problems and control methods developed as part of research, development, demonstration, test, or evaluation activities is made available to Federal agencies, States, counties, municipalities, institutions, and other entities, as appropriate.

(d) Review their agencies' statutory authority, administrative regulations, policies, and procedures, including those relating to loans, grants, contracts, leases, licenses, or permits, in order to identify any deficiencies or inconsistencies therein which prohibit or limit full compliance with the purposes and provisions of the Act. A report on this review and the corrective actions taken or planned, including such measures to be proposed to the President as may be necessary to bring their authority and policies into conformance with the intent, purposes, and procedures of the Act, shall be provided to the Council on Environmental Quality not later than September 1, 1970.

(e) Engage in exchange of data and research results, and cooperate with agencies of other governments to foster the purposes of the Act.

(f) Proceed, in coordination with other agencies, with actions required by section 102 of the Act.

Sec. 3. Responsibilities of Council on Environmental Quality. The Council on Environmental Quality shall:

(a) Evaluate existing and proposed policies and activities of the Federal Government directed to the control of pollution and the enhancement of the environment and to the accomplishment of other objectives which affect the quality of the environment. This shall include continuing review of procedures employed in the development and enforcement of Federal standards affecting environmental quality. Based upon such evaluations the Council shall, where appropriate, recommend to the President policies and programs to achieve more effective protection and enhancement of environmental quality and shall, where appropriate, seek resolution of significant environmental issues.

(b) Recommend to the President and to the agencies priorities among programs designed for the control of pollution and for enhancement of the environment.

(c) Determine the need for the new policies and programs for dealing with environmental problems not being adequately addressed.

(d) Conduct, as it determines to be appropriate, public hearings or conferences on issues of environmental significance.

(e) Promote the development and use of indices and monitoring systems (1) to assess environmental conditions and trends, (2) to predict the environmental impact of proposed public and private actions, and (3) to determine the effectiveness of programs for protecting and enhancing environmental quality.

(f) Coordinate Federal programs related to environmental quality.

(g) Advise and assist the President and the agencies in achieving international cooperation for dealing with environmental problems, under the foreign policy guidance of the Secretary of State.

(h) Issue guidelines to Federal agencies for the preparation of detailed statements on proposals for legislation and other Federal actions affecting the environment, as required by section 102(2)(C) of the Act.

(i) Issue such other instructions to agencies, and request such reports and other information from them, as may be required to carry out the Council's responsibilities under the Act.

(j) Assist the President in preparing the annual Environmental Quality Report provided for in section 201 of the Act.

(k) Foster investigations, studies, surveys, research, and analyses relating to (i) ecological systems and environmental quality, (ii) the impact of new and changing technologies thereon, and (iii) means of preventing or reducing adverse effects from such technologies.

SEC. 4. *Amendments of E.O. 11472*. Executive Order No. 11472 of May 29, 1969, including the heading thereof, is hereby amended:

(1) By substituting for the term "the Environmental Quality Council", wherever it occurs, the following: "the Cabinet Committee on the Environment".

(2) By substituting for the term "the Council", wherever it occurs, the following: "the Cabinet Committee".

(3) By inserting in subsection (f) of section 101, after "Budget," the following: "the Director of the Office of Science and Technology".

(4) By substituting for subsection (g) of section 101 the following:

"(g) The Chairman of the Council on Environmental Quality (established by Public Law 91-190) shall assist the President in directing the affairs of the Cabinet Committee."

(5) By deleting subsection (c) of section 102.

(6) By substituting for "the Office of Science and Technology", in section 104, the following: "the Council on Environmental Quality (established by Public Law 91-190)".

(7) By substituting for "(hereinafter referred to as the 'Committee')", in section 201, the following: "(hereinafter referred to as the 'Citizens' Committee')".

(8) By substituting for the term "the Committee", wherever it occurs, the following: "the Citizens' Committee".

RICHARD NIXON

The White House
March 5, 1970

[Filed with the Office of the Federal Register, 2:29 p.m., March 5, 1970]

Mr. ROGERS. On solid wastes I understand you are proposing that a good bit of your duties be turned over to the council on environmental quality.

Mr. JOHNSON. No, sir, that is not true. The legislation that is being proposed says that the council would have the directional responsibility for coordinating our recycling and reuse efforts research.

There is much within the solid waste legislation that is still within the direct responsibility of the Department of HEW.

Mr. ROGERS. But you don't think this should be a direct responsibility of your agency?

Mr. JOHNSON. The administration feels that because of the number of departments that have interacting responsibilities, the Bureau of Mines for instance, the Department of Agriculture, that there ought to be a higher coordinating mechanism to again make sure that we do bring about the maximum effective impact as far as recycling efforts are concerned.

Mr. ROGERS. So it would be only on recycling and what other?

Mr. JOHNSON. Recycling and reuse of solid waste materials.

Mr. ROGERS. Well now what has been accomplished do you really feel under the solid waste disposal act?

Mr. JOHNSON. Why don't we ask Mr. Vaughan to speak to that.

Mr. ROGERS. Yes.

Mr. VAUGHAN. Well, it is hard to put this in quantitative terms I think that many things in many areas have been accomplished. We have been responsible for new technology which we described in the testimony.

I think probably the thing which has been the most dramatic is the change you will see in the state agencies. Where this was a forgotten, if not completely ignored, item of a state agency program prior to 1965, now it is an important part in at least 41 state agencies that we are working with cooperatively to develop a state action plan, and for the first time come to grips with the problems that exist within their jurisdictions.

We have been working with universities, 11 in fact, who turn out additional research scientists and professional regulatory personnel for the states and others to carry on this work.

We have been working to demonstrate new and improved technology that comes off the research drawing boards or the research laboratories.

We found it is not good enough just to come up with a new idea even if you can prove it will work under carefully controlled circumstances.

You must put it in the city to see how it works today and day after day with the kind of personnel they have and the kind of situations they face. This is the real concept of our demonstration projects.

Here again we conducted these all over the country in a variety of areas from recycling and reclamation to collection and disposal techniques, and having cities work together. One of the more difficult things is to stimulate small communities to work together without giving up their autonomy? How do they develop one plan which is the best for all of them and yet preserve the rights and the interests of the individual community?

Several communities are attempting to do this right now. We are waiting to see how well they are doing. One thing I measure progress by is the number of state laws passed in the last few years—they say as a result of our planning grants—where the states, when they found out what kind of problem they had in solid wastes went to their legislatures and they got better solid waste laws passed.

Ohio, Pennsylvania, South Carolina are three examples of this. There are others. This gives strong regulatory power to the state where none existed before. If you want to put in a new disposal technique in these states you have to get this approved by The State Solid Waste Agency.

They call for elimination in a certain time period of open burning dumps. This is a very important spin off, if you will permit that word, of our activities.

We have about 150 research projects at this time and a like number of demonstration projects. We have been answering requests for technical assistance to give the cities better information on which to base their judgments of which way to go.

Many times a city is faced with a crisis and they have had no one to go to advise them of what is available, what kind of information, what alternatives do they have available to them.

Many times they have made what we consider the wrong decision based on insufficient evidence. We have regional offices working carefully with them to make sure they know they can get help in this area. We don't make the decisions for them, that is their responsibility.

But if we can give them sound technical information that will then help them make one we feel we are doing important work.

Mr. ROGERS. Should you have more authority to set requirements nationally?

Mr. VAUGHAN. I think if these are developed in close concert with the state agencies that will have to enforce them this would be desirable.

Mr. ROGERS. Would you submit to the committee those suggestions that you might have that would give you the necessary authority?

We would like to have them for the record at this point.

Mr. VAUGHAN. Yes, sir, we would be happy to submit them for the record.

(The following statement was received for the record:)

The Department is currently developing new legislative proposals with regard to the solid wastes program and will include in these proposals any necessary additional authorities for the Department. The work on these proposals has not been completed.

Mr. ROGERS. Do you give any help as far as construction grants?

Mr. VAUGHAN. No, sir, we have no authority for construction grants. Our financial assistance under this law is limited to research and demonstration grants and to state planning grants to help them but not for the construction of routine operations.

Mr. ROGERS. Should you have that program?

Mr. VAUGHAN. We feel that while there might be some benefit in this because we recognize how hard pressed the cities are, that this is perhaps the short sighted attitude toward the basic problem and the federal government can play a far different role of making money available from other sources, perhaps from the very industries that produce the wastes that cause the cities such problem.

We hate to see short sighted solutions that may not really solve the problem. We have serious doubts as to whether a construction grant program will be truly effective.

Mr. ROGERS. Has it been helpful in water sewage disposal, do you know?

Mr. VAUGHAN. Probably someone in that field could answer it better.

Mr. ROGERS. Were you aware of it?

Mr. VAUGHAN. I am aware of this program. I am aware of some of the difficulties in this program, by not having enough money to do the job.

Mr. ROGERS. The President has thought that the grants to communities for handling sewage problems has been effective and he has agreed to spend \$800 million this fiscal year.

Now, I would presume that solid waste would come somewhere within the same significance to a community. Could you just quickly capsule for us the extent of the problem nation-wide on solid waste disposal.

Mr. VAUGHAN. I will do that and try to compare it with the kinds of water pollution problems we face and how these are different.

First, the ever growing amount we are taking care of, it is growing much faster than population because of many things. We have 360 million tons that we have to do something with in this country. This is growing and we expect it to double within ten years.

Mr. ROGERS. This is a problem every day for every community, is it not?

Mr. VAUGHAN. That is right, every day for every community to handle this amount and do something about the loads that are increasing so fast.

Mr. ROGERS. And it is a problem that is not tomorrow that you have to study, we know it is here, don't we?

Mr. VAUGHAN. It is here today, yes, sir. In addition to the general problem of this gigantic mass of solid waste we have to do with, there are some specific problems of hard to handle wastes that are creating difficult problems even though they may be small in volume. An example of this is the kind of plastics that when burned in incinerators or open dumps will produce very, very toxic and corrosive gases. That is a specific problem independent of the overall mass we have to deal with.

We have problems of collecting this material, not just disposing of it. This is where we might differ from the construction grants you mentioned. The greatest amount of money we spend in this field is spent in the collection of this material and getting it to some place where you can do something with it.

The city needs as much money there as they do in the disposal end of it. We see the mass of solid wastes growing so fast that unless we as a nation do something to actually cut down the amount that is generated from a variety of points of view that we won't be able to build facilities fast enough to take care of it.

It is that simple. We won't be able to build trucks fast enough to collect it all or land fills enough if we double it every ten years, and it will if we don't do anything to stop the production of this.

Mr. ROGERS. The projection is that it will double in ten years.

Mr. VAUGHAN. Yes, sir, if we don't stop population and don't stop productivity, these two things.

Mr. ROGERS. What is the amount of money now being spent?

Mr. VAUGHAN. Roughly \$4½ billion a year.

Mr. ROGERS. What is the effectiveness of the present disposal systems? Have you done any study on that?

Mr. VAUGHAN. Yes, sir. We have. Our studies were very startling to us because they revealed we were doing such a poor job especially in the disposal area. In land disposal, which is by far the most predominant method, accounting for 90 percent of all garbage disposed of.

Mr. ROGERS. You mean just dumped.

Mr. VAUGHAN. Yes. Anything that uses the land as a repository for this. Approximately 94 percent of that method is unsatisfactory.

Mr. ROGERS. Ninety-four percent.

Mr. VAUGHAN. Ninety-four percent. Only six percent is good.

Mr. ROGERS. What do you mean by unsatisfactory?

Mr. VAUGHAN. Unsatisfactory from the standpoint of a relatively few criteria. One, do they cover with dirt every day like a sanitary land fill should or do they burn? If they never cover or if they burn we consider these both unsatisfactory. Or if they are designed so that

they create ground water or surface water pollution problems, any of these three, if they are not done, we consider unsatisfactory. The bulk of the 94 percent are for just open burning dumps, no ifs and buts. The municipal incinerators have a little better record, but not much better.

We consider 75 percent of those unsatisfactory from the standpoint of efficiency of reducing the waste, which is their prime purpose, or because they have inadequate air pollution control devices or both.

Mr. ROGERS. What about dumping at sea?

Mr. VAUGHAN. Dumping at sea is something that has come to our attention relatively recently. We are in the midst of a study now to determine how much is going on. I took a look at the preliminary results of this and a great deal, especially from industrial sources, is being dumped right now. We are trying to come up with criteria that would face this question but we have to know more about the problem first.

Mr. ROGERS. Would you keep the committee advised?

Mr. VAUGHAN. I will send you the first copy, yes, sir.

(The following material was received for the record:)

(An interim summary of the work conducted by the Dillingham Corporation under a contract entitled "Oceanic Disposal of Solid Wastes and Industrial Sludges from 16 U.S. Coastal Cities" follows:)

MARINE DISPOSAL OF SOLID WASTES AN INTERIM SUMMARY

Robert P. Brown and David D. Smith¹

This report presents an interim summary of work being conducted under contract PH 86-68-203. It is expected that the final report on this project will be published by the Bureau of Solid Waste Management early in 1970.

Important amounts of solid wastes are being transported by tug and barge and disposed of in the deep sea. These wastes include dredging spoils, refuse, construction and demolition debris, waste oil, industrial chemicals and sludges as well as sewage sludge and other materials. In 1968 the Bureau of Solid Waste Management within the Environmental Control Administration of the Department of Health, Education, and Welfare recognized the need to assess the magnitude and significance of marine disposal operations as well as to predict the future effects of increasing tonnages of wastes disposed of at sea. The Bureau accordingly contracted with the Dillingham Corporation to provide an appraisal of oceanic disposal of solid wastes and industrial sludge from U.S. coastal cities. This inventory has considered the origin, composition, and marine disposal of wastes from Portland (Oregon), San Francisco, Los Angeles, San Diego, Galveston, Texas City, Houston, Port Arthur, Beaumont, New Orleans, Pascagoula (Mississippi), Mobile, St. Petersburg, Charleston, Norfolk, Baltimore, Philadelphia, New York, and Boston. The survey was based on interviews with individuals from approximately 90 Federal and State agencies and industrial organizations within the the civilian sector.

DISPOSAL METHODS

Preliminary estimates reveal that some 48 million tons of these wastes were disposed of at sea in 1968 at an estimated cost of \$29 million (Table 1). If dredging spoils are excluded, this estimate is reduced to 9.8 million tons disposed of at a cost roughly \$13.5 million. These figures do not include outdated munitions.

Methods employed for disposal consisted primarily of transporting the wastes in bulk or barrels aboard self-propelled or towed barges. The majority of the wastes were disposed of in bulk form and discharged while underway. Barreled wastes might, depending on local practices, be weighted and sunk, or ruptured at the sea surface by axes or rifle fire and allowed to sink. Barging equipment ranged from highly sophisticated automated barges to antiquated barges and vessels that carry barreled wastes as deck cargo.

¹ Staff Oceanographer and Director, Applied Oceanography, Oceanographic Engineering Division Dillingham Corporation, La Jolla, California.

Dredging spoils are routinely handled by U.S. Corps of Engineers' ocean-going hopper dredges employed in annual harbor channel maintenance programs. In several cases, highly toxic chemical wastes have been carried to sea aboard merchant ships as deck cargo. The containers were then discharged in undetermined areas once the ship was 300 miles from land.

REGULATION AND ENFORCEMENT

In general, the Corps of Engineers, on the basis of the River and Harbors Act of 1899, is the principle point of contact in most cities for processing applications to dispose of wastes at sea. This situation, is however, far from being clear-cut, as there is a series of other Federal, State and local agencies that by nature of their charter are concerned with pollution of the marine environment. Invariably, these agencies become involved in the final decision to allow or deny permission for marine waste disposal. To complicate the picture further, the legal aspects of marine disposal are complex due to the fact that most disposal activities take place beyond the continental limits of the United States and thus covered explicitly by present regulations.

The survey has revealed that very few applications are denied, even though in some cases strong disapproval of the proposed operation has been voiced by several conservation agencies. A major factor here is that the legal responsibility for marine disposal is unclear.

Compliance with whatever disposal procedures that regulatory agencies set up when an applicant is granted permission to dispose of wastes at sea is primarily a matter of cooperation. Although in some cases logs and fathometer charts are required from tugboat operators as a check on their operations, these are rarely given much scrutiny by the regulatory agency. Efforts at control are found at New York where dumping permits are issued for 3-month periods and where occasional fines are levied. Even so, no instance could be found where a permit has ever been rescinded or not renewed because of past infractions of prescribed disposal procedures.

Thus, there is a clear and urgent need for proper regulation which, in concert with both existing and future international conventions or agreements, will fix the responsibility for controlling discharges of solid or containerized wastes at sea, regardless of the distance from shore.

MARINE DISPOSAL INFORMATION MANAGEMENT

Although there are many Federal, State, and local agencies involved in one way or the other with the disposal of wastes from barges and ships in any one city, rarely did more than one of these agencies have a comprehensive picture of the total activities in their city. This lack of effective data management appears to be due primarily to both a lack of communication between the agencies involved and the concentration of interest in a given agency in only specific types of wastes. There are corresponding gaps in the management of environmental data required for assessment of existing or future waste discharges.

ENVIRONMENTAL MONITORING AND OBSERVED EFFECTS

The results of this inventory have revealed that effective monitoring and surveillance of disposal activities is nonexistent. After the occasional initial studies conducted either by industry or interested regulatory agencies, there have been no follow-up programs. Even though water quality standards have been established, they are for the most part based on fragmentary evidence and seem more concerned with protecting the aesthetic enjoyment of the environment (e.g., color, floatables, aquatic growths, etc.) than with potential larger scale effects on the marine food chain.

Thus, there is a serious knowledge gap regarding both the short- and long-term effects that present marine waste disposal activities will have on the marine environment. This lack of knowledge has seriously hampered various responsible individuals in cognizant agencies when a request for a disposal permit has been circulated to them for review and comment; in almost all cases they have had to pass judgment without adequate facts.

BENEFICIAL USES

One area that holds promise as a partial solution to the serious problem of our nation's solid waste disposal is the utilization of various types of wastes (such as car bodies, tires, rubble) to create artificial marine habitats for sport fish. Research

in this area has been conducted since 1958 by the California Department of Fish and Game in Southern California and since 1966 by the Bureau of Sport Fisheries and Wildlife Marine Laboratory at Sandy Hook, New Jersey. Another example often cited for the beneficial uses of wastes is the disposal of acid wastes, primarily spent sulfuric acid, from the New York area, which has reportedly created a sizable sport fishery for bluefish which previously didn't exist. These fish are caught at the outer fringe of the disposal grounds.

Although there has apparently been a good deal of research on the increase of fishing productivity of artificial reefs, there are few estimates of the total tonnages of various classes of wastes (cars, tires, rubble, etc.) that would be required for large-scale reef or island building programs. One estimate indicates that a square area of flat ocean floor 2,500 feet on a side could handle one million tires, unstacked.

FUTURE TRENDS

Increasingly stringent water and air pollution as well as other environmental control laws, the loss of land areas now used for land disposal of solid wastes or ponding of liquid wastes, and the anticipated growth in population and industry within coastal areas during the coming years will almost certainly result in corresponding increases in the quantities of waste discharged at sea.

Several major cities have already shown substantial interest in proposed schemes for sea disposal of municipal refuse. One proposed method is to submerge the refuse (either baled or loose) to a depth where the hydrostatic pressure of seawater is sufficient to compress the material and cause it to become negatively buoyant. Another method proposes to utilize surplus World War II Liberty ships to transport the refuse to sea for incineration and disposal of the ashes.

During the last two years, there has been a marked increase in the number of inquiries to regulatory agencies by various industry representatives regarding the procedures involved in obtaining permission to dispose of wastes at sea. In addition, representatives from industry already practicing marine waste disposal have indicated that unless other less costly solutions to their waste disposal problems become available, they expect to continue their present marine disposal practices.

In summary, the present level of 48 million tons per year of wastes being barged to sea for disposal is expected to increase in the future. In order to control the effects of these materials upon the marine environment, there is a need to fix the responsibility for regulating discharges of solid or containerized wastes at sea.

TABLE 1.—ESTIMATED AMOUNTS AND COSTS OF WASTES BARGED TO SEA IN 1968¹

| Wastes | Pacific coast disposal | | Atlantic coast disposal | | Gulf coast disposal | |
|--|------------------------|------------------|-------------------------|-------------------|---------------------|------------------|
| | Tons | Cost | Tons | Cost | Tons | Cost |
| Dredging spoils..... | 7,320,000 | \$3,175,000 | 15,808,000 | \$8,608,000 | 15,300,000 | \$3,800,000 |
| Industrial wastes (Chemicals, acids, caustics, cleaners, sludges, waste liquors, oily wastes, etc.): | | | | | | |
| Bulk..... | 981,000 | 991,000 | 3,011,000 | 5,406,000 | 690,000 | 1,592,000 |
| Containerized..... | 300 | 16,000 | 2,200 | 17,000 | 6,000 | 171,000 |
| Garbage and trash ² | 26,000 | 392,000 | | | | |
| Miscellaneous (airplane parts, spoiled food, confiscated material, etc.)..... | 200 | 3,000 | | | | |
| Sewage sludge..... | | | 4,477,000 | 4,433,000 | | |
| Construction and demolition debris..... | | | 574,000 | 430,000 | | |
| Total..... | 8,327,500 | 4,577,000 | 23,872,200 | 18,894,000 | 15,996,000 | 5,563,000 |

¹ Does not include outdated munitions.

² Includes 200,000 tons of fly ash.

³ At San Diego 4,700 tons vessel garbage at \$280,000 per year were discontinued in November 1968.

⁴ Tonnage on wet basis. Assuming average 4.5-percent dry solids, this amounts to approximately 200,000 tons dry solids per year being barged to sea.

Mr. ROGERS. What is the order of magnitude of the differing types of waste materials such as paper, glass, plastics?

Mr. VAUGHAN. The preponderance of solid waste is paper, roughly 50 percent. I don't have the figures with me for the others.

Mr. ROGERS. You can submit the exact figures for the record.

Mr. VAUGHAN. Yes. But they are relatively small and pretty evenly distributed among the other things but paper is the biggest single item in solid waste today.

Mr. ROGERS. Bottles, cans.

Mr. VAUGHAN. Bottles, cans, other things are smaller. Glass is high in this. Tin cans, aluminum, plastics, and similar material represent the remainder.

(The following tables were received for the record:)

Composition and Analysis of Composite Municipal Refuse (1966)¹

| <i>Components</i> | <i>Percent by weight</i> |
|---------------------------------|------------------------------|
| 1. Corrugated paper boxes..... | 23.38 |
| 2. Newspaper..... | 9.40 |
| 3. Magazine paper..... | 6.80 |
| 4. Brown paper..... | 5.57 |
| 5. Mail..... | 2.75 |
| 6. Paper food cartons..... | 2.06 |
| 7. Tissue paper..... | 1.98 |
| 8. Wax cartons..... | .76 |
| 9. Plastic coated paper..... | .76 |
| 10. Vegetable food wastes..... | 2.29 |
| 11. Citric rinds and seeds..... | 1.53 |
| 12. Meat scraps, cooked..... | 2.29 |
| 13. Fried fats..... | 2.29 |
| 14. Wood..... | 2.29 |
| 15. Ripe tree leaves..... | 2.29 |
| 16. Flower garden plants..... | 1.53 |
| 17. Lawn grass, green..... | 1.53 |
| 18. Evergreens..... | 1.53 |
| 19. Plastics..... | .76 |
| 20. Rags..... | .76 |
| 21. Leather goods..... | .38 |
| 22. Rubber composition..... | .38 |
| 23. Paint and oils..... | .76 |
| 24. Vacuum cleaner catch..... | .76 |
| 25. Dirt..... | 1.53 |
| 26. Metals..... | 6.85 |
| 27. Glass, ceramics, ash..... | 7.73 |
| 28. Adjusted moisture..... | 9.05 |
| Total..... | 100.00 |

¹ Source: Kaiser, E. R. Chemical analyses of refuse components, 1966.

Municipal Solid Wastes: Physical Characteristics Data¹ (Typical Ranges)

| <i>Category</i> | <i>Percent by weight</i> |
|---|------------------------------|
| Metal products..... | 8-11 |
| Glass products..... | 8-11 |
| Paper products..... | 40-54 |
| Food wastes..... | 10-26 |
| Yard wastes..... | 3-80 |
| Wood products..... | 3-70 |
| Plastic products..... | 1-20 |
| Cloth, rubber, leather, synthetics..... | 1-20 |
| Dirt, ashes, rocks, and other inerts..... | 1-50 |

¹ Source: "Characteristics of Municipal Solid Waste Management," Scrap Age, February 1969.

Mr. ROGERS. Would you set forth for the record those types of methods that you think offer the greatest possibility of solution to the problem? In other words, where you gather the material and it is processed to be burned, to bring about electrical power, some of the research on that offers great hope.

Mr. VAUGHAN. We agree.

Mr. ROGERS. This ought to be accelerated. Do you have sufficient funds to continue that research and perhaps shorten the time element there?

Mr. VAUGHAN. You are talking about our research projects on the incinerator that would burn solid waste and convert it, using a jet engine, to electricity.

Mr. ROGERS. Yes.

Mr. VAUGHAN. We have sufficient funds to carry this project on. Perhaps not as fast as we would like, but we do have funds this year and next year in this budget for this purpose.

Mr. ROGERS. This is the type of thing, Mr. Johnson, that we ought to be putting more funds to and the request ought to come in, if you don't have funds, to accelerate this because we don't have much time if we are going to double this problem in 10 years and where we know there is a possibility of solution and it looks good, and this one does from the reports I have seen, then we ought to come in and start doing it on a project basis.

This one offers great promise, let us put additional funds there. If you need more the Congress wants to know about it and we will help you get them. Unless you put some priority on these research projects where they really offer some hope, then I think we are in just a mess of projects and eventually they may turn out something five or six or seven years from now.

When is this one to be completed?

Mr. VAUGHAN. About 5 years from now.

Mr. ROGERS. If you had some additional funds, maybe two or three.

Mr. VAUGHAN. We might make it three, but not much sooner than that, because there are certain things that have to be done.

Mr. ROGERS. We ought to do it in three then. That is already three years into the ten. Then it will take time for building. I don't think we are meeting a \$4½ billion program with \$15 million in research. It is just out of kilter. I don't think the American people realize, they are beginning to, the problem of solid waste disposal, Now we dramatized water pollution, we dramatized air pollution some. It is beginning. But no one is talking much about the every day problem that every community has to live with, every household in America has to live with. And we spend \$15 million in research. We just need to do more.

I hope you will come in with a review of this and let the committee know because I think the committee wants to be helpful and if you would let us know what you could actively use efficiently to speed these things up we would like to know it.

Mr. CARTER. Mr. Chairman?

Mr. ROGERS. Yes.

Mr. CARTER. If the distinguished gentleman will yield, there is an increasing awareness of the cities throughout our country on this. Even the small towns are interested in it because it presents a great problem to them. All through our country I have seen it. They constantly contact us about this, if there are any funds to help them.

They really need these funds. In some cases there are agencies which are giving aid to certain sections of the country as perhaps you know.

For instance, in certain areas for land acquisition funds are furnished and also for purchase of machinery and equipment to be used in solid waste disposal. I am happy that this is being done in certain areas. I think it is necessary. I believe there is an increasing awareness and of course there must be of this problem.

Thank you, Mr. Chairman.

Mr. ROGERS. Let me also ask you how are we coming along with these programs to get them to make reusable items? Are you making any progress? I think Reynolds Aluminum has a program where they pay for cans to be brought back.

Mr. VAUGHAN. Yes.

Mr. ROGERS. Are there any other aluminum companies that do that?

Mr. VAUGHAN. There may be some. This is the only one I know about. Certainly the only one that has been widely publicized.

Mr. ROGERS. How about bottles. Are they trying to go back to the bottles?

Mr. VAUGHAN. No we are disappointed in the trend of disposable bottles that is going on now. We have had some working arrangement with the glass people to find uses for crushed glass. One of our research projects is using crushed glass as an aggregate. It is with the University of Missouri at Rolla, Missouri and Toledo, Ohio, Libby-Owens-Ford Glass Company. This is fine. We still see more and more bottles coming out and find ourselves sometimes questioning this as well.

Mr. ROGERS. Let us know some of this because we would like to have some background. We would like to question some of the makers of these products, why they won't cooperate if this is what is needed.

Mr. VAUGHAN. There is one example I would like to bring to your attention that we wish all industries could do and that is the example of cutting down citrus waste by using the waste for cattle feed. I spoke recently to an industrialist that did this and found out this is as profitable an operation as making fruit juices.

Mr. ROGERS. Put some molasses with it sometime.

Mr. VAUGHAN. This is an extract from the liquid that is in the peel, they evaporate it and put it back into the feed. There is a high demand for it, in Florida in this case, and the feed is considered superior to anything else that is available by many dairymen. They were able to take solid waste equal to the daily volume of San Francisco in this one industry and get rid of it as cattle feed rather than having to burn it or bury it or do something else with it.

Mr. ROGERS. This is a constructive way to do it. What about flue ash?

Mr. VAUGHAN. We are trying to find use for this, not only flue ash but other materials of a similar nature from various mining operations as well, as sanitary land fill cover or aggregate for cinder blocks or for road paving, this kind of thing.

Mr. ROGERS. Are you having some success in this do you feel?

Mr. VAUGHAN. Yes, limited success. We hope for more in the future.

Mr. ROGERS. What about automobiles, reclaiming automobiles for the steel industry? Why is not more of that done?

Mr. VAUGHAN. Not because they don't have the technology to crush the cars; you mentioned this this morning—I have seen the same thing, but because of a variety of problems: the market for such material, the technology of steel making, transportation cost involved from the time the person is through with the car to getting it to some centralized point. The legal problem of getting them off the street. There are a variety of problems that are independent of the mere technology of crushing or shredding.

We are looking into this, but our work on this is just beginning.

Mr. ROGERS. Someone told me that if they could get the copper out of the automobile and substitute aluminum for some of the wiring and so forth, which is possible, that the steel companies would be more willing to buy the automobiles.

Mr. VAUGHAN. That is correct. The copper in the steel is a contaminant so far as the steel makers are concerned, that they don't like. They can handle the aluminum better.

Mr. ROGERS. That is what I understand. What progress are we making in encouraging this type of activity? Are we doing anything or just still researching?

Mr. VAUGHAN. On this particular one we are researching to try to find out—a variety of things that would make the auto hulk more valuable to the salvage and steel maker.

Mr. ROGERS. I would be hopeful that here again we could get the automobile industry—

Mr. VAUGHAN. I think actually some of the provisions of H.R. 15847 address themselves to just this kind of activity.

Mr. ROGERS. I would hope so. I would like to have some reports on any activity in getting together the automobile companies, the copper companies, aluminum, to see what could be done for reclaiming. I realize this may fall more within the jurisdiction of the Interior than your jurisdiction because I guess reclaiming metals is handled by Interior, is it not?

Mr. VAUGHAN. This is a responsibility that is shared by both of us. They have full jurisdiction of the industrial waste from the mineral and fossile fuel industries. Where this waste becomes a community problem this is something that we both do.

(The following information was received for the record:)

To our knowledge, there has been little activity among the automobile manufacturer and the copper and aluminum industries related to substituting materials to enhance the reclaimability of junked automobiles. A copy of a presentation by J. S. Poliskin entitled "Automobile Steel Scrap of Low-Residual Copper" given on the subject as follows:

AUTOMOBILE STEEL SCRAP OF LOW-RESIDUAL COPPER

By J. S. Poliskin, Supervisor, Raw Materials
Colt Industries, Crucible Inc.,
Materials Research Center,
Pittsburgh, Pa.

ABSTRACT

Re-use of the steel in scrapped automobiles is hindered by the retention of copper in wire conductors and small motors which are costly to remove. Lower copper in the scrap can be achieved by using aluminum for the electrical conductor wiring and ceramic ferrite permanent magnets for the stators in small motors. During melting and refining of this scrap, the aluminum will oxidize and enter the slag, together with the ceramic oxides. The steel produced from this scrap will be low in copper.

The accumulation of scrapped, obsolete automobiles has been identified as an esthetic and resource problem within the United States.¹ The federal government, through such offices as the Bureau of Mines of the Department of the Interior, the Business and Defense Services Administration of the Department of Commerce, and the Bureau of Solid Waste Management of the Department of Health, Education and Welfare, has studied the automobile disposal problem. These bureaus, concerned with solid forms of environmental pollution and the conservation and use of resources of the U.S. have conducted investigations and sponsored research on this problem. The largest automobile producer in the U.S. has reported² that the accumulation of scrap automobiles rose from about 14 million in 1960 to about 18 million in 1967. The Institute of Scrap Iron and Steel has sponsored conferences and urged research and other assistance in the disposal of the mounting number of scrap automobiles. Some legislators have considered imposition of a tax on the sale of an automobile to pay for its ultimate disposal.

The components of a typical scrap car² have been detailed as:

| | <i>Pounds</i> |
|---|---------------|
| Hulk or body..... | 1, 100 |
| Engine and transmission..... | 850 |
| Heavy melting, frame, axles, drive shaft..... | 900 |
| Combustibles and debris..... | 400 |
| Glass, miscellaneous..... | 90 |
| Total..... | 3, 340 |

The major disposal problem resides in the hulk which remains after removal of all the other parts listed above. The removed parts are usually salvaged separately or sold as replacement parts for other cars. The sole large outlet for the hulks is as scrap for remelting into steel. However, technological advances of the past decade in steelmaking have imposed economic and quality limitations on the use of car scrap. Improvements in blast furnace productivity of molten metal and increasing adoption of the fast-moving basic oxygen furnace have resulted in reduced demand by the steel industry for scrap in general and high impurity bearing automobile scrap in particular. Basic oxygen furnaces normally take only about 30% scrap compared to 50-100% scrap in open hearth furnaces and 100% scrap in electric furnaces. However, increased use of scrap by preheating it externally to the basic oxygen or electric furnace is under development and will lead to greater scrap demand.

Industry has not yet developed economic methods for processing all used steel products, particularly automobile bodies into acceptable grades of steel scrap. As others have pointed out (1), (2), a major hindrance to the greater acceptance of automobile scrap for steelmaking is its copper content. Despite removal by stripping of the large copper bearing components such as the radiator, generator and starter, much of the copper in electrical conductor wiring and small covered-over accessory motors remains in the hulk because the expense entailed in its removal is considered excessive. This applies to the two common methods of processing hulks for scrap, i.e., baling or compressing into No. 2 bundles which retain all the attached impurities, or shredding into small pieces from which some of the impurities may be removed. When the product from either of these processes is melted in steel furnaces, the copper alloys with the iron and is practically completely recovered in the steel product. Some reduction in copper can be attained by reacting molten iron with sodium sulfate (4), (5), (6), but none of the melting and refining methods common to the steel industry today are economically capable of removing copper from steel.

Although acceptable in some applications, the presence of copper is considered harmful in steel for hot working and deep drawing processes. For general use in the steel industry, scrap with 0.15% Cu maximum is considered a desirable goal. However, all the commercial processes now in use for preparing automobiles for scrap have a product with copper content in excess of that value. The lowest copper presently available is in clean scrap obtained from shredded or fragmented cars.

A comprehensive study (3) of scrap quality made for the Institute of Scrap Iron and Steel Inc., and the American Iron and Steel Institute reported that No. 2 bundles produced mainly from scrapped automobiles had an average of 0.48% Cu, with a wide range of 0.0% to 1.36%. Melts of 92 automobiles by PPG Industries showed 0.40% Cu.⁴ Shredders followed by magnetic separators have successfully removed much of the tramp materials including some copper from the steel in the hulks. Thus, commercially shredded cars have melted in at about

0.22% Cu. However, shredders represent a large investment, require a large volume of cars for steady feed, and require heavy, costly maintenance. Shredders have been estimated at costing over \$2 million for a capacity of up to 15,000 tons scrap per month. A 100-ton lot of scrap, obtained by processing automobiles through a ripping operation before shredding and additional screening and magnetic separators after shredding, melted to 0.16% Cu. Other scrap yards, without shredders, by exercising great care and expense in hand labor have brought the copper down to similar low levels. Thus, with high expenditures in capital equipment and labor, the copper can be reduced to about the target level. On the other hand, the increasing application of electrically driven accessories in modern automobiles, such as for raising windows and seats, will result in higher copper residuals in future automobile scrap.

A definite, direct way to lower copper in automobile scrap is through the use of less copper in the parts of the automobile which are critical to steel scrap recovery. As the normal electrical functions of the automobile must be maintained, a successful solution to the copper-in-scrap problem requires that other materials, suitable for both electrical properties and acceptability for steel melting should be used in place of the copper. Such materials are aluminum for electrical conductor wire and ceramic or ferrite magnets for stators in small electric motors.

Aluminum and copper are the two common commercial metals suitable as electric conductors. The conductivity of aluminum is 62% that of copper, but because aluminum has less than one-third the specific gravity of copper, a half-pound of aluminum can replace approximately one pound of copper as an electrical conductor. The diameter of aluminum conductor may be approximately 50% greater than an equivalent copper conductor, hence appropriate connectors must be installed for aluminum service. These facts are well known and have been used as a basis for introduction of aluminum as an electrical conductor in other industries and for overhead transmission lines. Also, in 1951, aluminum wiring was actually used in automobile harnesses because of a copper shortage at that time. (7) One problem encountered was corrosion of hood-exposed terminals, but this should be controllable.

One particular property of aluminum, not hitherto fully credited in its usual applications, should be considered in the overall automobile conductor wire applications. Aluminum is more easily oxidized than iron whereas copper is less readily oxidized than iron. Consequently, during melting and refining of steel scrap containing aluminum and copper wire in industrial furnaces, the aluminum will oxidize enter the slag, and separate from the steel while the copper will dissolve in the steel. Thus, the steel produced will be essentially free of aluminum, but will contain all the tramp copper. The decrease in tramp analysis will be the amount of copper replaced by aluminum in the steel source. Indeed, it is normal practice in the steel industry to deliberately add aluminum to molten steel after refining to act as a deoxidizer and float away from the steel. In the U.S. about 25,000 tons per year of aluminum are used for this purpose. Aluminum wire for the parts of the automobile electrical system critical for steel scrap recovery can total more than 10,000 tons per year.

In the second application under consideration, electric motors have traditionally used stators wound with copper wire. In recent years, ceramic permanent magnets of barium or strontium ferrites have been developed and widely used as stators. Rated on usual terms of price and technical performance in industrial application, the ferrite stators are excellent. This is true for small motors of the types used with automobile accessories such as window and seat lifters, and many ferrite stators are already used in such applications. Many of these small motors remain with the steel after scrapping the car whether it be by baling into No. 2 bundles or shredding. Further conversion to ferrite stators in the accessory motors will contribute to lower copper content in the steel scrap piles of the future.

Alleviating the automobile scrap disposal by changing the materials in the electrical system adds a new dimension to the usual concepts of materials engineering. It considers both the needs of the immediate consumer of the initial product, and the needs for recycle of the scrapped product after its initial useful life is completed. This allows nonrenewable materials to be recycled, mineral resources to be conserved, unusable and unsightly scrap piles to be minimized. Fortunately, in these cases, aluminum wire and ferrite magnets can be made to suit the general technical requirements of the application and are readily available from many sources at competitive prices.

In summary, the ease of reaction and separation of foreign materials in steel refining processes should be considered by designers of systems which may enter

the steel scrap market after their initial useful life is over. This factor can be particularly pertinent in the design of electrical systems for automobiles and other large steel products and appliances.

REFERENCES

1. Automobile Disposal. U.S. Dept. of the Interior, Bureau of Mines, 1967.
2. F. J. Uhlig, GM Efforts in Junk Car Processing. AIME 28th Ironmaking Conference, Toronto, Canada, April 15, 1969.
3. W. L. Swager. Battelle Memorial Institute 1960. The Measurement and Improvement of Scrap Quality.
4. F. A. Settino, E. J. Stofka. Treatment of Molten Automotive Scrap to Reduce Copper Content. PPG Industries for Bureau of Mines, Contract 14-09-0070-363.
5. H. V. Makar and B. W. Dunning. Use of Sodium Sulfate for Copper Removal from Molten Iron. Journal of Metals, July, 1969, pp. 19-22.
6. F. C. Langenberg and R. W. Lindsay. "The Removal of Copper from Iron-Copper-Carbon Melts," Contributions to the Metallurgy of Steel, No. 51, A.I.S.I., March, 1957.
7. Metalworking News, October 6, 1969, p. 22.

Mr. ROGERS. Would you let me know how you would spend a breakdown of \$30 million, \$45 million and \$60 million, roughly? And what generally could be accomplished.

Mr. VAUGHAN. That was 30, 45 and 60?

Mr. ROGERS. Yes, sir, under the provisions of the new proposal.

(The following information was received for the record.)

How we would spend \$30 million, \$45 million, and \$60 million during FY 1971 is presented in exhibits E, F, and G, respectively. Some major new activities possible with such funding are also given. The following manpower resources are needed for each level of funding.

| Level of funding: | <i>Estimate of necessary positions</i> |
|-------------------|--|
| 30..... | 300 |
| 45..... | 350 |
| 60..... | 400 |

\$30 million budget

| | |
|---|------|
| Research and development..... | 9. 0 |
| Studies and basic data development..... | 6. 0 |
| Training..... | 2. 0 |
| Technical assistance..... | 1. 2 |
| Demonstrations..... | 8. 0 |
| Information..... | 0. 8 |
| Planning..... | 3. 0 |

Total..... 30. 0

In addition to continuation of existing activities with some expansion of scope, the following new activities would be allowed during Fiscal Year 1971 under a \$30 million/year budget.

To investigate and conduct studies to determine the effect of sea disposal of solid wastes on the marine environment.

At this level of funding the Combustion Power Unit can be completed in five years for a FY 71 cost of \$2,000,000.

The development of a Basic Data Network.

The undertaking of the assessment of the solid waste management manpower needs at the Federal, State, and local levels.

Examination of incentives relating to the recycling and reclamation of various solid waste components.

Conduct a training program for operators and managers of solid waste processing and disposal facilities.

The establishment of a curriculum pertaining to solid waste management at a total of 20 universities.

Expansion of the existing solid waste information and retrieval system by automation to serve the nation.

To demonstrate a comprehensive system including all aspects of solid waste management for the metropolitan area.

\$45 Million Budget

| | |
|---|-------------|
| Research and development..... | 14.0 |
| Studies and basic data development..... | 9.5 |
| Training..... | 3.5 |
| Technical assistance..... | 2.0 |
| Demonstrations..... | 9.0 |
| Federal facilities..... | 1.5 |
| Information..... | 1.0 |
| Planning..... | 4.5 |
| Total..... | 45.0 |

In addition to continuation of existing activities with some expansion of scope, the following new activities would be allowed during Fiscal Year 1971 under a \$45 million/year budget.

To investigate and conduct studies to determine the effect of sea disposal of solid wastes on the marine environment.

At this level of funding the Combustion Power Unit can be completed in four years for a FY 71 cost of \$3,000,000.

To assist in the development of major regional solid waste management systems including reclamation.

The establishment and operation of a Basic Data Network.

The undertaking of the assessment of the solid waste management manpower needs at the Federal, State, and local levels.

Examination of incentives relating to the recycling and reclamation of various solid waste components.

Expand technical assistance activities by decentralization to regions.

Conduct a training program for operators of solid waste processing and disposal facilities through establishment of two regional training centers.

The establishment of curriculum pertaining to solid waste management at a total of 30 universities.

The demonstration of a pipeline transport system for a large segment of a metropolitan area.

Survey and assessment of solid waste management practices in Federal installations.

Expansion of the existing solid waste information and retrieval system by automation to serve the nation.

To demonstrate a comprehensive system including all aspects of solid waste management for the metropolitan area.

\$60 million budget

| | |
|---|-------------|
| Research and development..... | 17.0 |
| Studies and basic data development..... | 12.0 |
| Training..... | 6.0 |
| Technical assistance..... | 3.0 |
| Demonstrations..... | 13.5 |
| Federal facilities..... | 2.0 |
| Information..... | 1.5 |
| Planning..... | 5.0 |
| Total..... | 60.0 |

In addition to continuation of existing activities with some expansion of scope, the following new activities would be allowed during Fiscal Year 1971 under a \$60 million/year budget.

To investigate and conduct studies to determine the effect of solid wastes on the marine environment.

At this level of funding the Combustion Power Unit can be completed in three years for a FY 71 cost of \$3,000,000.

The establishment of a joint effort by the Federal government and industry towards identifying and solving research problems associated with solid waste management.

To assist in the development of major regional solid waste management systems including reclamation.

The establishment and operation of a National Basic Data Network.

The undertaking of the assessment of the solid waste management manpower needs at the Federal, State, and local levels.

Examination of incentives relating to the recycling and reclamation of various solid waste components.

Establishment of a solid waste management equipment testing center.

Expand technical assistance activities by decentralization to regions.

Conduct a training program for operators of solid waste processing and disposal facilities through establishment of four regional training centers.

The establishment of curriculum pertaining to solid waste management at a total of 40 universities.

The demonstration of a pipeline transport system for a large segment of a metropolitan area.

Survey and assessment of solid waste management practices in Federal installations.

Expansion of the existing solid waste information and retrieval system by automation to serve the nation.

To demonstrate a comprehensive system including all aspects of solid waste management for the metropolitan area.

Mr. ROGERS. Dr. Middleton, if you could let us have a breakdown, a projected breakdown of how you would spend \$150 million, \$200 million, and \$300 million.

Dr. MIDDLETON. We will be very glad to report to you.

(The information requested was not available to the committee at the time of printing.)

Mr. ROGERS. Dr. Carter, do you have any questions?

Mr. CARTER. Just a few. I wonder if you have checked on how solid waste disposal is handled in Germany.

Mr. VAUGHAN. Yes, I did. I had a two day meeting with the head of solid waste in Germany two years ago. I can report what he reported to me. They have some of the most modern incinerators in the world in Germany that effectively recapture the waste heat to produce steam for and generation of electricity.

Unfortunately though for them the most common way for getting rid of solid waste in Germany is an open burning dump as in this country.

Mr. CARTER. What about their automobiles?

Mr. VAUGHAN. I don't know about that, I am sorry. I can find out.

Mr. CARTER. It would be good to find out. When I have been in that area or in England or Scotland I don't believe I ever saw yards with many, many old cars.

Mr. VAUGHAN. I think they are generally ahead of us in reclaiming natural resources probably because they are not as blessed as this country is with natural resources.

Mr. CARTER. It would be well to check that.

(The following information was received for the record:)

The information on how European countries handle their junked automobiles is being obtained but is not available at this time.

Mr. ROGERS. What about your collection systems now? Are you using any hydraulic systems?

Mr. VAUGHAN. Yes, sir; we have hydraulic and pneumatic systems. We completed a research project and are now demonstrating a hy-

draulic system in California. After you grind up wastes with water they transport them under pressure in a hydraulic line.

In other words, this would approximate a collection system similar to sewage on this solid waste that is ground up. We are also demonstrating in a high density urban area in New York City the collection and transportation to a central point of solid waste in vacuum tubes. This is the Swedish vacuum system that we are demonstrating in this country. They did the research and we are demonstrating it here in a housing project in New York City.

Mr. ROGERS. Could you let us have for the record the approximate time when the major cities of this country, and I don't know if you have these readily available or not, but when the major cities of the country expect to run out of their space areas for the dumping or handling of their solid wastes?

Mr. VAUGHAN. I will do the best I can with that.

Mr. ROGERS. New York City has an area where they have dumped. They anticipate it would last maybe eight years but they said in reality probably four. This is the type of information we would like to have.

Mr. VAUGHAN. We have it for some cities and some would be very difficult to get, but I will do the best I can.

(The following information was received for the record.)

Based upon the 1968 Survey of Community Solid Waste Practices, we find that 34 of the 50 largest cities have reported upon their landfill operations. We have reports in 128 active landfills located and presently serving these cities. A tabulation of the expected remaining life for the landfill operation of these 34 cities follows. This survey only addressed itself to current operations which were reported and did not determine what additional lands might be available to communities once their present site is filled.

Reported Expected Life for 34 City's Landfill Operations

| <i>City</i> | <i>Expected life</i> | <i>City</i> | <i>Expected life</i> |
|---------------------------|----------------------|--------------------------|----------------------|
| Birmingham, Ala..... | 9.6 | Cleveland, Ohio..... | 1.0 |
| Los Angeles, Calif..... | 11.0 | Columbus, Ohio..... | 25.3 |
| District of Columbia..... | 1.0 | Cincinnati, Ohio..... | 5.4 |
| Miami, Fla..... | 6.5 | Toledo, Ohio..... | 1.0 |
| Tampa, Fla..... | 1.5 | Dayton, Ohio..... | 4.8 |
| Atlanta, Ga..... | 1.5 | Akron, Ohio..... | 0 |
| Chicago, Ill..... | 0 | Oklahoma City, Okla..... | 1.5 |
| Indianapolis, Ind..... | 6.2 | Tulsa, Okla..... | 5.3 |
| Louisville, Ky..... | 1.6 | Pittsburgh, Pa..... | 13.0 |
| New Orleans, La..... | 2.3 | Philadelphia, Pa..... | 1.8 |
| Baltimore, Md..... | 4.8 | Memphis, Tenn..... | 8.0 |
| Minneapolis, Minn..... | 5.5 | San Antonio, Tex..... | 9.3 |
| St. Paul, Minn..... | 20.5 | Dallas, Tex..... | 3.4 |
| Newark, N.J..... | 1.6 | El Paso, Tex..... | 9.7 |
| New York, N.Y..... | 6.5 | Houston, Tex..... | 1.5 |
| Buffalo, N.Y..... | 1.3 | Fort Worth, Tex..... | 5.8 |
| Rochester, N.Y..... | 2.0 | Norfolk, Va..... | 1.6 |

Mr. ROGERS. Are there any other questions?

Thank you very much. If you would submit for the committee's record the material we asked for, we will be grateful. It may be that we would want to get you back again after we hear other witnesses who will be before us this week.

We appreciate your being here and your patience. Thank you very much.

Mr. JOHNSON. Thank you, Mr. Chairman.

Mr. ROGERS. Our next witness is a most distinguished gentleman, Dr. Vincent Schaefer, Director of the Atmospheric Sciences Research Center, State University of New York at Albany, New York.

Dr. Schaefer, the committee is very pleased to welcome you. We appreciate the trouble you have gone to in order to give us some of your thinking on the question of air pollution because we know of your expertise in this matter.

The committee would be pleased to receive your testimony.

STATEMENT OF DR. VINCENT J. SCHAEFER, DIRECTOR, ATMOSPHERIC SCIENCES RESEARCH CENTER, STATE UNIVERSITY OF NEW YORK

Dr. SCHAEFER. I am very pleased to have this opportunity to appear before this group because I think it is extremely important that we attempt to get the very best information before the committee and before other groups in various parts of the country about the rather serious problems that are confronting us on all sides.

The thing that I am becoming more concerned about than almost anything else related to environmental problems of the atmosphere is the role that invisible and just slightly visible particles are playing in relation to the air pollution problem.

I suspect that these problems will have a bearing on health and many other things once we understand all the implications that I believe are inherent in the system.

The best example of the area that I am speaking about is the ordinary automobile, the typical automobile. If when one goes down a highway and looks for pollution from an automobile, as a general rule you do not see any. The only pollution that is noticeable is occasionally a person with an old car emitting a bluish cloud or a grayish cloud of smoke and in a way most of us automatically think of that individual as an air polluter not realizing in most cases that our own automobile, even though we see nothing coming from the exhaust pipe, is perhaps as bad or perhaps even worse than the one that is putting out the visible effluent.

If one takes the exhaust emission from an idling automobile that has nothing visible coming from the tail pipe and measures the number of particles that are being emitted, and I am now talking about particles, not gasses, there are at least 100 billion particles a second being emitted by the automobile.

Within a million of these particles there will be about 10,000 lead particles. These are not large particles. They are microscopic with a size range of 0.01 to 0.05 microns diameter. There are no methods that I know of wherein these particles can be detected directly except in the electron microscope. The way we detect them is to take the effluent, expose it to a tiny bit of iodine vapor converting the lead compound to lead iodide. Lead iodide is one of the best seeding materials we know of for producing ice crystals in a super cooled cloud.

In practice we take a sample of automobile exhaust and put it in a cold chamber at -20°C ., introduce a super cooled cloud to air containing a trace of iodine vapor. We immediately see between 1,000 10,000 per cubic centimeter ice crystals in the chamber.

Ordinarily in natural air we find one to three particles ice crystals per liter. There are 1,000 cubic centimeters in a liter. So, we find at least of million times more of these embryo nuclei on which ice crystals will grow than one finds in what we might call clean air, the kind of air that one encounters over the middle of the Atlantic or the middle of the Pacific Oceans.

We have been seeking for places in America devoid of these ice embryos. In general, we do not find such regions. Two years ago we conducted an expedition down the Green River in Utah. The reason we selected the Green River for our observations was that the area was the farthest from an automobile road in the contiguous United States.

Yet in the depths of Desolation Canyon we found lead particles as detected by this reaction. This has been our experience in many other instances.

Now, this is not just an American problem. I just recently returned from Japan. In northern Japan on the island of Hokkaido, whenever we had air from the land we also found these particles. Air from the ocean on the other hand coming from the Japanese sea from the direction of Siberia was free of such nuclei. We find similar conditions when the wind blows for two or three days from the Pacific when we look for such particles on the Oregon coast.

So, in general the evidence we have is that the residue from automobiles is becoming an all pervasive type of aerosol in continental air.

It will take a long time for such particles to have a major impact on visibility although automobile exhaust and other small particles that come from man-made pollution are increasingly reducing the visibility of distant mountains. The particles are so small they are removed from the air primarily by precipitation. That is the general way in which the air is cleaned by the diffusion of these particles to precipitation in the form of snow and rain.

The size of the particles is so small that gravity has very little if any effect on their removal. So, we now commonly observe that down wind of most of our big cities it is possible to see very large concentrations of ice crystals in low level clouds. For those of us interested in cloud physics we find it difficult to account for their presence unless it is related to air pollution.

Since one can take automobile exhaust and product this reaction we are forced to the conclusion that the source of the ice crystal concentrations that are so frequently seen in polluted regions is primarily from the automobile.

I hope that sooner or later, and hopefully sooner, we will see our way clear to eliminate that source of pollution that I think could begin to have a climatic effect on the atmosphere. This is what concerns me at present. If we have ice crystals in the concentration that I see downwind of most of our polluted regions, I feel that there is a chance that the climatic patterns of the country will be modified.

Mr. ROGERS. In what way, Doctor?

Dr. SCHAEFER. Primarily in this way, that by having this high concentration we have a very unnatural condition. One can easily postulate that when there are concentrations of the kind that we are now observing they can do one of two things. These high concentrations of ice crystals either prevent rain and snow or they could produce

much more than we would like to have. It could do one or the other. Such concentrations in my opinion could eliminate the modest rains which are of common occurrence. The reason for such a paradox is this: When there is a relatively small amount of moisture in cloud form the clouds would be "overseeded," the large number of particles will all be competing for the water so that they don't grow big enough to fall, they just float in the air and eventually evaporate. That in my opinion is what causes the large zones of ice crystals downwind of the cities which I commonly observe.

On the other hand, if a rich supply of moisture moves into the region and entrains the reservoir of effective nuclei that have been built up from pollution, then nature is provided with a very large concentration of good nuclei. Under such conditions, it would just continue to snow or rain so long as the moisture flow continues. These are phenomena that are not easy to prove and thus we need to pay much more attention to this possibility. I am not for a moment saying that without question this is going on, but I have more and more data that makes me concerned. One of our major efforts at Schenectady and Albany in my center is to see if we can verify our suspicion that this is a factor.

The one solid observation that I have so far obtained is that we have been experiencing in our region of the country a large number of what I call misty rains. The rain droplets are so tiny that they really don't fall, they drift. The particles are much smaller than drizzle rain.

The precipitation, if you want to call it that, is in the air for often a half day or a day and yet hardly any precipitation can be measured in our rain gauges. Since last November we have had 15 of those occurrences in eastern New York.

While I can't be positive that this did not happen in a similar manner when I was a boy, I think I would have remembered it. This is one of the things that we have to look at very carefully. We have to see if the past records show evidence that this has happened in the past. I doubt very much if it has.

Now, I am not about to say that the heavy snows we had this winter were produced by this mechanism, but we are trying to develop techniques that will give us a chance to determine whether this is in fact the case. We are looking at the snow with all the sensitive methods we can assemble. We are using the electron microscope, atomic spectrometers and mass spectrometers and various other approaches to see if we can tie this matter down so that it is a meaningful, scientifically supportable phenomenon.

I consider this to be a classic example of the manner in which the development of technology and science has taken us into a situation where we have not been aware of the price we must pay for the modern "things" that we all seem to want as part of our way of life.

I believe that the time has arrived when most of the things we do in America needs to be looked at in a more critical manner. Is the product or procedure really necessary and if so then are we making it or doing it in the best way?

As an example, as I flew down from Albany this morning I looked down at several of our super highways, seeing them jammed with cars, in some cases not moving. A line of cars not moving is a very potent pollution source. A moving flow of traffic is not nearly as bad. These are things that we must think about. It might come to the

point where eventually we will have to say that no longer pleasure cars can be allowed in big cities. At the present time much of our city traffic seems to move at about the speed of a horse and buggy. That does not make sense.

I think we have to re-examine many of our present values to see whether or not in fact we are really doing the right "thing." That is what the young people are talking about, the more serious and concerned of them, and there are many who are very sober, very concerned. We in the university are sensing this in a very vivid way. I feel quite strongly that the sensible ones have a very valid reason to question many of the things that we have permitted to happen in America.

I believe that the Congress is in a wonderful position to act in a constructive way to show young people that after all our method is the best. But if leadership does not come from Washington, then I think we have a rough time ahead of us.

Mr. ROGERS. Thank you, Dr. Schaefer, for an excellent statement.

Mr. Preyer?

Mr. PREYER. Thank you, Mr. Chairman. I agree that this is an excellent statement. You have certainly given us a lot of questions to think about. I appreciate very much your being here. I hope you will keep us informed on what your data develop.

Dr. SCHAEFER. I will be very pleased to.

Mr. ROGERS. Dr. Carter?

Mr. CARTER. Thank you, Mr. Chairman. I just want to say that this has been an excellent presentation. And it is true that we have not built too good a future for our young people. I for one regret it and want to do something about it. That applies in many different ways, not just in the field of air pollution and water pollution.

Dr. SCHAEFER. That is right.

Mr. CARTER. Thank you, Mr. Chairman.

Mr. ROGERS. Has there been an increase did you say of these particles in the air?

Dr. SCHAEFER. In the past 10 years I have been conducting research in various parts of the country, Yellowstone Park in the winter time, Flagstaff, Ariz., in the summer time and various other parts of the western mountains, both in the summer and winter. When I look back at the data I obtained 10 years ago and of recent date I now find, in general, there is a fivefold to tenfold increase in background numbers of small particles.

These are the small particles. These are the particles I am concerned about. They are the kind of particles that will go into the alveoli of the lungs. They are the ones that could have an effect on our health.

Mr. ROGERS. In other words, you could breathe these in and not really be aware of it.

Dr. SCHAEFER. That is right. You would never know you were doing it.

Mr. ROGERS. And these particles are lead?

Dr. SCHAEFER. They consist of all sorts of things, every conceivable kind of substance. Lead is one of the factors certainly. Some of the particles can be quite inert. The thing that must be remembered is when you take a fifty micron particle, that is a particle that is

2/1000ths of an inch, about the diameter of a human hair, and subdivide it so as to be of the invisible size range I am talking about, you would now have 10 billion of them from that single particle.

Mr. ROGERS. Ten billion.

Dr. SCHAEFER. Ten billion from one particle. That is one of the things that sometimes happens at present. When one converts big particles to small particles by evaporation, and recondensation as can happen with passing particulates through afterburners so that you don't see them, that does not necessarily mean they are not there. And in fact such a procedure could produce even a worse condition. Since some of the air which passes through the hot flame of the afterburner is oxidized to form nitrogen oxides.

We need to have a much better understanding of the spatial distribution of pollution particles throughout America. There are very few places in the continental United States where one can enjoy good visibility toward distant horizons. It really bothers me.

When I go into such places as the Rocky Mountains of our West a good part of the time one cannot obtain a clear view of the mountains because of the haze. Much of that haze nowadays is from pollution and that pollution often comes from a long distance.

Mr. ROGERS. Thank you very much, Doctor. I think all of the committee shares your concern about this problem and particularly, as you say, as it relates to young people today too because they are vitally interested and I think this is a field that we will see young people take a very positive attitude about doing something whereas before we have seen them in many instances take negative attitudes, being against something.

Dr. SCHAEFER. Right.

Mr. ROGERS. I think you will find them exerting their energies in a very positive way and I think leadership is called for from the Federal Government as well as at the state and local level.

Dr. SCHAEFER. I certainly agree.

Mr. ROGERS. Your testimony has been most helpful. We are grateful. I hope you will keep the committee advised of any information you think will be helpful.

Dr. SCHAEFER. I will be pleased to.

Mr. ROGERS. Tomorrow our hearing will move to room 2322 at ten o'clock.

The committee stands adjourned until ten o'clock tomorrow.

(Whereupon, at 3:25 p.m., the subcommittee was adjourned to reconvene at 10 a.m., Tuesday, March 17, 1970.)

AIR POLLUTION CONTROL AND SOLID WASTES RECYCLING

TUESDAY, MARCH 17, 1970

HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON PUBLIC HEALTH AND WELFARE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in room 2322, Rayburn House Office Building, Hon. Paul G. Rogers presiding (Hon. John Jarman, chairman).

Mr. ROGERS. The subcommittee will come to order.

We are continuing our hearings on air pollution and solid waste disposal.

As our first witness this morning, it is my pleasure to welcome to the committee our distinguished colleague, the gentleman from Florida, Mr. Bennett. Mr. Bennett has taken an active interest in pollution problems and I am particularly pleased to welcome my own Florida colleague before the committee.

STATEMENT OF HON. CHARLES E. BENNETT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. BENNETT. Thank you, Mr. Chairman.

Mr. Chairman, I deeply appreciate this opportunity to appear before your Committee, hearing testimony on legislation to amend the Clean Air Act. My bill, H.R. 15871, is identical to H.R. 15848, the bill introduced by the Chairman and the ranking minority member. It is proposed by the administration.

I strongly favor the thrust of this legislation. I believe it is needed and will strengthen the Clean Air Act. If the Committee feels the bill needs to be broader or should desire to perfect it to insure cleaner air for all Americans, I will support the legislation, just as I have other anti-air pollution measures reported from the Committee to the House of Representatives.

The bill before the Committee requires that the Secretary of Health, Education and Welfare issue national air quality standards, including standards from stationary sources which pollute the air. Testing of car pollution control is made mandatory, registration and regulation of fuels and fuel additives is required and violation of the law carries a civil penalty of \$10,000 a day, and the authorizations for the Clean Air Act is extended for an additional 3 years, fiscal years 1971-1973.

Over the last 15 years, Congress has enacted laws to control air pollution. The first legislation passed was in July, 1955, authorizing a Federal program of research in air pollution and technical assistance

to State and local governments. In the period between 1955 and 1963 it became clear that not enough was being done to curb air pollutants, and in December, 1963 the Clean Air Act was passed. Improvements to the Clean Air Act were made by Congress in 1965 and 1967, which I have supported.

The bill you are considering today has a wide sweep to it, proposing the Federal Government do more to halt the rising health and economic hazard of the air pollution, which I am told costs the American people some \$12 billion annually in economic loss alone. This estimated cost due to air pollution is damage to property and materials, agricultural losses; reduced property values and reduced visibility that may contribute to automobile accidents and airport delays. My own hometown of Jacksonville, Florida has experienced two separate incidents of this type. In 1948 nylon blouses and stockings actually disintegrated on the wearers and in 1961 severe vegetation damage was experienced in the residential areas on both sides of the St. Johns River, which flows through the middle of Jacksonville. National Air Pollution Control Administration experts say there is little doubt that air pollution caused these incidents.

As President Nixon said in his "Message on Environment" February 10, 1970: "Air is our most vital resource, and its pollution is our most serious environmental problem." The problem is one which must be solved through strong legislation and also by individual action.

I believe the federal program to halt air pollution is providing vital assistance to state and local communities. In the last several years it has been my pleasure to have Dr. John T. Middleton, director of the federal air pollution program, and his regional director, Gene B. Welsh, of Atlanta, participate in urban and environmental seminars in Jacksonville. They both gave excellent presentations and helped to alert local officials, civic leaders and citizens to the need and availability of anti-air pollution programs. This has helped spur citizen action. In Jacksonville we have some very effective leaders in the fight to control air pollution. For example, Mrs. Lee Adams, is stimulating private and public efforts for clean air in Jacksonville.

Mr. Chairman, your Committee has proved substantial leadership for a nationwide battle against air pollution. I urge you to approve the strongest and most effective measure to combat this problem. Thank you for the opportunity to appear.

Mr. ROGERS. Thank you, Mr. Bennett, we are grateful for your statement. It will be most helpful to the committee.

Mr. BENNETT. Thank you, Mr. Chairman.

Mr. ROGERS. The honorable Leonard Farbstein of New York has a statement for us this morning. Welcome sir. Proceed as you see fit.

STATEMENT OF HON. LEONARD FARBSTAIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. FARBSTAIN. Mr. Chairman, it is a great pleasure to appear today before the distinguished members of this Subcommittee in support of legislation which would eliminate the problem of automotive air pollution by the mid-1970's and achieve almost immediately a radical reduction in such emissions.

Automotive air pollution can be eliminated by the mid-1970's by adoption of pollution free alternatives to the internal combustion engine. Steam and gas turbines appear to be most feasible. It is my belief that such alternatives are not only technologically and economically feasible and capable of being mass produced in the next few years, but may well be less expensive to manufacture and operate.

As I am sure the Members of the Subcommittee are aware, I have arrived at these conclusions as a result of ad hoc hearings that 20 other Members of the House from New York and New Jersey joined me in sponsoring last December. At those hearings, we heard testimony from Ralph Nader, the vice presidents of General Motors and Ford, and experts on health and pollution-free engines.

Just as the recent Federal antitrust suit against the auto industry documented the strong opposition of the industry to the development of antipollution devices, so we believe the December hearing demonstrated the industry's strong opposition to the development of pollution free alternatives to the internal combustion engine.

The industry's opposition comes as a result from its desire to avoid the retooling expense and preserve the current market status quo.

It is trying to meet the administration's 1975 standards with the internal combustion engine despite the fact that they admit this would increase the cost of automobiles to the consumer 10 percent, result in a less efficient engine operation, require costly maintenance, and possibly not work at all. By so doing, the industry hopes to put off until 1980 taking the steps that will eliminate the automotive air pollution problem once and for all.

The focus of automotive company opposition comes in the industry's insistence that alternatives to the internal combustion engine are not feasible and in its public relations oriented research and development program which produces steam engines so obviously unappealing to the public to show the "infeasibility and undesirability" of alternatives.

Outside of Detroit, I believe, there is general agreement, however, that alternative propulsion systems are technologically and economically feasible and may be cheaper to produce and operate.

I believe automotive air pollution can be eliminated by the mid-1970's by first, setting auto emission standards on the basis of the cleanest feasible propulsion system, and second, beginning to phase out in 1975 large horsepower internal combustion engines that cannot meet the standards.

I further believe a radical reduction in the automotive air pollution can be achieved almost immediately if interim auto emission standards similar to those for California for 1971, 1972, and 1974 are established nationwide. These standards have been approved as technologically feasible by the Department of Health, Education, and Welfare, and will be required on all autos manufactured by the industry for California residents. There is no reason why the resident of New York City or Miami should not also enjoy the benefit of this low pollution technology. It is certainly not a question of technological feasibility or economics.

What makes this even more essential is the opposition of the industry to making cars with the California clean air package available to residents of other areas who are willing to pay the slightly added cost.

However, these and any other standards are meaningless if large numbers of devices are found to be defective, a view I know the gentleman from Florida (Mr. Rogers) shares. I welcome the administration's recommendation that the National Air Pollution Control Administration be authorized to make assembly line inspections of air pollution devices. But I do not believe that recommendation goes far enough. The Federal Government should be empowered to conduct assembly line inspections of air pollution devices in place of its present testing of prototype devices, which may or may not be the same as those mass produced. It should also be given the power to inspect devices after they have been in operation and require recalling of model lines found to have defective devices, with the auto company picking up the cost of correction.

These and other recommendations, which I strongly urge the committee to consider, are included in the report which other sponsors of the December ad hoc hearings joined me in making in mid-February. The 11 recommendations will be introduced in bill form on April 22. While they have not, as yet, been formally introduced, I would hope the subcommittee would nevertheless fully consider them.

I appreciate the opportunity to testify before this distinguished subcommittee today.

The text of the above referred to report and proposed legislation follows:

TO ELIMINATE AUTOMOTIVE AIR POLLUTION

Representative Leonard Farbstein submitted the following report on behalf of himself and Representatives Benjamin S. Rosenthal, Shirley Chisholm, Bertram L. Podell, William F. Ryan, Joseph P. Addabbo, Edward I. Koch, James J. Delaney, Peter Rodino, Jr., Seymour Halpern, Adam C. Powell, Richard Ottinger, Allard K. Lowenstein, Joseph G. Minish, Mario Biaggi, Frank J. Brasco, and Edward J. Patten to the Congress and the American public. The report is based upon information collected as a result of an ad hoc hearing on automotive air pollution held on December 8, 1969, in New York City.

American technology has finally caught up with American air. The result is that our air has become visible, potentially lethal and—if we continue to pollute at the rate we are—unbreathable. Our polluted air is costing the economy \$20 billion annually in cleanup and material repair costs; and has been medically linked to cancer, emphysema, heart disease, bronchitis, the common cold, and high death rates, especially among the very young and the very old. If doctors and scientists are right, within 10 to 15 years we are going to have to wear masks to protect ourselves from the air.

One source is predominantly responsible for air pollution; the automobile. The automobile's internal combustion engine stands as the logical target of those who want to improve the quality of the environment. According to the Public Health Service, the auto is responsible for 60 percent of the air pollution in this country; and up to 92 percent in urban areas. If the auto can be eliminated as a source of air pollution, much of the present crisis will have been alleviated. *We believe this goal can be achieved by the mid-1970's if the Federal government is willing to undertake the commitment. In addition a radical reduction in air pollution from the automobile can be achieved almost immediately.*

THE INTERNAL COMBUSTION ENGINE

The internal combustion engine (IC engine) is inherently a polluter. Since it cannot produce uniform or complete combustion, pollutants must be spewed into the air. The IC engine must use the air as a sewer. Aside from engine adjustments which can achieve minor reductions in emission levels, and changing the composition of the fuel, the only method of reducing the level of pollutants emitted into the air is to install devices which chemically convert the pollutants the engine produces. However, this method of pollution reduction has a limited potential. It cannot lower emission levels sufficiently to give us the clean air we require.

There is a question concerning how far technology can bring about a reduction in pollutants emitted by the IC engine. The report of the Panel on Electrically Powered Vehicles, U.S. Department of Commerce in October, 1967 declared that it was not technologically possible in the foreseeable future for an internal combustion engine to emit much less than 1 gram/mile of hydrocarbons and 1 gram/mile of nitrogen oxides. The Technical Advisory Committee of the California Air Resources Board in November, 1969 suggested hydrocarbons could be brought somewhat lower. *In either case, one thing is certain, more stringent standards will quite substantially increase the cost of antipollution devices for the internal combustion engine.*

The deterioration of devices must also be considered. Since they are external to the engine, they deteriorate with age. The extent of that deterioration is suggested by a yet-to-be-released Federal study of devices in rental cars which according to one of our witnesses, Ralph Nader, disclosed a 57 percent defect rate. Emission control devices must be able to last for the life of a car if any significant inroads into the pollution problem are to be made. To prevent deterioration requires that a car owner maintain the devices. This means the owner must undertake the \$35-\$50 a year expense and inconvenience of periodic servicing. From the evidence available, few have been willing to undertake this. If an inspection program for all cars were set up to force maintenance, the cost would run several billion dollars a year.

Finally, there is the adverse effect the air pollution devices have on gas economy and performance. The control system impedes the efficiency of the engine. As a result many drivers and mechanics may be prone to disconnect the emission device entirely. An unconnected device is going to provide no control over air pollution emission. If on the other hand the device is placed within the engine so it cannot be disconnected, it becomes difficult to service and to prevent deterioration.

THE FEASIBILITY OF ALTERNATIVES TO THE IC ENGINE—THE AUTO INDUSTRY VIEW

In contrast to the IC engine, alternative propulsion systems like steam and gas turbines are recognized as inherently cleaner engines. And aside from Detroit, there is general agreement among studies conducted that they are technologically and economically feasible and could be produced in the next few years.

Studies conducted both on the Old Stanley steamer and more modern steam cars have found steam propulsion produces one-sixtieth the level of hydrocarbons of the unregulated IC engine, one eighty-third the carbon monoxide and one-tenth the oxides of Nitrogen. These levels are far lower than those the IC engine is believed capable of achieving. Similar results have also been found for the gas turbine engine. *If either of these alternatives were in operation, the air pollution would be virtually eliminated.*

The auto industry claims that these cleaner alternatives are not technologically and economically feasible; and that the IC engine has at least another 20 years of life. But the industry has a huge financial stake in the IC engine, the components on which it relies, and in the current market status quo. It is interesting that only the American Motors Corporation which has little stake in the current market, it is at all interested in alternatives. So, too, any conversion would involve a significant new capital investment and thus reduce profits for a short period. And it is profits, not clean air which are the rewards of the auto industry and its top executives.

The result is that the industry is doing everything it can to maintain the IC engine. With strong public pressure, they have been willing to antagonize their once close allies, the oil industry, by advocating the elimination of lead from fuel. This would bring about a moderate reduction in pollution from the IC engine and thus possibly divert the public's attention from banning the engine, buying time until around 1990.

But the auto industry has traditionally placed its primary reliance for combating alternatives to the IC engine on its research and development programs. With its almost total monopoly on technology and research facilities, it has been difficult for the public to do other than accept the industry's assessments. There was no other source of comparable resources or capital to dispute them. Traditionally, the industry's research and development program has thus been primarily oriented toward public relations. The experimental vehicles developed through the program give the industry something to show the American public when they start "getting hot under the collar" about alternatives. More importantly, the monstrous characteristics of these experimental vehicles designed to be unattractive to the consumer serve to play down the feasibility for alternative propulsion systems.

For example, one of the major auto companies spent over \$4 million to develop a car powered by liquid hydrogen and oxygen, which required a 17 foot tank, and which was so inherently dangerous that it could not be driven through tunnels or over most bridges. It was useful, however, in making news before a Congressional Committee by demonstrating that the company was, indeed, working on alternatives. It is estimated that the industry spends the equivalent of less than one one-hundredth of its styling budget on anti-pollution research. Even this figure is deceptive, however, when the money is being spent on projects like the liquid hydrogen-oxygen car.

The same company last summer demonstrated before the President's Environmental Council a car with a ludicrously huge steam engine, which made wild noises and—in spite of the fact that steam is generally conceded to be inherently low polluting—spewed forth great clouds of smoke and soot. According to industry spokesmen, the walls of the engine were made to meet regulations for building boilers, or at least that was their excuse for the size. Independent experts have indicated as well that the engine did not even apply the modern "closed circuit" steam technology developed in the late 1920's, which eliminated vapor loss. But according to industry spokesmen, it was the "most advanced engine" around; for their company had the most money and man-hours to spend on it. But "wasn't it terrible, and shouldn't we go back to the internal combustion engine?"

Almost in spite of itself, the industry has come up with at least one alternative, that even it has to admit works well. This is the gas turbine car. Chrysler has had one that has gone through more than a decade of development, with 50 produced in the mid-1960's for testing by ordinary drivers. Almost all of the participants, Chrysler's spokesmen at the environment council, admitted liked them and would be the first ones to line up to purchase them if they were ever mass produced. But Chrysler was not going to mass produce them, since they argue the cost of converting the entire industry to gas turbine would be \$5 billion.

Forgotten is the fact that each year the industry spends approximately \$2 billion to just convert from old models to new, and that it spends billions more to add new lines. A turbine or steam car is not going to be produced by a total conversion. What would happen is that, for example, instead of Ford introducing a 1969 Maverick with an IC engine, one with a gas turbine or steam engine would be introduced and the volume expanded the following year. Other models would gradually be introduced and those with IC engines phased out. Complete conversion of all cars would extend over a period of years.

THE FEASIBILITY OF ALTERNATIVES TO THE INTERNAL COMBUSTION ENGINE—NON-INDUSTRY VIEW

Outside of Detroit, there is general agreement that alternative propulsion systems are technologically and economically feasible and may be cheaper to produce and operate. In recent years there have been several Federal studies that have reached this conclusion. Among them are the Panel on Electrically Powered Vehicles (the so-called Morse Panel) which did not limit itself just to electric cars and was chaired by one of our witnesses, the Battelle Memorial Institute, and North American Rockwell. In addition there were the reports of the U.S. Senate Commerce Committee, the California State Assembly and the County of Los Angeles. All of them came to the opposite conclusion from the auto industry with respect to the feasibility of alternatives. Each was done by men from widely differing backgrounds who used different sources of information. The only characteristic each shared in common was independence from Detroit.

Characteristic of the conclusions reached by those outside of Detroit is the testimony of Dr. Robert Ayres of International Research and Technology Corporation before our committee. He indicated that steam propulsion when compared under actual testing conditions to the IC engine was found to be

- (1) mechanically simpler (no clutch, transmission, starter, distributor, carburetor, fuel induction system, muffler, etc.;
- (2) longer lived and more reliable;
- (3) more powerful for the size and weight;
- (4) cheaper to operate;
- (5) virtually pollution free;
- (6) quiet;
- (7) safe and quick to start up; and
- (8) as efficient under normal driving conditions.

The Morse Panel concluded "that compact and low maintenance reciprocating (steam) engines are feasible. . . . The reciprocating steam engine power plant may be a reasonable alternative to the IC engine, in terms of meeting both performance and emission requirements."

The Research Report of the Battelle Memorial Institute declared that a steam engine would probably cost "about the same as an equivalent V-8 engine with automatic transmission . . . and recommended the development of a Rankin-Cycle (steam engine)."

STEPS TO ELIMINATE AUTO POLLUTION

Despite all this—much of which has been financed by the Federal Government—the Federal Government is still setting automotive air quality standards based on what the IC engine is capable of achieving. We do not believe we can afford to let the machine continue to control the quality of our environment. Emission standards must be based on man's needs, not those of the machine's he creates. In the case of the automobile, this means setting standards which will effectively eliminate automotive air pollution. This can be achieved by basing emission standards not on what the IC engine is capable of achieving, but on the emission level produced by the lowest polluting of all feasible propulsion systems. Such standards would first apply to the high horsepower, more polluting "high performance" internal combustion engines, and be progressively extended to engines of all horsepower. It would then be left up to the auto industry to achieve these standards by whatever means it could, including the IC engine if that were possible,

The auto industry will not voluntarily meet such standards and abandon the IC engine if it cannot meet them. This is why the industry is talking about putting a catalytic muffler together with other devices in an attempt to meet the Administration's announced standards for 1975. *In this way the industry hopes to put off the capital investment necessary to eliminate auto pollution once and for all by converting to an alternative propulsion system.*

Specific experiences with the auto industry suggest the need for legislation; for it took legislation to force the industry to come up with technology it already possessed with respect to anti-pollution devices and utilize it to reduce air pollution. The efforts of the industry beginning in 1953 to fight installation of anti-pollution devices, we believe, are well documented by the evidence of the Federal suit against the auto industry (United States v. Automobile Manufacturer Association, et al). The technology, according to the suit, was available in 1953. But because the industry was successful in preventing legislation for over 15 years by denying the existence of the technology, we are today 15 years behind in auto pollution control and therefore face the present crisis.

That the auto industry is following the same tactics with respect to alternatives to the IC engine is suggested by the following statements of an industry representative to a California Assembly Committee considering legislation to ban the IC engine; and to a press conference less than a week after, when the legislation had been safely defeated.

"The know-how isn't there to do the job by 1976." Testimony of auto industry spokesman before California Assembly Committee considering legislation to ban the IC engine (Los Angeles Times, August 1, 1969).

"We would have complied, and of course . . . would have remained in the business of producing automobiles." Statement of the same industry spokesman to a reporter's question *after* the California Assembly had defeated legislation to ban the internal combustion engine (San Fernando Valley News, August 7, 1969).

SUMMARY OF LEGISLATIVE RECOMMENDATIONS

A. Automotive air pollution can be eliminated by the mid-1970's if the Federal Government is willing to undertake the commitment now. What is needed is to (1) set auto emission standards on the basis of the cleanest feasible propulsion system; (2) begin phasing out larger horsepower IC engines which cannot meet the standards in 1975; (3) undertake a large-scale Federal prototype development program for a pollution free vehicle; (4) utilize part of the auto excise tax to provide earmarked funding for the air pollution program; (5) establish a Federal program to purchase pollution-free vehicles even if they are more costly; and (6) authorize the states to utilize highway trust funds to establish pollution-free vehicles purchase programs of their own.

(1) Set auto emission standards on the basis of the cleanest feasible propulsion system

There is agreement among many recent studies conducted for government that at least two inherently cleaner alternative propulsion systems, steam and gas turbine, are technologically and economically feasible and possibly cheaper to produce and operate. Current auto emission standards are based on what the inherently polluting IC engine can achieve. Standards should be set on the basis of the cleanest feasible propulsion system and responsibility to carry out the standards left to the auto industry.

(2) Large IC engines which cannot meet the standards should be phased out beginning 1975

It must be recognized that conversion to a new propulsion system cannot be completed in one year, but must be done on a gradual basis, beginning with a limited number of lines. Large horsepower IC engines which cannot meet the standards should be phased out first based on the following time-table:

Based on sales of 1969 American cars, the phasing out would have the following effect:

- (a) 375 horsepower in 1975—Less than 5 percent of new car sales.
- (b) 275 horsepower in 1976—35 percent of new car sales.
- (c) 175 horsepower in 1977—All but 10 percent of new car sales.
- (d) All internal combustion engines in 1978.

Phasing out large horsepower engines first has the advantage of eliminating the highest pollutant first. Large engines burn more fuel and thus produce higher levels of pollution. It also has the following additional advantages:

- (a) It is easier to develop a new propulsion system in a large engine.
- (b) Fewer people buy automobiles with large engines for personal use, therefore, any recalls that might be necessary to perfect a system would affect fewer people. The industry follows a practice now of putting experimental systems, which may need recalling to perfect them, on "odd-ball lines" that attract fewer customers and inconveniences fewer customers. This would follow that practice.

(3) A large scale Federal prototype development program for pollution free vehicles should be undertaken.

Currently, the Federal Government is developing one prototype rankine (steam) propulsion system. A more extensive program is needed. Such a program would not need to test all forms of propulsion, since steam and gas turbines are generally conceded to be the most feasible and the most developed. Nor would such a program have to undertake initial development. While the spokesmen for the major auto companies were telling a Senate Committee that steam autos were not feasible, members of the committee were driving a modern steam car in the Senate basement. Similarly, at least one small company is now producing inexpensive gas turbine engines. What remains to be developed is the mass production capability and not the engine itself. Such a program would also provide a source of technological and cost information independent of the auto industry.

(4) Part of the Federal automobile excise tax should be utilized to provide the necessary financing for the air pollution program

A federal commitment to eliminating automotive air pollution will require a guaranteed source of funding for the next 4 to 5 years. The mechanism of the automotive excise tax offers a logical source of such funding.

The tax should be recalculated on the basis of the amount of engine horsepower and the amount of pollution produced. This would be in line with the philosophy that the polluter should pay for cleaning up his pollution. It would also reflect a recognition that in addition to producing more pollution, large engines—and this generally means large cars—occupy more parking and road space in our crowded central cities, a privilege for which they should pay.

The revenue collected in excess of the current 7 percent tax level should then be set aside to finance the prototype development and federal purchase of pollution free automobiles.

(5) The Federal Government should purchase pollution free vehicles even if they are more costly

To create a significant market for low pollution vehicles now and thus stimulate earlier production, the Federal Government should purchase entirely pollution free vehicles even if they are more costly than currently available high polluting vehicles.

(6) The states should be encouraged to purchase pollution free vehicles by authorizing the use of the highway trust fund to compensate for any added cost

The states and local governments, like the Federal Government, are major purchasers of new cars, trucks and buses. To stimulate them to purchase pollution-free vehicles, highway trust fund money should be authorized to be used for added cost involved in purchasing them.

B. A radical reduction in automotive air pollution can be achieved almost immediately. What is needed is (7) an increase in interim auto emission standards to those already established for California; (8) the establishment by 1972 of auto emission standards for used cars; (9) the establishment by 1972 of rigorous emission standards for fleet owned vehicles; (10) ban leaded gasoline and regulate the composition of fuel; and (11) regulate rubber and asbestos emissions.

(7) Increase interim auto emission standards to those already established for California and strengthen enforcement procedures

According to Federal law, California is the only state that can set its own auto emission standards. It can set standards so long as they are more rigorous than Federal standards and are approved by the Federal Government as "technologically feasible." Standards for 1971, 1972 and 1974 have been approved, which began to regulate oxides of nitrogen in 1971.

We applaud the Administration's announced auto emission standards for 1975, but believe standards more stringent than those for 1970 models are necessary in the interim. We also are pleased that oxides of nitrogen will be regulated, but do not believe we should wait to 1973 to do so. As an interim step, the California standards, which have been approved by the Federal Government as "technologically feasible," should be required of all new cars. There is no reason standards demonstrated to be feasible should be applied just in California.

However, such standards are meaningless if large numbers of devices are found to be defective. The Federal Government should be empowered to conduct assembly line inspections of air pollution devices in place of its present testing of prototype devices, which may or may not be the same as those mass produced. It should also be given the power to inspect devices after 6,000 miles of operation and require recalling of lines found to have defective devices, with the auto company picking up the cost of correction.

(8) Auto emission standards should be established for used cars by 1972

To achieve clean air now, air pollution standards should be established for all used cars to go into effect after January 1, 1972. Such standards should apply to all cars sold or licensed after that date.

Even if a pollution free auto could be marketed today, it must be remembered that over 90 percent of the cars on the road are more than one year old, and these cars account for more than 90 percent of the pollution that comes from the auto. Approximately 10 million new cars are sold annually, and these have an average life of ten years. It would be almost a decade before today's high polluting used cars would be retired.

One of the major auto manufacturers recently announced development of an air pollution device for used cars. An independent firm has also developed and tested such a device. We believe they are now technologically feasible and should be required.

According to evidence presented in connection with the recent Federal suit against the auto industry. *United States v. Automotive Manufacturers Association, et al*, the auto industry has been conspiring since 1953 to prevent the development or manufacture of anti-pollution devices. If they had not acted in this way, pollution devices might well have been on cars 15 years ago. As the polluter, we do not believe the auto manufacturer should make a profit in selling pollution control devices to owners of autos without devices that they manufactured. It would seem to us that the industry has the obligation to sell and install these devices at cost.

(9) Rigorous emission standards should be established by 1972 for fleet owned vehicles

Fleet owned trucks, buses and taxis make up only 10 percent of vehicular traffic in urban areas, yet account for over 30 percent of the air pollution that comes from vehicles. Fuels, like compressed natural gas, which can operate in current internal combustion engines, can dramatically reduce these pollution levels, and are readily accessible to a fleet operation. The Florida telephone company, for example, has been operating its trucks on one form of natural gas

for the past ten years. Rigorous emissions standards for fleet operations should, therefore, be established by 1972. Such standards should be similar to those tentatively established by the State of California for 1975.

(10) Ban leaded gasoline and regulate the composition of fuel

Leaded gasoline should be banned and the Federal Government empowered to regulate the composition of fuel. Current engines need no modification to use unleaded gasoline. One oil company has been marketing a premium brand non-leaded gasoline for many years.

There is currently a "gentlemen's agreement" in the oil industry limiting to 4 grams per gallon the lead content of gasoline. This should be phased out in accordance with the following time table:

- (a) 3 grams per gallon after January 1, 1971.
- (b) 2 grams per gallon after June 30, 1971.
- (c) 1 gram per gallon after January 1, 1972.
- (d) 0 gram per gallon after June 30, 1972.

Gasoline is the largest unregulated source of lead in the atmosphere—98 percent—and can be directly correlated with the level of lead in the air. Forty-five percent by volume of lead in gasoline ends up in the air. We do not believe this uncontrolled experiment can be permitted to go on any longer. Leaded gas must be totally banned by mid-1972.

Elimination of lead from gasoline would not only remove the major source of unregulated lead in the atmosphere, but would reduce emission from hydrocarbons and carbon monoxides as well which are increased as a result of the presence of lead. Except for the oil and lead industries, there was unanimous support in recent California legislative hearings on the banning of lead. The auto industry, we believe, is supporting a ban because it sees the result of pollution reduction as one way of taking the pressure off the move to ban the IC engine, and to buy time until approximately 1980.

Many of the additives and other components of fuel also contribute hazardous emission to the atmosphere. The Federal Government should have the power to regulate the composition of fuel to reduce this hazard.

(11) Federal auto emission standards should be established for rubber and asbestos

Federal auto emission standards should be established for rubber and asbestos as well as for carbon monoxide, hydrocarbons and oxides of nitrogen. Testimony at our hearing revealed the health hazards of these previously little noticed pollutants. Rubber emission comes primarily from auto tires and can be reduced. Asbestos in the air comes primarily from automotive brake systems and can also be reduced.

TABLE 1.—POLLUTION CHARACTERISTICS OF VARIOUS PROPULSION SYSTEMS

[In grams per mile]

| | Internal combustion engine (unregulated) | Internal combustion engine on natural gas | Gas turbine ¹ | Steam engines ² |
|-------------------------|---|--|-----------------------------|-------------------------------|
| Hydrocarbons..... | 11.0 | 31.5 | 0.32 | 0.2 |
| Carbon monoxide..... | 80.0 | 6.0 | 3.5 | 1.0 |
| Oxides of nitrogen..... | 4.0 | 1.5 | 1.9 | .4 |

¹ Based on the Chrysler Corp. experimental gas turbine car.

² Based on Williams steamcar tested by Mobil Oil Corp. in December 1966.

³ Mostly nonreactive hydrocarbons.

TABLE 2.—COMPARISON OF EMISSION RECOMMENDATIONS

[In grams per mile]

| | Current 1970 model | California | | | Nixon | | This report, 1975-78 |
|-------------------------|--------------------------|------------|------|------|-------|------|-------------------------|
| | | 1971 | 1972 | 1974 | 1973 | 1975 | |
| Hydrocarbons..... | 2.2 | 2.2 | 1.5 | 1.5 | 2.2 | 0.5 | 0.2 |
| Carbon monoxide..... | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 11.0 | 1.0 |
| Oxides of nitrogen..... | | 4.0 | 3.0 | 1.3 | 3.0 | .75 | .4 |

¹ The regulation of hydrocarbons and carbon monoxide has increased the emission of oxides of nitrogen beyond the level of the unregulated internal combustion engine. The chemical conditions relied upon in antipollution devices to date have increased the emission of oxides of nitrogen.

[91st Cong., second sess.]

A BILL To amend the National Emission Standards Act to provide for the elimination of automotive air pollution

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Emissions Standards Act Amendments of 1970".

Sec. 2. Section 202 of the National Emission Standards Act is amended by striking out in subsection (b) thereof "prescribed under this section," and inserting in lieu thereof "prescribed under subsection (a) of this section" and by adding at the end thereof the following:

"(c)(1) In addition to standards prescribed under subsection (a) of this section, the Secretary shall, by regulation, giving appropriate consideration to technological feasibility and economic costs, prescribe as soon as practicable, but not later than June 30, 1971, standards applicable to the emission of any kind of substance, from any class or classes of new motor vehicles propelled by any system other than one using an internal combustion engine, and new motor vehicle engines other than internal combustion engines, which in his judgment cause or contribute to, or are likely to cause or to contribute to, air pollution which endangers the health or welfare of any persons, and such standard shall apply to such vehicles or engines whether they are designed as complete systems or incorporate other devices to prevent or control such pollution.

"(2) The regulations initially prescribed under this subsection shall be applicable (A) on and after January 1, 1975, to all new motor vehicles propelled by engines having 375 horsepower or more and to all new motor vehicle engines having 375 horsepower or more, (B) on and after January 1, 1976, to all such new vehicles and engines having 275 horsepower or more, (C) on and after January 1, 1977, to all such new vehicles and engines having 175 horsepower or more, and (D) on and after January 1, 1978, to all new motor vehicles and new motor vehicle engines. Amendments to any regulations prescribed under this subsection shall become effective on the effective date specified in the order promulgating such regulations which date shall be determined by the Secretary after consideration of the period reasonably necessary for industry compliance.

(d)(1) In addition to standards prescribed under subsections (a) and (c), the Secretary shall by regulation, giving appropriate consideration to technological feasibility and economic costs, prescribe as soon as practicable standards, applicable to the emission of any kind of substance, from any class or classes of motor vehicles or motor vehicle engines sold, or offered for sale in commerce, other than a new motor vehicle or new motor vehicle engine sold or offered for sale to an ultimate consumer, which in his judgment cause or contribute to, or are likely to cause or contribute to, air pollution which endangers the health or welfare of any persons, and such standards shall apply to such vehicles or engines whether they are designed as complete systems or incorporate other devices to prevent or control such pollution. Standards prescribed under this subsection may be amended by the Secretary by regulation in the same manner as in the case of prescribing the initial standards. Standards initially prescribed under this subsection shall establish maximum levels of emission for at least the following: reactive hydrocarbons, carbon monoxide, and oxides of nitrogen. Standards first prescribed under this subsection shall become effective as of January 1, 1972, and subsequent standards or amendments to then existing standards shall become effective on the date specified in the order promulgating such regulations, which date shall be determined by the Secretary after consideration of the period reasonably necessary for compliance.

"(2) Whoever sells or offers for sale in commerce or introduces or delivers for introduction into commerce any motor vehicle or motor vehicle engine which is not in conformity with standards issued under paragraph (1) of this subsection shall be subject to a fine of not more than \$500 if he is not engaged in the business of selling motor vehicles or motor vehicle engines and of not more than \$1,000 if he is so engaged in such business."

Sec. 3. The National Emission Standards Act is amended by renumbering section 212 as section 217 and by inserting immediately after section 211 the following:

"RESEARCH AND DEVELOPMENT

"Sec. 212. The Secretary shall conduct and accelerate research and development of propulsion systems for use in motor vehicles, other than those using internal combustion engines, which systems are technologically and economically

feasible including, but not limited to, mass production methods and techniques. Such research and development shall include cost analysis of mass production of such feasible propulsion systems, and such cost analysis shall be independent of cost analysis produced by manufacturers. Any knowledge and information resulting from research or development, including cost analysis, carried on under this section shall be public information.

“FEDERAL LOW-EMISSION VEHICLE PROCUREMENT

“Sec. 213. (a) For the purpose of this section—

“(1) ‘Board’ means the Low-Emission Vehicle Certification Board;

“(2) ‘Federal Government’ includes the legislative, executive, and judicial branches of the Government of the United States, and the government of the District of Columbia;

“(3) ‘motor vehicle’ means any vehicle, self-propelled or drawn by mechanical or electrical power, designed for use on the highways principally for the transportation of passengers except any vehicle designed or used for military field training, combat, or tactical purposes;

“(4) ‘low-emission vehicle’ means any motor vehicle which meets the regulations prescribed under section 202(c) of this title.

“(b) There is established a Low-Emission Vehicle Certification Board to be composed of the Secretary of Transportation or his designee, the Secretary of Health, Education, and Welfare or his designee, the Director of the National Highway Safety Bureau in the Department of Transportation, the Administrator of the General Services Administration, and one member appointed by the President. The Secretary of Transportation or his designee shall be the Chairman of the Board.

“(c) Any member of the Board not employed by the United States may receive compensation at the rate of \$125 for each day such member is engaged upon work of the Board. Each member of the Board shall be reimbursed for travel expenses, including per diem in lieu of subsistence as authorized by law (5 U.S.C. 5703) for persons in the Government service employed intermittently.

“(d)(1) The Chairman, with the concurrence of the members of the Board, may employ and fix the compensation of such additional personnel as may be necessary to carry out the functions of the Board, but no individual so appointed shall receive compensation in excess of the rate authorized for GS-18 by section 5332 of title 5, United States Code.

“(2) The Chairman may fix the time and place of such meetings as may be required.

“(3) The Board is granted all other powers necessary for meeting its responsibilities under this Act.

“(e) The Secretary of Health, Education, and Welfare shall determine which models or classes of motor vehicles qualify as low-emission vehicles in accordance with the provisions of this Act.

“(f) The Board shall certify any class or model of motor vehicles—

“(1) for which a certification application has been filed in accordance with subsection (h) of this section;

“(2) which is a low-emission vehicle as determined by the Secretary of Health, Education, and Welfare; and

“(3) which it determines is suitable for use as a substitute for a class or model of vehicles presently in use by agencies of the United States.

The Board shall specify with particularity the class or model of vehicles for which the class or model of vehicles described in the application is a suitable substitute. In making the determination under this subsection the Board shall consider the following criteria:

“(1) the safety of the vehicle;

“(2) its performance characteristics;

“(3) its reliability potential;

“(4) its serviceability; and

“(5) its fuel availability.

“(g) Certification under this section shall be effective for a period of two years from the date of issuance.

“(h)(1) Any party seeking to have a class or model of vehicles certified under this Act shall file a certification application in accordance with rules established by the Board and published in the Federal Register.

“(2) The Board shall publish a notice of each application received in the Federal Register.

"(3) The Board shall determine whether or not the vehicle for which application has been properly made is a low-emission vehicle in accordance with procedures established by it and published in the Federal Register.

"(4) The Board shall conduct whatever investigation necessary, including actual inspection of the vehicle at a place designated by the Board in the certification application rules established under this section.

"(5) The Board shall receive and evaluate written comments and documents from interested parties in support of, or in opposition to, certification of the class or model of vehicle under consideration.

"(6) Within ninety days after the receipt of a properly filed certification application, the Board shall reach a decision by majority vote as to whether such class or model of vehicle is a suitable substitute for any class or classes of vehicles presently being purchased by the Federal Government for use by its agencies.

"(7) The Board shall publish in the Federal Register, within ninety days after the receipt of a properly filed certification application, a report of its decision on such application which sets forth with particularity the reasons for granting or denying certification, together with dissenting views.

"(i) As soon as possible, but no later than January 1, 1973, only certified low-emission vehicles shall be acquired by purchase by the Federal Government for use by the Federal Government.

"(j) For the purposes of this section any statutory price limitations shall be waived, and the procuring agency shall be required to purchase available certified low-emission vehicles which are eligible for purchase before purchasing any other vehicles for which the low-emission vehicle is a certified substitute.

"(k) This section shall take effect upon its enactment and the Board shall promulgate the procedures required to implement this section within ninety days thereafter.

"STATUTORY STANDARDS

"Sec. 214. (a) Notwithstanding any other provision of this title, the maximum level of emission from any new motor vehicle or new motor vehicle engine, expressed in grams per mile, with respect to reactive hydrocarbons, carbon monoxide, and oxides of nitrogen shall be as follows: Reactive hydrocarbons—2.2 for 1971, 1.5 for 1972, 1973, and 1974; carbon monoxide—23.0 for 1971 through 1974; oxides of nitrogen—4.0 for 1971, 3.0 for 1972 and 1973, and 1.3 for 1974. For the years after 1974, such levels shall be determined by the Secretary in accordance with this title but such levels shall not exceed those established herein for 1974.

"(b) Nothing in this section shall be construed to prohibit the Secretary from establishing for any year with respect to reactive hydrocarbons, carbon monoxide, and oxides of nitrogen emission standards establishing lower levels of emission than those provided in this section.

"(c) The Secretary shall conduct such inspections and investigations as may be necessary to enforce standards established under this title, including, but not limited to, (1) the inspection (continuously or periodically) of new motor vehicles and new motor vehicle engines and items of equipment necessary to conform such vehicles and engines to such standards, at the time and place of manufacture (including the assembly of parts of such vehicles, engines, or items of equipment), and (2) the inspection of new motor vehicles and new motor vehicle engines after such engines have been operated at least 6,000 miles but not more than 50,000 miles. Any inspection of a new motor vehicle or new motor vehicle engine, after its sale to the ultimate purchaser, shall be made only if the owner of such vehicle or engine volunteers to permit such inspection to be made. If, as a result of any such inspection or investigation, the Secretary determines that any new motor vehicle or new motor vehicle engine is no longer in conformity with regulations prescribed under this title because of any defect in such vehicle or engine, the manufacturer of such vehicle or engine shall furnish notification of such defect to the owner of such vehicle or engine within a reasonable time after such manufacturer has been notified of such defect by the Secretary. Such notification to the owner shall contain a clear description of the defect, a statement of measures to be taken to repair such defect, and a commitment of the manufacturer to cause such defect to be remedied without charge.

"FLEET OPERATIONS

"Sec. 215. After January 1, 1972, if a person is engaged in any business, commercial, industrial, or other activity which results in any year in such persons' operating, directly or indirectly, ten or more motor vehicles, each such motor

vehicle without regard to age or condition, must produce a level of exhaust emissions of not more than .5 grams per mile of reactive hydrocarbon, 11 grams per mile of carbon monoxide, and .75 grams per mile of oxides of nitrogen. Violations of this section shall be subject to injunction and the penalties provided in section 204 and 205 of this Act in the same manner and to the same extent as is provided therein for violations of paragraphs (1), (2), and (3) of section 203(a) of this Act.

"RUBBER AND ASBESTOS STANDARDS

"Sec. 216. No later than January 1, 1972, the Secretary shall, acting under and in accordance with the authority given him by this title, prescribe maximum levels of emission of rubber and asbestos from motor vehicles and motor vehicles and motor vehicle engines."

Sec. 4. (a) Subsection (a) of section 210 of the National Emission Standards Act is amended to read as follows:

"(a) The Secretary may by regulation designate any fuel (which, for purposes of this section, means only fuel intended for use in the transportation of any person or thing) or fuel additive, and after such date or dates as may be prescribed by him, no manufacturer or processor of any such fuel or fuel additive may sell or deliver it unless the manufacturer of such fuel or fuel additive has provided the Secretary with the information required under subsection (c) of this section and unless such fuel or fuel additive has been registered with the Secretary in accordance with subsection (c) of this section."

(b) Section 210 of such Act is amended by redesignating subsections (b), (c), (d), and (e) as subsections (c), (d), (e), and (f), respectively, and by adding after subsection (a) the following new subsection:

"(b) The Secretary may, on the basis of information obtained under subsection (c) of this section or any other information available to him, establish standards respecting the composition or the chemical or physical properties of any fuel or fuel additive to assure that such fuel or fuel additive will not cause or contribute to emissions which would endanger the public health or welfare, or impair the performance of any emission control device or system which is in general use or likely to be in general use (on any motor vehicle or motor vehicle engine subject to this title) for the purpose of preventing or controlling motor vehicle emissions from such vehicle or engine. For the purpose of carrying out such standards the Secretary may prescribe regulations—

"(A) prohibiting the manufacture for sale, the sale, the offering for sale, or the delivery of any fuel or fuel additive; or

"(B) limiting the composition or chemical or physical properties, or imposing any conditions applicable to the use of, such fuel or fuel additive (including the maximum quantity of any fuel component or fuel additive that may be used or the manner of such use)."

(c) The subsection of section 210 herein redesignated as subsection (c) is amended by striking out "For purposes of this section, the Secretary shall" and inserting in lieu thereof "For the purpose of establishing standards under subsection (b), the Secretary may require the manufacturer of any fuel or fuel additive to furnish such information as is reasonable and necessary to determine the emissions resulting from the use of the fuel or fuel additive or the effect of such use on the performance of any emission control device or system which is in general use or likely to be in general use (on any motor vehicle or motor vehicle engine subject to this Act) for the purpose of preventing or controlling motor vehicle emissions from such vehicle or engine. If the information so submitted establishes that toxic emissions or emissions of unknown or uncertain toxicity result from the use of the fuel or fuel additive, the Secretary may require the submission within a reasonable time of such scientific data as the Secretary may reasonably prescribe to enable him to determine the extent to which such emissions will adversely affect the public health or welfare. To the extent reasonably consistent with the purposes of this section, such requirements for submission of information with respect to any fuel additive shall not be imposed on the manufacturer of any such additive intended solely for use in a fuel only by the manufacturer thereof. Among other types of information, the Secretary shall"; by inserting in clause (2) "the description of any analytical technique that can be used to detect and measure such additive in fuel," after "above,"; by striking out in such clause "to the extent such information is available or becomes available,"; by striking out clauses (1) and (2)" in the second sentence and inserting

in lieu thereof "the provisions of this subsection"; and by striking out "such fuel additive" in such sentence and inserting in lieu thereof "such fuel or fuel additive".

(d) The subsection of section 210 herein redesignated as subsection (d) is amended by inserting between the first and second sentences the following new sentence: "The Secretary may disseminate any information obtained from reports or otherwise, which is not covered by section 1905 of title 18 of the United States Code and which will contribute to scientific or public understanding of the relationship between the chemical or physical properties of fuels or fuel additives and their contribution to the problem of air pollution." The first sentence of such subsection is amended by striking out "subsection (b)" and inserting in lieu thereof "subsection (c)".

(e) The subsection of section 210 herein redesignated as subsection (e) is amended (1) by adding "or subsection (b)" after "subsection (a)"; and (2) by striking out "\$1,000" and inserting in lieu thereof "\$10,000".

(f) The amendment made by subsection (e)(2) of this section shall be effective with respect to any fuel or fuel additive to which a regulation issued under subsection (a) of section 210 of such Act or a standard established under subsection (b) of such section, as amended by this Act, applies.

(g) Notwithstanding any of the amendments made by this section, after January 1, 1971, no person shall process, blend or produce in any way any gasoline containing any component of lead in excess of 3 grains per gallon, nor may any such gasoline be imported into the United States. After June 30, 1971, no person shall process, blend or produce in any way any gasoline containing any component of lead in excess of 2 grains, nor may any such gasoline be imported into the United States. After June 30, 1972, no person shall process, blend or produce in any way any gasoline containing any component of lead in excess of 0 grains per gallon, nor may any such gasoline be imported into the United States. Whoever violates this subsection shall forfeit and pay to the United States a civil penalty of \$1,000 for each gallon of gasoline processed, blended, produced, or imported in violation of this subsection. Such penalty may be recovered in a civil suit in the name of the United States brought in the district where such person has his principal office or in any district in which he does business. The secretary may, upon application, remit or mitigate any such forfeiture.

[91st Cong., second sess.]

A BILL To impose an excise tax on automobiles based on their horsepower and emission of pollutants, for the purpose of financing programs for research in, and Federal procurement of, low emission vehicles

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) (1) section 4061(a) of the Internal Revenue Code of 1954 (relating to motor vehicle excise tax) is amended—

(1) by striking out "the specified percent of the price for which so sold" in the matter preceding paragraph (1) and inserting in lieu thereof the following: "a percent of the price for which so sold equal to the specified percent determined under paragraph (1) or (2), plus (in the case of an article taxable under paragraph (2)) the percent determined under paragraph (3)", and

(2) by adding at the end thereof the following new paragraph:

"(3)(A)(i) An article taxable under paragraph (2) which when sold is a motor vehicle is taxable under this paragraph at a percent determined by adding the percent determined under subparagraph (B) to the percent determined under subparagraph (C).

"(ii) An article taxable under paragraph (2) which when sold is not a motor vehicle is taxable under this paragraph at 4.5 percent.

"(B) Each motor vehicle referred to in subparagraph (A)(i) is taxable at a percent, based on the brake horsepower of the engine of such vehicle, determined under the following table:

"If the brake horsepower is—

| | Then the percent is— |
|---------------------------------|-------------------------|
| Not over 175..... | 0 |
| Over 175, but not over 275..... | 0. 5 |
| Over 275, but not over 375..... | 1 |
| Over 375..... | 1. 5 |

"(C) Each motor vehicle referred to in subparagraph (A) (i) is taxable at a percent, based on the grams of carbon monoxide it emits per mile, determined under the following table:

| "If the grams of carbon monoxide emitted per mile is— | Then the percent is— |
|--|---|
| Not over 11..... | 0 |
| Over 11..... | $\frac{1}{4}$ of 1 percent for each gram in excess of 11 |

"(D) For purposes of subparagraph (C), carbon monoxide emissions of a motor vehicle shall be determined (in accordance with regulations prescribed by the Secretary or his delegate) on the basis of the standard tests conducted by the Secretary of Health, Education, and Welfare on vehicles of the same kind for purposes of determining whether such vehicles meet the emission standards prescribed under section 202 of the National Emission Standards Act."

(2) The amendments made by paragraph (1) of this subsection shall apply with respect to articles sold on or after the _____ day after the date of enactment of this Act.

(b) Amounts received in the Treasury by reason of the tax imposed by section 4061(a)(3) of the Internal Revenue Code of 1954 shall be paid into a separate account in the Treasury and shall be available for appropriation only to carry out section 212 of the National Emission Standards Act (as amended by section 2 of this Act) and to pay the amount by which the price of certified low-emission vehicles purchased by the United States in accordance with section 213(i) of such Act (as so amended) exceeds the price of similar automobiles which are not certified low-emission vehicles.

Sec. 2. The National Emission Standards Act is amended by renumbering section 212 as section 214 and by inserting immediately after section 211 the following:

"RESEARCH AND DEVELOPMENT

"Sec. 212. The Secretary shall conduct and accelerate research and development of propulsion systems for use in motor vehicles, other than those using internal combustion engines, which systems are technologically and economically feasible including, but not limited to, mass production methods and techniques. Such research and development shall include cost analysis of mass production of such feasible propulsion systems, and such cost analysis shall be independent of those produced by manufacturers. Any knowledge and information resulting from research or development, including cost analysis, carried on under this section shall be public information.

"FEDERAL LOW-EMISSION VEHICLE PROCUREMENT

"Sec. 213. (a) For the purpose of this section—

"(1) 'Board' means the Low-Emission Vehicle Certification Board;

"(2) 'Federal Government' includes the legislative, executive, and judicial branches of the Government of the United States, and the government of the District of Columbia;

"(3) 'motor vehicle' means any vehicle, self-propelled or drawn by mechanical or electrical power, designed for use on the highways principally for the transportation of passengers except any vehicle designed or used for military field training, combat, or tactical purposes;

"(4) 'low-emission vehicle' means any motor vehicle which meets the regulations prescribed under section 202(e) of this title.

"(b) There is established a Low-Emission Vehicle Certification Board to be composed of the Secretary of Transportation or his designee, the Secretary of Health, Education, and Welfare or his designee, the Director of the National Highway Safety Bureau in the Department of Transportation, the Administrator of the General Services Administration, and one member appointed by the President. The Secretary of Transportation or his designee shall be the Chairman of the Board.

"(c) Any member of the Board not employed by the United States may receive compensation at the rate of \$125 for each day such member is engaged upon work

of the Board. Each member of the Board shall be reimbursed for travel expenses, including per diem in lieu of subsistence as authorized by law (5 U.S.C. 5703) for persons in the Government service employed intermittently.

"(d)(1) The Chairman, with the concurrence of the members of the Board, may employ and fix the compensation of such additional personnel as may be necessary to carry out the functions of the Board, but no individual so appointed shall receive compensation in excess of the rate authorized for GS-18 by section 5332 of title 5, United States Code.

"(2) The Chairman may fix the time and place of such meetings as may be required.

"(3) The Board is granted all other powers necessary for meeting its responsibilities under this Act.

"(e) The Secretary of Health, Education, and Welfare shall determine which models or classes of motor vehicles qualify as low-emission vehicles in accordance with the provisions of this Act.

"(f) The Board shall certify any class or model of motor vehicles—

"(1) for which a certification application has been filed in accordance with subsection (h) of this section;

"(2) which is a low-emission vehicle as determined by the Secretary of Health, Education, and Welfare; and

"(3) which it determines is suitable for use as a substitute for a class or model of vehicles presently in use by agencies of the United States.

The Board shall specify with particularity the class or model of vehicles for which the class or model of vehicles described in the application is a suitable substitute. In making the determination under this subsection the Board shall consider the following criteria:

"(1) the safety of the vehicle;

"(2) its performance characteristics;

"(3) its reliability potential;

"(4) its serviceability; and

"(5) its fuel availability.

"(g) Certification under this section shall be effective for a period of two years from the date of issuance.

"(h)(1) Any party seeking to have a class or model of vehicles certified under this Act shall file a certification application in accordance with rules established by the Board and published in the Federal Register.

"(2) The Board shall publish a notice of each application received in the Federal Register.

"(3) The Board shall determine whether or not the vehicle for which application has been properly made is a low-emission vehicle in accordance with procedures established by it and published in the Federal Register.

"(4) The Board shall conduct whatever investigation necessary, including actual inspection of the vehicle at a place designated by the Board in the certification application rules established under this section.

"(5) The Board shall receive and evaluate written comments and documents from interested parties in support of, or in opposition to, certification of the class or model of vehicle under consideration.

"(6) Within ninety days after the receipt of a properly filed certification application, the Board shall reach a decision by majority vote as to whether such class or model of vehicle is a suitable substitute for any class or classes of vehicles presently being purchased by the Federal Government for use by its agencies.

"(7) The Board shall publish in the Federal Register, within ninety days after the receipt of a properly filed certification application, a report of its decision on such application which sets forth with particularity the reasons for granting or denying certification, together with dissenting views.

"(i) As soon as possible, but no later than January 1, 1973, only certified low-emission vehicles shall be acquired by purchase by the Federal Government for use by the Federal Government.

"(j) For the purposes of this section any statutory price limitations shall be waived, and the procuring agency shall be required to purchase available certified low-emission vehicles which are eligible for purchase before purchasing any other vehicles for which the low-emission vehicle is a certified substitute.

"(k) This section shall take effect upon its enactment and the Board shall promulgate the procedures required to implement this section within ninety days thereafter."

[91st Cong., second sess.]

A BILL To permit the Governor of a State to elect to use funds from the State's Federal-aid highway system apportionment for purposes of paying additional costs incurred by such State in purchasing low-emission vehicles

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "State Low-Emission Vehicle Procurement Act".

DEFINITIONS

Sec. 2. For purposes of this Act—

(1) the term "Federal-aid highway system apportionment" means an apportionment for a fiscal year to a State under one of the five paragraphs of section 104(b) of title 23, United States Code;

(2) the term "Governor" means the chief executive officer of a State;

(3) the term "State" means a State, the District of Columbia, or Puerto Rico.

GRANTS

Sec. 3. The Governor of a State may elect to use all or part of one or more of any Federal-aid highway system apportionment for such State for a fiscal year for the purpose of reimbursing such State and its political subdivisions for the additional cost to such State and its political subdivisions (determined under regulations of the Secretary of Transportation) of purchasing low-emission vehicles (meeting standards prescribed by the Secretary) for their own use. The election authorized herein shall be made in such manner as the Secretary of Transportation shall by regulation prescribe, within sixty days after the Secretary of Transportation certifies to the Governor, pursuant to title 23, United States Code, the sums apportioned to that State for a fiscal year.

AMENDMENT TO TITLE 23, UNITED STATES CODE

SEC. 4. (a) Section 104(e) of title 23, United States Code, is amended by inserting after "State highway department" the following: "and the Governor or chief executive officer of each State".

(b) Section 104(b) (5) of such title is amended by adding at the end thereof the following: "Rules, regulations, and standards adopted by the Secretary for estimating the cost of completion of the Interstate System and taking into account all previous apportionments shall prescribe a consistent and equitable procedure for taking into account amounts of apportionments which the Governor of a State has elected to use to carry out section 3 of the State Low-Emission Vehicle Procurement Act."

(c) Section 104 of such title is amended by adding at the end thereof the following new subsection:

"(f) No amount which the Governor has elected to use to carry out section 3 of the State Low-Emission Vehicle Procurement Act in a fiscal year shall be available for expenditure for Federal-aid highways under this title."

(d) Section 118(a) of such title is amended by striking out "On and after" and inserting in lieu thereof "Sixty days after".

AMENDMENTS TO HIGHWAY REVENUE ACT

SEC. 5. (a) Section 209(f) (1) of the Highway Revenue Act of 1956 is amended by inserting "(A)" before "making expenditures" and by striking out the period at the end thereof and inserting in lieu thereof the following: "and (B) for the purposes of section 3 of the State Low-Emission Vehicle Procurement Act."

(b) Section 209(g) of such Act is amended by adding at the end thereof the following: "An election by the Governor of a State under section 3 of the State Low-Emission Vehicle Procurement Act to use funds to carry out such section 3 shall not be taken into account in making any adjustment under this section."

EFFECTIVE DATE

SEC. 6. This Act shall take effect upon the first certification of Federal-aid highway system apportionments under section 104(e) of title 23, United States Code, following the date of enactment of this Act.

Mr. ROGERS. Thank you, Mr. Farbstein, for sharing your views with us this morning.

Mr. FARBSTEIN. Thank you, Mr Chairman, for affording me the opportunity.

Mr. ROGERS. Next we shall hear from our colleague from the State of Iowa, the Honorable Fred Schwengel. Welcome sir.

STATEMENT OF HON. FRED SCHWENGEL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IOWA

Mr. SCHWENGEL. Mr. Chairman, the polluted condition of our air has been allowed to worsen recently by well-intentioned but ineffective legislation such as the Clean Air Act of 1963 and the Air Quality Act of 1967, and now looms as an obstacle to the propagation of life on this planet. Air pollution has reached such overwhelming proportions that it is estimated that, if the present rate of pollution continues, in 5 years, only those people wealthy enough to live in airtight environmentally-controlled houses will remain healthy. Clearly, it is past time for action. President Nixon has offered a set of amendments to the Clean Air Acts which hopefully will impose the necessary restrictions and provide the necessary muscle to reverse or at least halt the present suicidal march. What follows is a brief description of the menaces posed by air pollution, and the expected remedies in the Nixon Plan.

The primary, most obvious, and most critical consequence of air pollution is the hazard it poses to the health of every American. In addition to being cited as a contributing factor to emphysema, the fastest growing cause of death in this country, air pollution has also been directly linked to these diseases: Chronic bronchitis (which afflicts thirteen to twenty percent of adult American males), chronic constrictive ventilatory disease, bronchial asthma, the common cold, and lung cancer. The respiratory diseases cited above are usually aggravated and advanced by the presence of the sulfur oxides family of pollutants. In older people, the continuing presence of sulfur dioxide in the atmosphere at low levels has been associated with increased cardiovascular morbidity. The primary cause of the presence of sulfur oxides in the atmosphere is the burning of coal and oil for heat and power. The new air pollution package empowers the Secretary of HEW to set ambient air quality standards for the nation, and to prohibit new construction of stationary sources of hazardous emissions while requiring control devices on existing sources. In the case of violation, the Secretary may give a hearing for the state and party in violation, and specify remedial actions to be taken and time limits. If further violation occurs, injunction proceedings may be started. In addition, the Secretary may impose a fine of \$10,000/day on violators. These provisions give the legislation more "teeth".

In addition to these diseases aided by air pollution, the automobile has progressively poisoned our population. Lead is a cumulative poison emitted by cars burning leaded fuel. Brain damage and even death can result from this type of poisoning. Carbon monoxide in concentrations commonly found in heavy traffic or tunnels can affect drivers, causing a safety hazard. For sensitive people, these relatively low concentrations of carbon monoxide pose a serious threat to health.

Under the 1970 amendments package, the Secretary of HEW may set standards for levels of pollutants permissible in automobile emissions, has expanded testing capabilities, and is empowered to ban from the market any hazardous car, engine, fuel or fuel additive. The standards would also apply to any foreign car brought into this country.

The sum total of pollutants in our atmosphere results in photochemical smog. This smog is irritating to the eyes, nose, and lungs. In some cities, breathing the air for one full day is equivalent in terms of tar taken in to smoking seven cigarettes. It is hoped that the Nixon plan will touch all the bases to clear up this general atmospheric condition.

These same types of pollutants also cause severe reactions on the part of plants. In many areas of the country, air pollution places very real restrictions on what can be grown. Various pollutants cause yellowing of the leaves, cause cell death at the tips and edges of leaves, or restrict the growth of plants. Elements of photochemical smog are highly toxic to many species of field crops. Clearly, agriculture can not help but suffer in a polluted environment.

The colossal waste involved in air pollution is equally appalling. The dense black smoke from a smokestack or exhaust pipe not only means that pollution will result, but also that incomplete combustion has occurred. The cost to the U.S. in wasted fuel undoubtedly runs into the billions of dollars. Agricultural losses from air pollution are estimated at about \$500 million/year. In addition, in a polluted atmosphere, steel corrodes, silver tarnishes, and iron rusts two to four times faster than in pure air. The annual cost of air pollution in the U.S. is frequently estimated at \$65 per capita per annum—an annual cost to the Nation of over \$12 billion. It is time to clear the air.

The future holds only increased population, which means more electricity, more cars, more production, and more pollution. The trend must be reversed.

The National Conference on Air Pollution in 1966 set forth two targets: (1) to create a safe environment, and (2) to create an environment conducive to human dignity. William H. Stewart, the then-Surgeon General, said in the concluding address: "It is high time we hit the first [target] and started working in the second." Today, almost 4 years later, the same can still be said. The President's package will hopefully provide an impetus for creation of a better environment. At least it is a start.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you, Mr. Schwengel, for your fine statement.

Our next witness is the Honorable Ken Hechler of West Virginia. Proceed as you see fit, sir.

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

Mr. HECHLER of West Virginia. Mr. Chairman, the air is getting dirtier and dirtier. Everbody talks a good game on air pollution control, but when the chips are down very little seems to be accomplished. There is a seemingly endless series of conferences, notices, appeals, delays, queries, teach-ins, buck-passing—and the public is frustrated and angered because the air is not getting cleaner.

There is one simple solution: it should be made more expensive to pollute than to preserve clean air. Admittedly, this is a matter of

degree, and strict Federal standards must be set, and accompanied by stringent penalties. A Federal tax on polluters would have a dramatic effect in reducing pollution.

The present law has been a dismal failure.

I would like to present to this committee a case study in pollution in West Virginia, showing that despite conscientious efforts to apply the law, the law has simply not worked.

The Union Carbide Corporation is the largest employer in the State of West Virginia. This corporation is a prestigious power in state politics. Union Carbide has met its civic obligations in countless ways, from fund drives to intellectual and scientific leadership, but the corporation's record on controlling air pollution is a miserable one, fraught with evasion, obfuscation and delay. In 1969, in its nationwide operations Union Carbide Corp. chalked up an 18.9 percent jump in profits over 1968, with profits reaching \$186 million and sales increasing 9.2 percent to a record \$2.9 billion in 1969 over 1968. 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 it spews into the air of the Ohio and Kanawha valleys every day.

Vienna, West Virginia has been termed the fastest-growing community in the state. This attractive residential town adjacent to Parkersburg on the Ohio River has been subjected to what amounts to chemical warfare. Mrs. Val Milsark, a Vienna housewife, describes the situation as follows:

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.

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. 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 Corporation. Three years ago, on March 22, 1967, I made this statement publicly to the conference: "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 * * *. 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."

The entire text of my March 22, 1967, statement to the Interstate Air Pollution Abatement Conference follows:

FEDERAL AIR POLLUTION ABATEMENT CONFERENCE, VIENNA, W. VA., 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 re-

quire 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.

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 side-step, 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, drawn-out 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. The text of the August 28, 1967 letter follows:

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,
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 Virginia 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.

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

UNION CARBIDE CORP.,
MINING AND METALS DIVISION,
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.

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:

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,
Washington, D.C., January 11, 1968.

Mr. G. 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 make a reply. I have received no such reply, and I would like to reiterate the request in my letter of August 28.

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.

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, 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.*

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 ask the central office of the Union Carbide Corporation at 270 Park Avenue in New York to supply the answers. On April 25, 1968 a meeting was held in Washington, D.C. with Dr. J. S. Whitaker, Coordinator for Environmental Health of Union Carbide. 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." When 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 after their pleasant visit with Dr. Whitaker of Union Carbide Corporation dutifully directed another letter to Dr. Arnold, as follows:

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,
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 us 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. Whittaker that you have such information, including specific control plans as well as timetables 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 yours,

WILLIAM H. MEGONNELL,
Acting Associate Director for Abatement and Control.

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,
U.S. PUBLIC HEALTH SERVICE, ABATEMENT PROGRAM,
Columbus, Ohio, June 10, 1968.

MR. WILLIAM H. MEGONNELL,
*Acting Associate Director for
Abatement and Control,
Department of Health, Education and Welfare,
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. Whitaker 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) SO₂ 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.

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:

NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,
Arlington, Va., 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, 1968, I directed a letter to the Ohio Department of Health on May 17, 1968, to request information relative to air pollution emissions from your plant in Marietta, Ohio. A copy of my letter to Dr. L. W. Arnold is enclosed for your information.

Despite your assurance that the Ohio Department of Health had been furnished the necessary information by your Company, and that the Department 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.

In a further effort to acquire the information repeatedly requested of you, I ask that you attend to this matter at hand promptly to forestall invocation of the provisions of section 108(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.

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.

Now on July 30, 1968, 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, it 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.

The conference was reconvened in October, 1969 in Vienna, West Virginia.

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." The full text of my statement to the October 31, 1969 conference follows:

STATEMENT OF REP. KEN HECHLER (D-W. VA.) 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, needled, 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 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 tolls 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.

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." The full text of the December 31, 1969 letter follows:

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
NATIONAL AIR POLLUTION CONTROL ADMINISTRATION,
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 in 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. As you get rid of the filth in your yards and on your person please remember his timeless remarks. He is a representative of Carbide, and he said "Our 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 overnight 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 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.*

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 as follows:

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 Sec. 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 plant. At this time we believe we can submit a schedule for particulate abatement within 6 months after the conference recommendation are published by the Secretary. Details of this schedule will depend largely on whether we can continue to run 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 collections facilities.

In the absence of ambient air quality objectives, it is not clear what course we should take with respect to sulphur oxide emissions. Will, for example, a tall stack be acceptable? If realistic recommendations on sulphur 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 6 months after 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 particulates 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 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.

Union Carbide's Board Chairman, Birney Mason, Jr., followed this up with a further letter dated February 17, 1970, pledging cooperation, as follows:

FEBRUARY 17, 1970.

Dr. JOHN T. MIDDLETON.

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, West Virginia-Marietta, Ohio, area. Contrary to the conclusion 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 pollutants 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 Jan. 27, 1970. Dr. J. S. Whitaker also submitted general comments in his letter to you of Jan. 29 and indicated our intention to cooperate fully in implementing an air pollution abatement program for the Parkersburg-Marietta area.

When 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 Ferroalloys Division has proposed to us a schedule for installing addition 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.

BIRNEY MASON, Jr.,
Chairman of the Board, Union Carbide.

Finally, on March 19, 1970, the Parkersburg-Marietta Interstate Air Pollution Abatement Conference regulations were issued—over three years after the Conference had first been called, and three years after the Conference had been convened. Because of the long and obdurate refusal of the Union Carbide Corporation to submit the necessary data on which sulfur oxide emission standards could be established, there was a delay in the issuance of sulfur oxide pollutant standards. Finally, once this information was obtained, the amendments to the Conference recommendations covering sulfur oxides were issued on April 20, 1970. The complete statement of the Conference recommendations and the amendments follows:

RECOMMENDATIONS AND SUMMARY OF PARKERSBURG, W. VA.-MARIETTA, OHIO,
INTERSTATE AIR POLLUTION ABATEMENT CONFERENCE

U.S. Department of Health, Education, and Welfare Public Health Service
Environmental Health Service
National Air Pollution Control Administration, Rockville, Md.

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 Magesterial 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, W. Va.
Hon. Curtis M. Uhl, City of Vienna, W. Va.
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 (page 16, *et seq.*), 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(c) 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 emissions do not exceed 0.3 grain 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

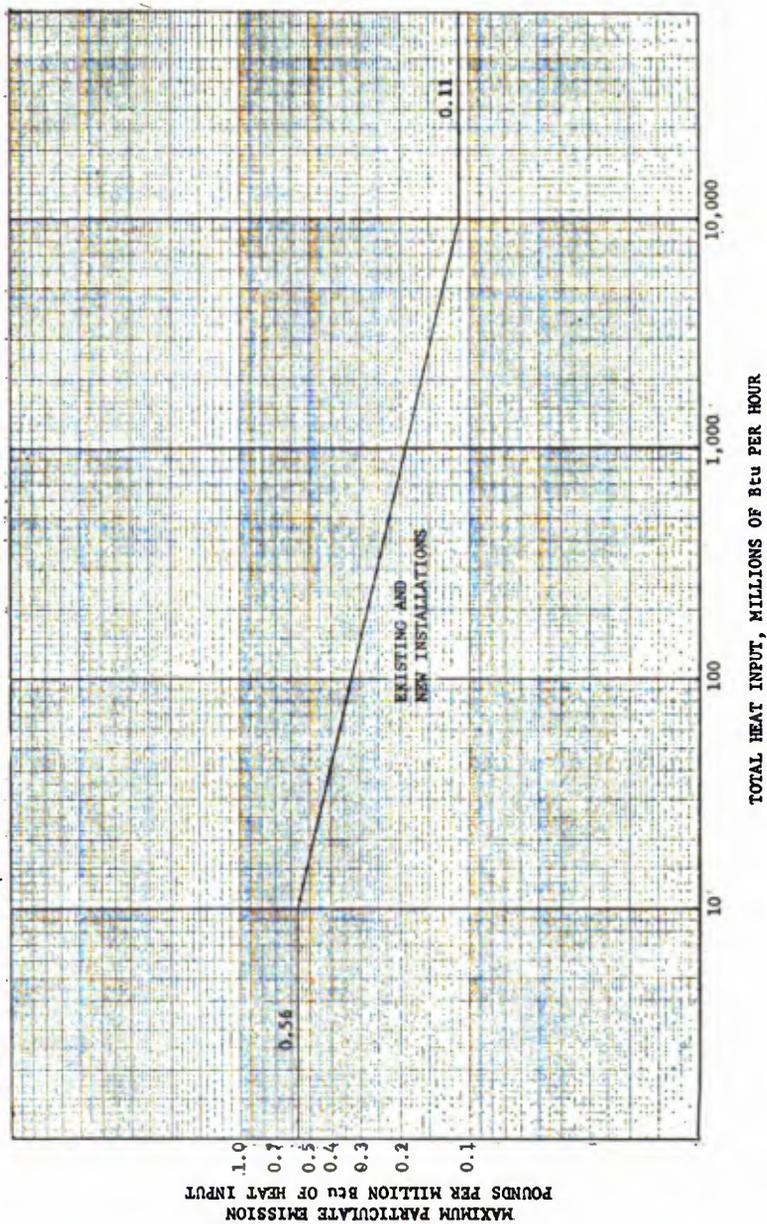
1. Emissions of particulate matter from all fuel-burning equipment whose energy input exceeds one million BTU's per hour should be limited in accordance with Figure 1, or equivalent, and that visible emissions to the atmosphere from such sources should be limited to a shade or density less than that 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 Ringlemann 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 thereof, 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 | 0.551 | 16,000..... | 8 | 16.5 |
| 200..... | .10 | .877 | 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 | 4.10 | 70,000..... | 35 | 41.3 |
| 2,500..... | 1.25 | 4.76 | 80,000..... | 40 | 42.5 |
| 3,000..... | 1.50 | 5.38 | 90,000..... | 45 | 43.6 |
| 3,500..... | 1.75 | 5.96 | 100,000..... | 50 | 44.6 |
| 4,000..... | 2.00 | 6.52 | 120,000..... | 60 | 46.3 |
| 5,000..... | 2.50 | 7.58 | 140,000..... | 70 | 47.8 |
| 6,000..... | 3.00 | 8.56 | 160,000..... | 80 | 49.0 |
| 7,000..... | 3.50 | 9.49 | 200,000..... | 100 | 51.2 |
| 8,000..... | 4.00 | 10.4 | 1,000,000..... | 500 | 69.0 |
| 9,000..... | 4.50 | 11.2 | 2,000,000..... | 1,000 | 77.6 |
| 10,000..... | 5.00 | 12.0 | 6,000,000..... | 3,000 | 92.7 |
| 12,000..... | 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:

$$E = 4.10 P^{0.97}$$

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:

$$E = 55.0 P^{0.11-40}$$

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.

RECOMMENDATION V.—PROGRESS REPORTS

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 the 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 area, 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 per cent 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.

Flouride 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, hazard 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.
- Etting, 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.

- Foster, 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.
- Fritto, 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 (Statement presented by Mr. James Fittro).
- Helmick, Car 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 de Nemours & 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, Herschel 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.
- Whitacre, Mary, M.D., Health Commissioner, City of Marietta, Ohio.
- White, Mrs. Alina 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.

AMENDMENTS TO RECOMMENDATIONS AND SUMMARY OF PARKERSBURG, W. VA.-
MARIETTA, OHIO, INTERSTATE AIR POLLUTION ABATEMENT CONFERENCE

U.S. Department of Health, Education, and Welfare

Public Health Service

Environmental Health Service

National Air Pollution Control Administration

Rockville, Md.

INTRODUCTION

The Recommendations and Summary of the Parkersburg, West Virginia-Marietta, Ohio, Interstate Air Pollution Abatement Conference issued March 19, 1970, by the Secretary of Health, Education, and Welfare, pertain to the abatement of pollutants other than sulfur oxides.

Specific recommendations regarding sulfur oxide 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, as amended. 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.

This Department accepts and adopts the following findings and Recommendations III, B, 2, 3, and 4, which amend the March 19, 1970, issuance, and hereby transmits them to the respective agencies, in accordance with the provisions of Section 108(c) of the Clean Air Act, as amended. The summary of conference discussions included in the March 19, 1970, issuance is hereby incorporated by reference and made a part hereof.

FINDINGS AND RECOMMENDATIONS

RECOMMENDATION III, AS AMENDED.—CONTROL OF EMISSIONS FROM FUEL-BURNING

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 facilities 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 Ohio 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. 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 (see Page 11, March 19, 1970 Issuance), 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 March 19, 1970, and that full conformity with this recommendation should be achieved within 36 months from March 19, 1970.

2. Union Carbide Corporation should 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 amended recommendations, sulfur oxide emissions should 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 amended recommendations, sulfur oxide emissions should not exceed a rate of 6,750 pounds per hour.

3. No later than three months after issuance of these amended recommendations, Union Carbide Corporation should 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 should provide for the completion of such modifications as soon as possible but no later than two years after issuance of these amended recommendations.

4. Union Carbide Corporation should be required to report, in accordance with Recommendation V.B.1 (See Page 15, March 19, 1970 Issuance), its plans and schedule for controlling sulfur oxide emissions.

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 to be confined to an intra-state 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.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you Mr. Hechler, for taking time out of your busy schedule to present your views this morning.

Mr. HECHLER. Thank you, Mr. Chairman, it has been my pleasure.

Mr. ROGERS. Our next witness is a most distinguished scientist. We are very honored to have him before the committee. We appreciate his making himself available. Dr. Barry Commoner from Washington University, St. Louis, Mo.

Dr. Commoner, the committee welcomes you.

We will be pleased to have your remarks.

We understand that you do not have a prepared statement because of the time element that was involved, so the committee will be pleased to receive your testimony and then we will go into questions after you make your statement.

**STATEMENT OF DR. BARRY COMMONER, WASHINGTON
UNIVERSITY, ST. LOUIS, MO.**

Dr. COMMONER. Thank you, Mr. Rogers.

I would like to take a short time simply to outline the way in which I view the air pollution and solid waste problem.

It is very complex. Each of us looks at it in a slightly different way. My approach is that of a scientist. What I am concerned with

is the way in which our technological and industrial activities have an impact on the environmental system.

Now, the thing that impresses a biologist such as myself is that the environment is basically a biological system. For example, the air that we breathe and the oxygen that we use not only for our own bodies but, let us say, to support combustion in a powerplant—that oxygen is put into the air by the activity of green plants. Before green plants appeared on the surface of the earth, there was no oxygen in the air.

In the same way the composition of the environment, the thin skin of air, water and soil that makes up what we call the ecosphere on the earth, is a complex system of physical, chemical and biological processes. But the driving force in all of it is the action of living things. It is the living things that make the soil; it is the living things that carry out the purification in water. It is the action of living things that has resulted in the present composition of the air.

So, we have to realize that this system, which was here before we were, is essential for the support of human beings as living animals and is also essential for the support of our entire technological and productive system.

The environment is an essential resource. We can look on it as the biological capital that every productive enterprise uses.

The basic problem that we biologists see is that the impact of our technology and system of productivity on the ecosystem is destructive; pollution is the symptom of that destruction.

We sometimes react to pollution as sort of a nuisance, things smell bad, look bad; it is dangerous to health. That is all very important, of course. But if you look at it in a more fundamental way, pollution is a sign that the integrity of the environmental system that supports us is beginning to break down. It is that fundamental approach to the problem that I want to emphasize.

To give you some examples of the consequences of looking at the thing fundamentally, let me take up the question of the impact of cars, trucks and buses on air pollution. The curious thing is that the reason why we have smog in most of our cities now is not because of some accidental fault, some minor fault in the internal combustion engine. The reason why we have smog is that the engineers in Detroit have succeeded in producing what they regard to be a very effective engine. Let me explain that.

The internal combustion engine operates, of course, with cylinders. These cylinders allow the combustion of the fuel with air to go on and one of the main thrusts of the improvement of the modern gasoline engine has been to increase the pressure in the cylinder. There are very good technical reasons for doing that, for it improves the efficiency of power production; it enables you to make a very powerful engine in relatively small space. It is a more efficient engine. The compression ratio in the modern engine has been raised steadily from the old days of the Model T.

It is this technical improvement in the engine which has led to the smog problem. The reason is that smog is triggered off by the appearance in the air of nitrogen oxides which are emitted by the exhaust of the engine. When nitrogen oxides are struck by sunlight, they are converted to very reactive materials. These in turn interact with waste fuel, hydrocarbon, producing the noxious material of smog.

The reason why nitrogen oxide is emitted by the modern car engine is that because of the high pressure which has been developed, the engine runs hot. When air, which contains oxygen and nitrogen, is brought over a temperature around 700 degrees Fahrenheit, the oxygen and the nitrogen begin to interact and the product is a mixture of nitrogen oxides.

Somewhere, I am not sure when, but somewhere between, shall we say, the Model T Ford and the present high compression engines the average temperature went over 700 degrees and the engines began to produce appreciable amounts of nitrogen oxide. I have often thought that if we were all driving Model T Fords we would not have a smog problem.

The present technique for controlling smog is to put devices on the exhaust which limit the production of waste fuel, hydrocarbons. In fact this does cut down the production of smog because the hydrocarbon is a necessary ingredient. But at the same time, since the nitrogen oxides don't react with the hydrocarbons, they have to go somewhere. (I should say one of the few simple rules of ecology is that everything is connected to everything. Another rule is that everything has to go somewhere.)

The nitrogen oxides that don't react with waste hydrocarbon fuel accumulate. For example, in Los Angeles, now that they have begun to control the emission of hydrocarbons, the nitrogen oxide levels have increased; and they are themselves toxic. So one cure immediately causes another problem.

It has been proposed that catalytic devices could be put on exhausts that would get rid of the nitrogen oxides. Unfortunately, it turns out that these catalysts are poisoned by the lead in the gasoline; and the lead has been put in the gasoline in order to control the knock due to high engine pressure.

So the fundamental error is developing an engine without taking into account the chemistry and biology of the environment. You try then to patch it up by what is called a technological fix, and one fix leads to another problem and then you have to put another fix on that. This illustrates the fundamental problem—which is that the environment does not tolerate nitrogen oxides very well. If you look at a natural environment, that is without technology intervening, we find that the forms of nitrogen which occur naturally are very rarely in combination with oxygen. Nature, so to speak, "abhors" oxidized forms of nitrogen. Yet, we designed an engine which produces exactly that kind of "abhorrent" form of nitrogen and this triggers off a whole series of difficulties.

This reveals the way in which our technological development, in this case of the modern high compression gasoline engine, has been carried forward without any consideration of the impact of this technology on the environment. Now, no engineer would dream of designing an engine without taking into account the basic laws of physics and chemistry. Yet we are very willing to design an engine without taking into account the basic laws of environmental biology; and this is what is leading to our trouble. Many of our major technologies violate the laws of ecology and as a result we are getting into trouble with the environment.

This reveals why we are faced with pollution problems, but the problems get much more complicated because the changes that occur in the environment interact with each other.

For example, the reason why sulfur dioxide is such a troublesome pollutant is that it interacts with and inhibits the body's self-protective mechanism that counteracts pollution.

For example, dust is not well tolerated by the lungs and the lungs have a mechanism for getting rid of particles and noxious materials that are taken in with the air. The air passages are lined with mucous-producing cells and also with cells that have very tiny hair-like projections, cilia, which move the mucous up and gets rid of it. Thus, noxious materials that get into the lungs are trapped in the mucous and pushed out after a time.

Consider the problem of benzopyrene, a carcinogenic material found in polluted air. We know this substance can cause lung cancer. The tendency to cause lung cancer will be due to the concentration of benzopyrene in the air but also to the time of contact between the benzopyrene and the cells of the lungs. The protective mechanism cuts down the time of contact because, as fast as benzopyrene comes in, the mechanism I have described tends to push it out.

However, sulfur dioxide inhibits the action of the cilia. It tends to paralyze them. In fact, if the concentration becomes high enough, it begins to destroy the mucous-producing cells and takes off some protective layers so that a substance like benzopyrene now comes into more intimate contact with the cells of the lungs and stays there longer.

This results in what is called the synergism, that is, the interaction of one pollutant with another. If you double the total level of air pollution in the city, raising both the concentration of benzopyrene and sulfur oxide, you will get more than double the effect on the lungs because you are multiplying the benzopyrene effect by the sulfur dioxide effect. This is a very important factor; it explains why the health effects of air pollution very often can't be accounted for by looking at one pollutant alone.

It is sometimes stated that the sulfur dioxide level in the city is not toxic because we know if we expose people to pure sulfur dioxide at that level there is no observable harm. If there is no other pollutant in the air, then the body can tolerate having the purifying mechanisms inhibited. But if you put a little dust into the air, then you find that that dust remains in the lungs longer because of the sulfur dioxide effect, and that a level of sulfur dioxide, which by itself may be harmless, begins to have an effect.

For this reason it is difficult to ascribe the air pollution disasters in Donora and London years back, to any one constituent. It was the dust plus the sulfur dioxide, for example, that caused the effect. This effect can lead to confusion about pollution standards, for example. We have to take into account the interaction of air pollutants.

Another point is that we are woefully ignorant about the nature of many air pollutants. For example, the composition of urban dust is just barely known. I would say not more than 25 percent of the chemical constituents in the small particles that we call dust is known. We are therefore taking into our lungs materials which **may be** very harmful without knowing what they are.

Dust particles also bind other air pollutants. For example, we know that DDT is carried all over the world because it is picked up on dust particles which are carried in the wind. These dust particles can carry concentrations of DDT, carcinogenic material, and radioactivity into the lungs. If the particles are of a particular size, they remain in the lungs.

That is why air pollution is such a complex problem, both biologically and from the point of view of its origin in technology.

The origin of pollutants, their effects are complex on the body, their interactions in the air are also very complex. For example, about 6 months ago, the Air Pollution Commissioner in New York noticed that when the sulfur dioxide levels were brought down in New York, the smog level increased. This indicates the possibility that sulfur dioxide was interfering with the smog reaction in the air, so that when the sulfur dioxide level was reduced, the smog level increased.

We have very little information about the chemistry that is going on in the air over most of our cities. For example, at our Center at Washington University we are right now carrying on what I regard to be the first total analysis of an air shed for nitrogen dioxide and sulfur dioxide. We are using a new instrument which was developed by a geophysicist, Dr. Barringer, which operates on optical principles. We carry this instrument in the back of a station wagon. It points up at the sky; as we drive down the road, we can read off on a paper chart the concentrations of nitrogen dioxide and sulfur dioxide in the air.

Now, to my knowledge, the work we are doing with this instrument in St. Louis is the first complete analysis of an air shed. The instrument has been used intermittently in Chicago and San Francisco; many cities have stationary analytical instruments.

Some of the things we are finding are striking.

For example, if you drive the instrument downwind from one of our large power plants you see a huge rise in the SO_2 and NO_2 levels due to the plume coming out of the stack. This, together with weather information, is going to tell us how weather influences the distribution of pollutants put out by cars and power plants throughout the area.

I mention this to point out how primitive our scientific understanding of air pollution is. I think it is shocking that this type of instrument, which is an enormous improvement over the stationary methods, is not in much wide use at this time.

Much more research support is needed for this sort of study in order to really give us a picture of what is happening in the air.

Instruments ought to be developed so that we can also make widespread measurements of smog and other organic pollutants in the air as well.

The eventual problem is very complex; it originates from fundamental mistakes in the way in which we have developed our technology; and we are not doing much to understand these fundamental problems.

The problem is much more difficult and much more complex than we would guess from present Government programs. I regard the present programs as really dealing with superficialities. For example, it is perfectly clear that the way to handle the smog problem is to make a fundamental revision in the nature of the gasoline engine so

that it doesn't produce nitrogen oxides. Then you won't have to get into this endless web of trying to patch one problem with another with a device that causes a new problem.

For example, if in New York City, let us say, where 60 percent of the automotive pollution is due to taxis, if those taxis could be revised so that they operated with low-powered small engines that function at a low temperature, you could make a real dent in the smog problem. After all, there is no reason why a taxi in New York has to have an engine that will drive it at 100 miles an hour. It can't go that fast in traffic. We are lucky if a taxi beats a pedestrian in New York.

Clearly what we have to do is to design an internal combustion engine that suits the environment in that city. The main thing that it has to do is to drive a car at relatively low speeds but, most important, it has to drive it without causing the smog problem, without causing carbon monoxide problems.

Incidentally, that is another thing which illustrates the faults of technology. Carbon monoxide levels in a city like New York, in many busy intersections, are reaching the point where they can begin to have physiological effects. For example the design proposed for the crosstown expressway downtown in New York, would have brought about levels of carbon monoxide of between 50 and 300 parts per million in the area. That is enough to cause headaches; exposure to 300 parts per million for a few hours might actually cause collapse.

The failure to take account of this issue is evidenced, for example, by the fact that the approach to George Washington Bridge in New York runs beneath a large apartment house complex. Recently measurements were made in an apartment on the third floor which revealed that there was, throughout a 24-hour period, 14 parts per million of carbon monoxide in the air. Some proposals have been made to build schools in the air space over expressways.

Yet, one of the things that carbon monoxide does is to lower mental acuteness. Obviously, it does not make much sense to put a school over an expressway and expose the kids who are trying to learn arithmetic to a physiologic effect that is going to block that.

Again, this indicates that we don't think about the environmental consequences of what we do with our technology. For this reason, I think that the costs of rolling back environmental pollution are going to be very much larger than many people think. It means, for example, the remaking of the automobile industry, not only to produce engines that don't pollute the air but also in terms of solid waste. You know, everyone talks about the problem of getting rid of junk cars. One way to solve that problem, to ameliorate it a good deal, is to have the cars last longer so that they are not junked so frequently.

I am not engineer, but I would guess that it is possible to build a car that does not need to be junked in five or six years. Clearly this would cut down the frequency of junking, and therefore reduce the load of solid waste that we have to handle. But, of course, this would have an enormous impact on the economy of the auto industry.

Again, this illustrates how most of our pollution problems, in air, in water, and in soil result from the failure of technology to take into

account environmental effects. We are going to have to remake our technology and this will lead to serious economic effects on the industries that use that technology.

That is why I think the present appropriations for air pollution and other forms of environmental pollution are really quite superficial and are not going to solve the problem at all.

If we wish to remake the way in which we use technology in our economy, we are going to need to make very sweeping changes in national priorities. To me, for example, it makes no sense whatsoever for us to be spending more on developing the supersonic transport, which is an environmental horror, than we do in combating many pollution problems. If it is not flown over the United States, it will not be economically self-sufficient. If it is flown over the United States, it will expose 25 percent of the population to an auditory insult equivalent to living within a thousand yards of the airport at Kennedy. People who live that close to runways all want to move. Where is 25 percent of the U.S. population going to move to? The SST violates the laws of ecology. We are spending more money to develop that ecological mistake than we are on air pollution. That is the kind of wrong priority that I think is symptomatic of the superficial way in which we are dealing with environmental problems at the present time.

I think that the billions being spent on the space program make no sense when compared with the enormous needs in the environment. I think it makes no sense to pretend that by putting a satellite up in the air we are going to learn a lot more about the environment. I think it would be easier to get most of the needed information from instruments on the ground. That is going a long way around to learn something about the environment.

There is important weather information that we can get from satellites but, as far as I am concerned, it is a very serious mistake in national priorities to put billions into the space program and to skimp on our environmental program. At the present time we are also in serious trouble in environmental research programs because the scientific community is now in the most serious financial crisis since 1945. This is something that the public is not very much aware of.

I have seen a recent survey which shows that 90 percent of the new Ph. D.'s in physics are now without jobs. In chemistry, the figure is not quite as high. Laboratories are being closed down; young people who are now very much interested in devoting their talent to working on environmental problems find that environmental research has not been given the added support it needs to take up the slack and provide jobs.

In other words, we are disrupting the development of professional, trained people in science without developing new activities which can devote their talents to work in the environment. If this goes on for a couple of years, we will break the chain of career development. You cannot turn a scientist off, so to speak, very long without his moving into other areas; we will then have lost the huge investment of our past support, fellowships and so on, in developing these scientists.

That is another reason why I regard our present environmental program so superficial. If we were really concerned with this problem, we would take the resources being devoted to the SST and the space

program and use them to enormously increase the work of the scientific community in general and in environmental research in particular. We need to reverse our priorities.

To put it crudely, there is a lot of talk without much action.

I think I will stop there and be glad to answer any questions you may have.

Mr. ROGERS. Thank you very much, Dr. Commoner, for putting this in a very vivid way for us to see this whole problem.

Mr. Satterfield?

Mr. SATTERFIELD. Thank you, Mr. Chairman.

Dr. Commoner, I listened with considerable interest to your statement, particularly the first part when you discussed how sulfur dioxide in the air inhibits the purification mechanisms in our bodies and this enables benzo-a-pyrenes to react in our lungs to produce lung cancer.

I wonder if you have ever made your views known to HEW on this point?

Dr. COMMONER. I believe that science gets the truth by making its mistakes in public. That is called publication. Whenever I have an idea, I either publish it or give a talk and make it known.

I tend to avoid talking in anybody's private ear. I speak openly.

Mr. SATTERFIELD. I would suggest some effort be made in this direction because we have been told in this committee, just within the last year, that the Surgeon Generals just past have discarded every possible hypothesis as to the reasons for the increase in lung cancer except smoking cigarettes. I think the views you have expressed today might enlighten them.

Dr. COMMONER. I think if you will ask them you will find that they know that benzpyrene is a carcinogenic substance and is in fact suspected to be the agent in cigarette smoke that causes lung cancer.

Mr. SATTERFIELD. Yes, but they discard that any other possible source for lung cancer exists.

Dr. COMMONER. There was a Public Health survey made 5 years ago of about 20 cities. I remember it very well because St. Louis came out, I think, third highest in benzpyrene of all the cities. So it is known that benzpyrene occurs in the air. I must say, however, that analyses have not been frequent enough.

Mr. SATTERFIELD. I am not talking about benzo-a-pyrene in the air. I agree with you. I only say that the Surgeon General said to this committee last year his conclusion is that there is one hypothesis for the increase in lung cancer and that is smoking cigarettes. I think what you have said would bear on this tremendously.

I am interested also in your observation that perhaps the most immediate solution to the problems that confront us in environment is to begin rolling back. It would seem to me looking at it objectively, that man's presence on this earth and everything he has done has to some degree or other upset our ecology.

Looking forward as we must to a population growth, I am wondering if we are not in a position, from a practical standpoint, that we are not going to be able to do but so much rolling back, that perhaps the only solution available to us if we are to survive is to develop

artificial means so as to continue to live within the society we have today to try to correct our environment and restore our ecology artificially. Is this possible?

Dr. COMMONER. That is a very large subject. Let me make a few brief remarks about it.

In the first place, there is no such thing as artificial ecology. A lot of people think, that we can invent a new way of doing what nature has been long doing. Let me try to explain why I think we are not going to find such new ways.

I think the best way I can explain it is this: If I took the back off my watch and opened up the works and shut my eyes and poked a pencil into them, there is a very small chance that I would improve the watch. But it is a very small chance indeed. The most likely thing I would do is to damage the watch. Why? Because there is an awful lot of research and development behind this watch and people have very carefully figured out the right way to put the parts together. Anything I do at random is likely to be wrong.

Now, we have the same situation in biology. For example, genetic changes or mutations, can occur at random. But it is a striking fact that if you increase the frequency of mutations in an organism, 99 per cent or more of the new ones are damaging to the organism. Why? Because the organism has had, so to speak, three billion years of research and development to develop the best biological characteristics and therefore any new changes are likely to be harmful.

Now, in the same sense, if you invent a new organic substance such as DDT, and put it in the environment, the chances are that this is a form of chemistry which living things have tried out, so to speak, in the past and rejected because it is incompatible with the rest of the living system. Nitrogen oxide, for example, is not a good thing to have around in the environment and I would assume that the reason is that it is incompatible with the chemistry of life.

So, in general, living systems are complex; during their elaborate evolution they really have worked things out in ways which are very difficult for us to improve on.

The population factors in pollution also deserve comment. Here are some figures on the way in which pollution has changed, in the 20-year period, between 1946 and 1966—at a time when our population increased roughly 43 percent.

For example, in that period of time, the consumption of gasoline motor fuel, increased 358 percent. That means that the per capita use of gasoline has increased considerably. In the same way, the amount of electric power production has gone up 565 percent in that period.

This tells us that the major impact on the environment is not that there are more people. It is the way in which they are forced to carry out their business. Take, for example, electric power. In 1946-66, total fuel consumption in the country increased by 184 percent; but electric power generation now uses much more of that fuel than before. When more homes were heated by coal or oil, then the pollution was spread out over a relatively large area. As we begin heating homes with electricity, fuel combustion is localized at the power plant. If, as is the case in St. Louis, the power plant is upwind from the airshed, we pour all of that pollution right down into the center of

the city. In effect, the switch from spread-out combustion to electric power production has intensified the pollution to which cities are exposed.

I do not think it is useful to regard the pollution problem in the United States as the consequence of increased population or even of increased crowding. It is the consequence of the intensified use of ecologically unsound technology.

MR. SATTERFIELD. To get back to basics, any time there is combustion we are in a sense upsetting our ecology, are we not?

DR. COMMONER. All combustion produces carbon dioxide, but there is no reason why combustion must produce nitrogen oxides.

MR. SATTERFIELD. How about sulfur dioxide?

DR. COMMONER. All you have to do is not burn sulfur-containing fuel.

MR. SATTERFIELD. Are there any?

DR. COMMONER. Alcohol.

MR. SATTERFIELD. That is it? That's all?

DR. COMMONER. No. Some oils and natural gas have a low sulfur content.

MR. SATTERFIELD. Isn't it really a fact, that as our population grows you have to provide more things for more people through industry and there has to be increased burning of fuels in order to produce these things. I think from a practical standpoint we are not going to roll back to the point that we do away with the kind of combustions that are essential.

DR. COMMONER. All I can say is that if we don't we are going to destroy the environment.

MR. SATTERFIELD. You don't think there is any way in the world that we can impose devices at the points of exhaust that will make certain that we don't put the harmful things into our environment?

DR. COMMONER. I tried to illustrate the kind of fix you get into when you start doing that.

MR. SATTERFIELD. In other words, you are saying we either roll back or we are dead.

DR. COMMONER. That is right. I think in the next 20 or 40 years we will approach the point of no return in destroying the environment if we don't really roll back production. That is why I think this is a very big, very serious problem.

MR. SATTERFIELD. If we can roll back as far as the automobile is concerned, we have not solved more than just a small piece of the problem, have we?

DR. COMMONER. Except that it is a major part of urban air pollution.

In addition, power plants are going to have to give up their smoke stacks. I think they will have to see to it that everything that is produced is packaged up—and probably sold—instead of put out into the environment.

MR. SATTERFIELD. We have to develop a new means of fuel.

DR. COMMONER. Yes. I think it is as serious as that. In other words, we are doing our business wrong, looked at from the point of view of the environment.

The environment sustains our life and our technology. In effect, as I said before, we are on a suicidal course. We are destroying the very capability of the environment to recover from the damage we are doing to it. I think we have to look at the problem fundamentally and roll back pollution if we are to survive.

Mr. SATTERFIELD. You certainly are not very encouraging, sir, because looking forward to the future, and accepting man as we know him to be, I am afraid that it is going to be very difficult for us to take the steps that you say must be taken if we are going to survive.

Dr. COMMONER. Well, I am an optimist. After all, what is the alternative to survival? I think people are beginning to recognize it. Look at the way public concern has changed dramatically in the last six months. Take the business of getting lead out of gasoline. General Motors has announced they are going to produce engines for unleaded gasoline. Nobody has raised that problem in a sharp way as yet, but the auto industry, I think, senses the fact that the public's willingness to abide by pollution that they have sustained in the past is beginning to disappear.

Mr. SATTERFIELD. Taking the lead out of gasoline is not going to take all the pollution out.

Dr. COMMONER. No, but lead is an important problem. I think we have to make even more fundamental changes, and develop new kinds of propulsion, in order to save the environment.

Mr. SATTERFIELD. Thank you.

I have no other questions.

Mr. ROGERS. Dr. Carter.

Mr. CARTER. Certainly I want to thank Dr. Commoner for his good statement.

I believe I understand you to say if we continue as we are at the present time in 20 years or so our environment will be destroyed?

Dr. COMMONER. What I want to say is that in the next generation, let us say, 20 to 40 years, we may reach the point of no return in certain aspects of our environment.

Mr. CARTER. Would you estimate at what time life on earth would no longer be possible?

Dr. COMMONER. I think you have to think of it in this way. It is impossible to fix a precise time but I would say that if we go on as we are, in the 1980s we will have to be prepared to experience very serious environmental catastrophies.

The best example is in the case of water pollution, where it has been calculated in a Government report that the oxygen demands—and that is the critical thing in dealing with organic waste—of the total organic waste produced in the United States in 1980 will equal the total oxygen content of all the river systems in the United States in the summer months.

Of course, that is an average but that tells us that we will have met the point at which our environment is unable to accommodate that much waste. In general I have the feeling that the 1980s are the point when we must expect this kind of trouble.

Now, the kind of sweeping changes that I think are needed are not going to take place over night. For example, pilot programs will have to be carried out. This is aside from the needed research and development. I think that research plus pilot programs are bound to take of the order of 10 years to carry out. That puts the starting time right back to today.

In other words, if we don't start today with decade-long test programs to find out new ways of using our technology, we will find ourselves in a disastrous condition by the 1980's. That is my main time message, I would say.

Mr. CARTER. Is air pollution cumulative?

Dr. COMMONER. In the sense of its effect on the body?

Mr. CARTER. No, sir. In the sense of its increased presence in the air.

Dr. COMMONER. It is not cumulative in the air because the air is continually washed by rain and snow. But the air pollutants then accumulate, for example, in soil and water.

One of the most striking things that I learned recently is some work done by Russians on benzpyrene. What happens to benzpyrene released into the air. It gets washed out by rain, carried down into the soil. They found that the benzpyrene was being picked up by crops downwind from the city and not breaking down very rapidly. This raises the problem of polluting crops with air pollutants.

If you make a plot of the amount of nitrate in rain water against the local gasoline consumption, you find that it is approximately a straight line for the eastern seaboard. Wherever there is a lot of gasoline used, there is a lot of nitrate in the rainfall. The reason is that the nitrogen oxide is oxidized to nitrate and then carried down by the rain, and, nitrate causes water pollution. The State of Maine is a good case—the one point on the curve that does not fit is Maine. Maine gets much more nitrate in its rainfall than it deserves from its gasoline consumption. The reason is that the wind blows up the entire eastern metroplex toward Maine and drops a good deal of pollution on Maine.

Vincent Schaefer, for example, has found that a lot of air pollutants turn up in Maine weather in heavy concentrations. After all, everything has to go somewhere. Some of the air pollutants, unfortunately, end up in our lungs.

For example, particles of asbestos and dust distributed in the air lodge in the lungs. Asbestos is a serious air pollution problem because it causes a special form of lung cancer. When asbestos comes down from a building where men are hammering on wallboard some of it ends up in our lungs.

Mr. CARTER. Have you ever thought about the increased percentage of lung cancer in England in relation to the United States?

Dr. COMMONER. No; I don't have any specific figures on that.

Mr. CARTER. It is twice as high.

Dr. COMMONER. Yes. In fact, most respiratory disease in England is higher than it is here.

Mr. CARTER. Is that caused by increased air pollution?

Dr. COMMONER. There are some studies that tend to show that air pollution in English cities which is sometimes very high is related to that.

Mr. CARTER. Do you think that the benzpyrene that is in the air is a cause of lung cancer?

Dr. COMMONER. It seems to me that the data point that way.

Mr. CARTER. You referred to the nitrates. That is rather interesting. Of course, nitrates are used in fertilizer throughout our country.

Dr. COMMONER. That is right.

Mr. CARTER. It is polluting the streams and so forth.

What is the effect of nitrates?

Dr. COMMONER. That is another long story. In my view a significant part of the water pollution problem in the United States is due to the drainage of nitrogen fertilizer from farm lands. In Illinois, 99 percent

of the nitrate which pollutes the rivers comes from fertilizer, according to the Illinois State Water Survey and every river in Illinois except one little creek in the southeast corner is now overgrown with algae and polluted because of the excess fertilizer in the rivers.

In other words, we have a pollution problem which results from the use of fertilizer, and this is another example of a technological failure. Fertilizer is very good for increasing crop production and the farmer can use it to increase his rate of return on his investment. But part of the cost is being borne by the cities that have to use the water.

In Illinois, the city of Decatur, for example, for the last few years, every spring has had nitrate levels in its drinking water that approach and exceed the Public Health Service standards. This is going to be a very serious problem because so much of the farmers' income is now dependent on the intensive use of fertilizer. Total nitrogen fertilizer usage in the United States has gone up fourteenfold since 1945.

Mr. CARTER. I have been extremely interested in your method of analysis of air pollution. Certainly I would recommend to HEW an instrument such as you mentioned. I would hope that they would use it. We have worked for a long time to try to get criteria and standards established for pollutants in our air. Up to the present time, I think we only have two or perhaps three standards established.

Dr. COMMONER. Yes. Using that instrument, here is the sort of thing you can learn just driving down the road past the powerplant. It is a little hard to see. But there is the powerplant upwind from St. Louis. That is the road that the instrument drove on. That is the peak due to be nitrogen dioxide from the plume produced by the powerplant smokestack. It is easy to detect what a plant is doing with this sort of instrument.

Mr. CARTER. I notice you mentioned taking lead out of gasoline. What is the main purpose of taking this lead out?

Dr. COMMONER. Well, lead is a poison. The levels of lead in the blood, for example, of traffic cops sometimes begins to approach levels that are toxic. The lead level in the human body in the United States is quite a good deal higher than it was in prehistoric times. This is cumulative.

Mr. CARTER. Do you think this is a source of lead poisoning?

Dr. COMMONER. There is a good deal of debate on that. It seems to me that the rate at which lead is accumulating is so fast that we really in order to be prudent should stop disseminating it into the environment.

Mr. CARTER. We are told that one of the main reasons for taking the lead out is not this but due to the fact that it clogs up the mechanisms which remove the pollutants.

Dr. COMMONER. Right. It inhibits the catalysts that can be used. The better way to handle that is not to produce the pollutant in the first place.

Mr. CARTER. We do have one car made in Sweden that advertises that it will last about 10 or 11 years.

Dr. COMMONER. I drive one.

Mr. CARTER. That is fine.

Don't you really think that as these cars grow older that they are more likely to give off more pollutants?

Dr. COMMONER. Sure, with the present kind of engine.

What I would favor would be redesigning the engine so that they produce minimal pollutants and redesigning the car so that it does not have to be scrapped so often.

Mr. CARTER. Even that way with increasing age I am afraid we would get the same effect of increased pollution. Would you not think so?

Dr. COMMONER. Yes, but there are various ways of handling that. For example, I think an engine designed for easy replacement in a car which is designed for lasting many years longer than the engine might take care of that.

Mr. CARTER. Certainly I am in agreement with much of what you say but we can't stay at a stationary position. There are many, many things that we must do. You know England and France have developed the supersonic Concorde. In reference to the serious damage you mentioned that our SST might cause, I might say that it is my understanding that they plan for it, as is already planned for the Concorde, to fly over populated areas at a speed which is below the sound barrier.

Dr. COMMONER. Yes. That is on the assumption that it flies only over overseas routes.

Mr. CARTER. On overseas routes, of course, it will break the sound barrier. That is the intention of it. But over populated areas it is so constructed that it will not break the sound barrier.

Dr. COMMONER. That is the point I made. The present proposal is that the SST will not fly over land.

Mr. CARTER. It will fly over land but it will fly at slower speed.

Dr. COMMONER. Yes, but then it will be uneconomical for the airlines.

Mr. CARTER. Perhaps it may but that is something we have to consider. Of course, we must consider all parts of these things. I strongly support this program but as yet we at the same time can't block off others of great importance.

Dr. COMMONER. Mr. Carter, you can make the same argument that increasing the compression ratio in gasoline engines is progress. It is exactly the kind of progress that is causing environmental difficulties.

I really would respectfully suggest that the attitude that we have to have progress in the case of making things go faster, further, carrying more load, has got to be looked at very carefully because I think that it threatens our survival.

Mr. CARTER. I would agree that the air was much less polluted and healthier back in the horse and buggy days but I doubt if very many of our people would like to return to that time, actually.

Now, I am interested in the fact that I believe you stated that 90 per cent of our Ph.D.s in physics are without jobs.

Dr. COMMONER. The new Ph.D.s.

Mr. CARTER. That is something I regret very much to hear. I would like to see them employed. We need their expertise very much. We have had a problem; it is my feeling that we didn't spend all the money appropriated last year on this program. Is that correct, Mr. Chairman?

Mr. ROGERS. I think all of it was not spent.

Dr. COMMONER. On the air pollution program; yes.

Mr. CARTER. Certainly we want to fund it to the extent at which it can be used in a worthwhile manner. But just to appropriate money for money's sake without developing the capability of using it wisely, we certainly do not want to do.

Dr. COMMONER. The point I make is that there are laboratories standing empty and scientists without jobs. So if the extra money were appropriated it could be used very well.

Mr. CARTER. We will bring that to the attention of the people in the Public Health Service and see if something more can't be done. I have been greatly interested in what you have said. I think you have made a very good statement.

Thank you.

Mr. ROGERS. Mr. Kyros.

Mr. KYROS. Dr. Commoner, one of the problems we have is the current distribution of population, east coast, west coast, and below the lower end of Lake Michigan.

Aren't you going to have to redistribute the population as one of the weapons against pollution?

Dr. COMMONER. One of the points I made before you came in was that the population problem is minimal in affecting pollution in the United States. The real difficulty is that the kinds of technologies that we are using are not designed for compatibility with the environment. If people want to live in crowded cities and like it, I think that it is perfectly possible to arrange our technology in such a way that they can have that degree of crowding and not have the kind of environmental pollution that we now have.

Mr. KYROS. Population control is not necessarily vital to cleaning up the environment?

Dr. COMMONER. No. I think there is a lot of misunderstanding about that. You know, people say, the trouble is that we all consume so much.

Mr. KYROS. That is what they say. Not only do they consume so much but aren't solid trash disposal, and sewage, also factors? Why isn't population a factor?

Dr. COMMONER. Because the per capita production of pollutants has gone up. That tells you right away that it is not simply the fact that there are more people. It is the way in which the resources are being used.

Take, for example, the aluminum beer can. Manufacturing aluminum beer can uses about six to eight times more electric power than a steel beer can. Now, the minute you switch from steel to aluminum, you are increasing power production and you are increasing air pollution. I don't think it is the number of beer drinkers that has caused the problem. It is the switch to the wrong kind of can. That is my main point.

Mr. KYROS. With increased population, don't we have an increased number of motor cars?

Dr. COMMONER. Yes. Obviously nothing would be bad if we didn't have people. People do everything. But what I am saying is that in the last 20 years the increase in population has been about a sixth of the increase in pollution. Therefore, you have a six times bigger factor which is not due to population.

I think that it does not make sense to confront the population question in order to solve the environmental problem in the United States.

You know, it is pretty hard to tell somebody in poverty circumstances to lower his consumption. This raises a kind of divisive politi-

cal issue which is very unfortunate. I don't think we have to reduce our consumption. We have to consume different kinds of things so that we don't pollute the environment.

Mr. KYROS. Based on the things you talked about this morning, and they are all most interesting, wouldn't we sort of have to redesign our whole economy?

Dr. COMMONER. Exactly.

Mr. KYROS. Tell me some of the things we should be doing, specifically and concretely.

Dr. COMMONER. I think it is perfectly clear that we have to change the fundamental basis of automotive transport. I think every manufacturing plant will have to be required to be a closed system. That is, everything that is produced will have to be packaged.

Mr. KYROS. Give me a specific instance of that. What do you mean everything that is produced will have to be packaged?

Dr. COMMONER. I think a powerplant instead of having a smoke stack will have series of tubes, chemical vats, which will remove various agents and package them in a small volume.

Mr. KYROS. Who is going to pay for these new systems?

Dr. COMMONER. That is your problem, not mine. But it is going to cost. Let me make this point. It has been said, and I think Mr. Nixon said it in his state of the Union message, that this cost will have to be transferred to the consumer. That may well be. But I think it is very clear that there are ways of doing this without transferring the cost to the consumer.

Take the business of durability of cars. Now, a durable car will be a saving to the consumer and that is one way you can go. On the other hand, if you want to make elaborate techniques for recycling the cars without worrying about their durability, then that will add a cost which the consumer will have to pay.

What I am saying is that we are going to confront fundamental economical, social, and political issues in order to determine who is going to stand the gaff on this.

Mr. KYROS. You talk about autos and closed plants. Tell me some more concrete instances as to how you would reconstruct our economy and society to protect our environment.

Dr. COMMONER. It seems to me the whole question of agriculture needs to be seriously looked at. At the present time, the economy of the farms in the midwest heavily depends on the intensive use of nitrogen fertilizer. In order to control water pollution we will have to reduce the use of fertilizer. There are some technical ways of handling that. But, in any event, it is very likely that the rate of economic reform will be cut down.

The reason is that we are overdriving the soil ecosystem. The profitability of exploiting the ecosystem is being derived at the cost of a strain on the soil system.

For example, in the midwest, for example in Missouri, we have lost half of the original organic matter in the soil since 1880. The organic matter is what sustains the natural fertility of the soil. There are very good economic reasons for allowing this to happen but it leaves the country with what Mr. Nixon called our huge debt to nature.

I think we are going to have to pay that debt and pay it now. This will require us to remake the way in which we carry out our agriculture.

Take feed lots, for example. I don't know if you are aware of the fact that feed lots produce more organic waste in the United States than all of the cities of the country combined. In effect, we have a sewage problem which is twice what we think it is.

Feedlots are popular because it pays the farmer to produce prime beef which yields a high price. We are putting this stress on the environment for the sake of that added economic return.

I think we are going to have to decide whether we are going to keep incurring that debt to nature or whether we are going to remake the structure of agriculture.

Mr. KYROS. Should we stop eating beef? What should we do?

Mr. COMMONER. You don't need to eat prime beef. Some doctors would rather not have us eat prime beef because of the fat content.

Mr. KYROS. You are going to try to educate the entire United States not to eat prime beef?

Dr. COMMONER. I am not a heart expert and I don't want to get into that. As far as education is concerned, let me suggest that the education has already begun. All you have to do is visit one of your campuses. You will find that the young people are beginning to say that we have got to look carefully at the kinds of economic, technological arrangements we have. You find that young people are protesting against using aluminum rather than steel because of its effects on the environment.

Mr. KYROS. Dr. Commoner, you tell us about autos, closed plants, agriculture. You tell us generally. Besides the scaling down of beef, what else can we do?

Dr. COMMONER. That is much too simple. I was using that as an example. I am saying we will have to convert our agriculture into a system that makes more use of the natural fertility of the soil.

Mr. KYROS. Will the economic method still be a system as we know it?

Dr. COMMONER. That is not my field. I am a biologist. My view is that the stress we are putting on the environment may be fatal. Therefore, if we want to survive, we are going to have to relieve that stress and what I am suggesting to you is that to relieve that stress we will have to face very serious economic, social, and political problems. There I stop. The way in which we will handle those problems I think will be up to the people of this country and to you gentlemen.

Mr. KYROS. You have three items: autos, closed plants, and agriculture. What is a fourth item that will have to change?

Dr. COMMONER. Power.

Mr. KYROS. What would you do to that?

Dr. COMMONER. Again, I think powerplants will have to be closed systems to avoid pollution.

Mr. KYROS. Use nuclear plants, hydro?

Dr. COMMONER. One of the things that I would like to see done is much more work done on solar energy. Also, on diverse ways of generating power.

You know, the environment is stable because it is complex. One of the mistakes we make is to put all our technological eggs in one basket. I think it would be very healthy if we had variety in the ways in which we produce power.

Mr. KYROS. Besides solar energy, what do you mean to have diversity?

Dr. COMMONER. Solar energy in the southwest would be an excellent idea rather than going wholly in the direction of, let us say, nuclear powerplants. Nuclear plants raise very serious questions regarding radioactive contamination. You know, at the present time scientists in the atomic energy field have suggested that the radiation standards are 10 times too lenient. There is going to be a very serious debate about this.

If the radiation standards are made more stringent, it will have a very significant economic effect on the nuclear power industry. Again, this is an example of a technology which barged ahead without adequate consideration of the environmental consequences.

Mr. KYROS. How about fuller development of hydro? Is that less harmful to the environment?

Dr. COMMONER. I am no expert in that field. I have the impression that we have probably come close to the limits but I am not sure about that. Also, there is the question of not using so much power.

You see, as far as I am concerned, I would be perfectly happy to tell every commercial enterprise that all they can use to advertise is 100 watts. That is a big enough amount of power to illuminate a sign which says "Good Food Here", or something.

After all, we do waste an awful lot of power. Consider the buildings that have their lights on all night. You see, Mr. Johnson might have had a good idea back in those days.

Mr. KYROS. What do you have in addition to power? You have autos, agriculture, power, closed plants. What other system would you change?

Dr. COMMONER. I think that is enough to make a pretty serious impact.

Mr. KYROS. How about human beings? Would you make any change in them?

Dr. COMMONER. I guess you missed my statement that it is hard to change living things. I like human beings the way they are.

Mr. KYROS. You said that certain pollutants coming from other States on the eastern seaboard seem to rest in the beautiful State of Maine.

Have you an authoritative article you have written in that respect? Can I have it later?

Dr. COMMONER. Yes.

Mr. KYROS. How did you come to make that particular statement?

Dr. COMMONER. I used data that were produced by the National Center for Atmospheric Research in Boulder, which showed the nitrate content of rainfall in different States of the Union.

I then used data, from the U.S. Statistical Abstracts, on local consumption of gasoline and plotted one set of values against the other. All of the values for the States on the eastern seaboard fell on a nice straight line except Maine. Maine was getting much more nitrate in

its rainfall than could be accounted for by its own gasoline consumption. That suggested to me that it was picking up pollution from the other States. The wind blows that way.

Mr. KYROS. What is the effect of nitrates biologically on a human being?

Dr. COMMONER. Well, if a baby gets too much nitrate in its drinking water, it develops a kind of "blue baby?" disease—methemoglobinemia.

Mr. KYROS. Do we have a high incidence of that in Maine?

Dr. COMMONER. I have no idea.

Mr. KYROS. What else do nitrates do to the human body?

Dr. COMMONER. The other problem is that it tends to trigger off water pollution problems. For example in Maine you may have, isolated lakes in mountain areas which have overgrowths of algae because nitrate is coming in from the rain.

Mr. KYROS. We do have problems with some Maine lakes and streams but usually we have tied them down to dumping by local cities or maybe plants. Up to now, our lakes and streams have been very clean, as you know, because we have not grown that fast industrially.

Dr. COMMONER. Lake Tahoe is running into a pollution problem and part of it is due to nitrate carried over in rain which is emitted from the soil in California where they use a lot of fertilizer. I think it is something worth looking into.

I know a fish farm in Montana with a pool way up on the hill which became polluted and apparently because of fertilizer in the rain.

Mr. KYROS. In your paper you discuss this study in Maine?

Dr. COMMONER. Yes; it is a paper on the whole nitrogen problem. I will send you a copy.

Mr. KYROS. Is there any other document or authoritative work on this particular subject?

Dr. COMMONER. Yes; I can give you a whole set of records. The movement of nitrates in the environment can be thoroughly documented.

Mr. KYROS. Nothing you have said today has been facetious, rather it has been serious, but you were facetious, I am sure, when you said, "All these things will have to be done; the cost is up to you."

You know, we do have the American people. How are we going to educate them to tell them "To get the things you want, a clean environment, it is going to cost a lot of money, a lot of effort." How do we do that?

Dr. COMMONER. Just to correct the record, I said it was up to the American people and to you. I am very much convinced that the very serious charges that we are going to have to confront will never come about until there is vast public support for them. It is perfectly clear to me that this support is beginning to develop. I think that the public attitude toward environment is changing very rapidly.

For example, in St. Louis, we have had a plant that puts out sulfuric acid as a pollutant. It has been doing it for perhaps 25 years. Everybody said, "You know paint on the house and on our cars is being destroyed." This year, they threw a picket line around the plant. In other words, for 25 years they stood for it and this year they decided not to.

I think the American public is now unwilling to tolerate the kind of environmental deterioration that we have stood for a long time. Education is responsible. I am very proud of the fact that I played some role in this education along with many members of the scientific community, by taking the facts to the public.

We have committees of scientists all over the country that do exactly that. The teach-ins that are already taking place are mobilizing public interest in education. Three thousand high schools are going to be involved in the teach-in, not to speak of 1,000 colleges. You will find a new generation of young people that will insist on carrying out these environmental changes, however difficult they may be.

Mr. KYROS. There is some danger, though, as we escalate the rhetoric on the environment that some people will say, "We have to stop everything."

You don't advocate that because life, itself, will stop. There has to be some measure of how we go in the effort.

Mr. COMMONER. I am in favor of progress so long as it is compatible with survival. For that, we have to have technology which does not violate the laws of ecology. I think we can do it. I am optimistic.

Mr. KYROS. Dr. Commoner, thank you very much for your testimony. I hope to be talking to you more fully about your mention of my own beautiful fresh air, clean water State.

Mr. COMMONER. I had a suspicion you were from Maine.

Mr. ROGERS. Mr. Hastings.

Mr. HASTINGS. Thank you, Doctor.

Just briefly you have covered an awful lot of subjects here and my colleagues have asked a lot of questions on a wide variety of problems on pollution. One I would like to touch on briefly is your judgment on thermal pollution. I have heard different viewpoints.

What is your judgment?

Mr. COMMONER. In some instances powerplants have raised the temperature of the water that they use to the point where it has a serious effect on the ecological system in the water. I think there is no denying that we can't go on designing our plants in such a way that they raise water temperatures appreciably.

I have to remind you, though, that there is a law of physics which tells us that it is impossible to transfer energy without losing some of it in the form of heat. Every time you produce energy and use it you are heating up the environment, whether it is the water or the air.

Again, this leads to the whole notion that there is a limit to the amount of energy that we can expend. I think it is a lesson that we have to learn. Thermal pollution in some cases may be quite serious because it changes the way in which the organisms in the water begin to react.

Mr. HASTINGS. I have heard some people, too, when they talk about the SST suggest that the condensation caused by vapors from the SST could contribute to a cloud cover.

Dr. COMMONER. Yes.

I came in from the airport today and there were an awful lot of square clouds up there. They were clouds resulting from vapor trails by the jet planes. At higher altitudes, this would become more serious.

There is now a debate going on in the scientific community as to whether the overheating of the earth due to the accumulation of carbon dioxide is going to melt the polar ice caps—which will flood most of the cities of the world—or whether the reverse trend, the cooling of the earth due to the shading of high altitude clouds and pollutant particles, will cause a new ice age.

If we are lucky, these effects will balance out. That is a most serious example of technological blindness.

Mr. HASTINGS. I hear learned people in your profession and others who are on opposite sides of that question.

Dr. COMMONER. The reason is that the problem is so complex that it has not been worked out satisfactorily as yet. The point is that we are barging ahead with technological developments which could have enormous effects on the environment even though the scientists do not adequately understand what is going to happen. That is one reason why I think the SST is a foolhardy kind of technology.

Mr. HASTINGS. That was going to be my next question. Thank you for answering it.

No more questions, Mr. Chairman.

Mr. ROGERS. Mr. Preyer?

Mr. PREYER. Thank you, Mr. Chairman.

Dr. Commoner, I have read some of your articles with a great deal of interest. I have admired the passionate and eloquent way in which you are serving as a Paul Revere on this question of environmental pollution.

I wanted to ask one question in one area that I don't think you touched on.

It seems to me I have read something that you have written in the area of irrigation. What effect does irrigation have on the whole question of environment, disturbing the ecology?

Dr. COMMONER. Well, it can have very serious effects because of the tendency of the soil to accumulate salts. For example, in some areas of the world such as Pakistan, land is rapidly going out of use because of the salting effect of the irrigation.

Now, in California, there has been a difficult problem because of the fact that irrigation has used so much ground water that the water table fell for quite a number of years. Then, with the development of the new canal systems, the ground water was restored and the ground water level rose. As it rose, it dissolved some of the salts, particularly nitrate, that were held in the soil, and pushed them up to higher levels. The nitrate began turning up in shallow wells.

In many parts of California there is a nitrate problem in well water which has arisen in part because of this manipulation of the ground water level due to irrigation. Again I think we have handled this matter without sufficient thought.

The San Joaquin drain is a very good example. I recently saw a study which indicated to get rid of the pollution that the drain is causing in San Francisco Bay would require an engineering project that would cost a total of \$5 billion in a 50-year period. At that all that it will do is bring the pollutants out into the ocean, which is not much of a solution.

In other words, the whole agricultural system in the Central Valley has resulted in this social cost of getting rid of the pollutants.

Mr. PREYER. What you have told us, Dr. Commoner, certainly staggers the imagination. How you can remain an optimist in the face of all you have said shows that you certainly have a robust constitution despite the—

Dr. COMMONER. You know, if you talk to the young people you can't help but be optimistic because the changes that have taken place in their attitudes towards this problem in the last year is very heart warming. I think what keeps me optimistic is the fact that I look students in the eye every day. I recommend that.

Mr. PREYER. Thank you very much, Dr. Commoner. It has been very interesting.

Mr. ROGERS. Thank you, Dr. Commoner.

I think your testimony has been excellent and has opened the eyes of the subcommittee to the extent of the problem that we are facing as a Nation.

When you think, for instance, of some of our programs, you have mentioned some specifically, but other programs like the foreign aid program, and there are parts of it I am sure that are necessary, but where this Nation is putting in direct requests for \$2.6 billion and on air pollution we are spending \$100 million, that is the whole Federal effort, and on solid waste, \$15 million, we are out of kilter somewhere. I hope that this committee can bring this to the attention of the House.

What you are contributing here, I hope, will also bring it to the attention of the American people. We are going to try to do this and begin to put these problems in a proper perspective and set priorities where they should be, we hope.

You talk about a primary system. We have been looking at that and not looking at the secondary and tertiary effects of that?

Dr. COMMONER. Right. And they are all interconnected.

Mr. ROGERS. And everything is interconnected.

We had testimony on solid waste. The witness said 10 years from now if we go at the present rate there will be so much that we won't be able to manufacture collective devices, the trucks and so on, we just won't be able to meet it.

Dr. COMMONER. Right.

Mr. ROGERS. So I think the problem is closer on us than a lot of us had thought.

With your prediction here of the 1980's, which is here again only a few years away, it is time for us really to put some emphasis on it. Now, the President has done this in his priorities. Yet the actions on funding and the attitudes of the Department do not correspond with the President's statements.

Dr. COMMONER. Yes; absolutely. I agree with you.

For example, it is quite shocking to me that at the present time those of us in the profession of environmental research are desperately trying to figure out how we can accommodate the budget cuts that the National Institutes of Health are proposing in research funds.

Mr. ROGERS. Here you have probably the only device of its kind in this country, very likely—

Dr. COMMONER. Well, it is an unusual one.

Mr. ROGERS (continuing). To help monitor and do some research, to find out something about the atmosphere which we know so little about, and here is the one institution.

Now, maybe you could be specific. What is programed for your own institution?

Dr. COMMONER. Just to give you a specific example if you are interested in that, our Center for the Biology of Natural Systems operates under a grant from the National Institutes of Health of originally \$4.2 million over a 7-year period.

Mr. ROGERS. For 7 years?

Dr. COMMONER. Yes. We have other funds from private agencies as well but this is the main source of our support.

Now, as you know, those budgets are approved year by year. This year we have been asked to make a better than 25 percent reduction in the previously approved level of funding. This is after several years of operation. Naturally, we are in the middle of very important projects and in the next week or two we have got to figure out whether we can accommodate that kind of cut without losing major projects that we have under way.

Now, to me, it is rather astonishing to find that the Government is busily telling the people that the environment is a now-or-never problem, that we owe a huge debt to nature, that we have got to do something about it, and at the same time funds already approved are being cut back in an institution which is trying hard to get its job done.

Even more serious is the fact that there are many institutions that want to set up new programs. I think it is clear that while all this talk has been going on there has been a major recession in the financial support of the American scientific community, including areas of environmental work.

I think this is foolhardy because all it will do is to interrupt on-going projects and waste the previous investment in research.

Mr. ROGERS. I agree with you. I hope that we will be able to do something about this, Dr. Commoner.

I think your testimony gives us a great basis for some action. We are very grateful for your being here with the committee.

Any other questions?

Mr. CARTER. Yes, sir.

I just want to say I, too, regret that it has been necessary to decrease the funding. Your Washington University is one of the many. We are told that this is necessary throughout the country. Of course, the Federal Government has done this. The administration is trying to combat inflation by doing it.

I am in hopes that they will increase the amount of funding in the future but this has not been done just during the past year. There has been a trend this way for the past two or three years because of inflation.

Thank you, Mr. Chairman.

Mr. ROGERS. I think, without question, this started under a prior administration. It has been carried on. It is quite bipartisan as far as the cut goes which is unfortunate.

Dr. COMMONER. Yes, but it has put the scientific community in the worst financial position that it has been in since 1945. I think you are right; it is probably the cumulative effects of several administrations, making it doubly bipartisan.

Mr. ROGERS. Right. What we are trying to do and this committee acts bipartisan, I might say, we are going to try to help reverse that trend now particularly in the environmental field.

We think your testimony has been most helpful. Are there any other questions?

If not, thank you so much for being here. We are sorry to have imposed on your time. We were supposed to let you go at eleven.

Dr. COMMONER. Thank you, Mr. Chairman.

Mr. ROGERS. Our next witness is Mr. Myron V. Anthony, who is chairman of the Air Quality Committee, Manufacturing Chemists Association, 1825 Connecticut Avenue NW., Washington, D.C.

Mr. Anthony, it is a pleasure to welcome you to the committee. We will be glad to receive your statement.

You may read it or highlight it for us, whichever you prefer.

You might identify your associate.

STATEMENT OF MYRON V. ANTHONY, CHAIRMAN, AIR QUALITY COMMITTEE, MANUFACTURING CHEMISTS ASSOCIATION; ACCOMPANIED BY DR. KENNETH JOHNSON, STAFF ENGINEER

Mr. ANTHONY. My name is Myron V. Anthony. I am appearing as a witness on behalf of the Manufacturing Chemists Association, a nonprofit trade association of 175 U.S. company members, representing more than 90 percent of the production capacity of basic industrial chemicals within the country. I am professionally employed by a major chemical company as director of its environmental control activities, and am currently serving as chairman of the MCA Air Quality Committee.

I am accompanied by Dr. Kenneth Johnson, a staff engineer, Air Quality Program of Manufacturing Chemists Association.

Mr. ROGERS. Mr. Johnson, we are pleased to have you with us today.

Mr. JOHNSON. Thank you, Mr. Chairman.

Mr. ANTHONY. The bills now before your committee propose numerous and extensive amendments to the Air Quality Act of 1967, and time does not permit us to discuss each of them in detail, or to define MCA viewpoints with respect to each of their proposals. There are, however, a number of provisions that recur, in various forms, in a number of the bills, and that pertain to aspects of air resource management that are of deep concern to the members of our association. We will offer specific comments on these, and then outline some basic tenets on characteristics that we hold to be essential to any sound and rational air pollution control program. We ask you to measure any other bills in this area against the benchmarks so drawn.

If we are to define pollution in terms of the unwanted effects that may accompany excessive concentrations of contaminants in our

atmosphere, it will necessarily follow that a careful statement of the relationships between those effects and the contaminant concentrations causing them is basic to the formulation of any rational program of pollution control.

We believe the appropriate criteria document should be issued before public hearings for the setting of ambient air quality standards for any given contaminant. Whatever the role accorded such statements in the Federal program, their usefulness cannot be denied. Five such documents have already been prepared by the National Air Pollution Control Administration (NAPCA), and a number of others are well along the way. We feel that this work should continue, regardless of the legal status ascribed to these documents. We oppose the provisions of H.R. 15848 repealing the directives to the Secretary regarding the Criteria Documents, unless provision is made for alternative mechanisms for their preparation—such as the independent council proposal offered by Dr. James H. Sterner to the Muskie Subcommittee July 31, 1968, and which MCA warmly seconded in its statement of November 8, 1968 to that subcommittee.

A few moments ago, we referred to one definition of air pollution. In spite of all the talking and legislation that it has devoted to this topic, Congress has yet to define "air pollution" as that term is used in its enactments. The incorporation of an appropriate definition in any legislation adopted at this session would be a productive step. We suggest that now used in a number of the States, including Illinois, Louisiana and New York.

"Air pollution" means the presence in the outdoor atmosphere of one or more air contaminants in such quantities and of such characteristics and duration as to be injurious to human, plant, or animal life or to property, or as to unreasonably interfere with the enjoyment of life and property. Section 1267 of the Consolidated Laws of New York.

The selection of ambient air quality standards that are rationally related to the effects that the electorate wishes to prevent is a sophisticated process calling for the application of our highest skills in science, engineering, medicine, and law. Unfortunately, the recent experiences of hearing boards engaged in this process indicate that the procedures established by the present Act are not necessarily conducive to the exercise of such deliberation. Furthermore, these experiences have shown that little consideration is being given to those local factors enumerated by the Senate Committee on Public Works in their report on S. 780 (90th Congress) as being appropriate to the setting of regional air quality standards. Taken in this frame of reference, the proposals made in several of the pending bills to direct the Secretary to adopt and promulgate ambient air quality standards applicable to the entire nation appear to have merit. We would urge that the standards he may be permitted to set be those necessary to protect the public health. Section 109 would still permit more stringent standards, for esthetic reasons, to be adopted by state or local jurisdictions.

None of the bills now before this committee would require that the Secretary hold hearings before setting national ambient air quality standards. Although we recognize the inefficiency of the public hearing as a deliberative process, nevertheless, it does have the merit of creating a public record of the scientific evidence upon which the standards are based, and provides the Secretary with a forum in which

he can, through the publishing of his findings, establish a "regulatory history" that can be of great value in providing guidance to the implementation and enforcement of his regulations. Unless some alternative means can be provided to fulfill these roles, we would most strongly urge that national ambient air quality standards be promulgated only after public hearings, and findings by the Secretary that the proposed standards are supported by the weight of the evidence presented.

Should this Congress adopt the concept of uniform national ambient air quality standards, we would ask that, at the same time, it define in clear and unambiguous terms a rational policy on the "antidegradation" question.

This committee now has before it proposals such as that in Section 113(a) of H.R. 14484 which would require that ambient air quality standards "shall as a minimum insure * * * the upgrading of existing air quality." With national ambient air quality standards, they and the Federal back-up authority to enforce them, would apply to all our regions that are now rural, recreational, or otherwise unindustrialized. Although we share with this Congress the desire to protect our remaining undeveloped areas, to the degree that such preservation can be made compatible with our other national goals, we see little prospect that population growth and its accompanying industrial expansion can be prevented entirely from encroaching upon areas that now are undeveloped. National policy, especially if ensclosed in statutory language, should encourage, rather than inhibit, the management of our remaining "clean" areas in accordance with a careful weighing of all the equities. An unqualified edict against any or every "degradation" hardly conforms to this criterion.

The adoption of uniform national ambient air quality standards would increase, rather than diminish, the importance of tailoring local abatement strategies to local conditions. In any rational and efficient abatement program, the jurisdiction and authority of the control agency should be commensurate with the geographic extent and nature of the problem. We cannot expect effective control in a metropolitan complex containing dozens of governmental units through the independent actions of each unit. Neither can we assume that a State agency, with responsibilities for many cities of widely varying topography, meteorology, and patterns of industrial development, will adapt abatement strategies to each such city with the discrimination and sensitivity to local problems that can be exercised by a board concerned solely with that region. We oppose the repeal of the section of the Air Quality Act of 1967 creating Air Quality Control regions. Even should their ambient air quality standards setting function be eliminated, their usefulness and need remain. If the current machinery for the establishment of these regions and their control agencies is too cumbersome, perhaps it may be streamlined, but we do not believe that it would be helpful to abandon the progress that has already been made in creating a body of regional authorities to cope with regional problems.

Consistent with our position that regulatory authority should be exercised by an echelon of government with jurisdiction commensurate with the geographic dimensions of the problem, we would accept, as a concept, that certain classes of stationary sources be subject to Federal regulation to protect the ambient air quality in

nonadjacent regions subject to contamination by their emissions. Emission restrictions imposed under this authority should, in each case, be appropriate to, and necessary for, the attainment of the specified ambient air quality standards. Uniform national emission standards are not justified by either economics or science. We would limit the extent of such Federal authority more strictly than is provided in H.R. 15577 or H.R. 15848, making it applicable only to classes of new plants that, by the scale or nature of their emission, may constitute a national problem, and further provide that the exercise of such Federal authority would pre-empt controls of the plants so regulated.

Where the emissions of a given plant, by reason of their residence time in the atmosphere, and the quantities in which they may be emitted, would have a significant effect upon the ambient air quality in areas beyond the jurisdiction of the State or interstate agencies under which they would otherwise operate, their regulation may properly be a Federal function. Conversely, such plants, constructed and operated within the guidelines provided by Federal regulations, should have protection against arbitrary or punitive standards that may otherwise be invoked locally when the inevitable commercial and residential growth builds up around them.

The views just expressed are not to be interpreted as a departure from our strong support for the congressional policy expressed in Section 101(a)(3) of the Clean Air Act, "that the prevent and control of air pollution at its source is the primary responsibility of States and local governments." We wish to indicate our most determined opposition to any reversal of this policy, such as that proposed in Section 2(b) of H.R. 13492.

We oppose granting the Secretary new authority to exercise Federal controls over "emissions extremely hazardous to health" as proposed in Section 8 of H.R. 15848 on the grounds that no need therefor has been shown. In our judgment, substantially all of the sources that might be so categorized are now under the control of the Atomic Energy Commission. If others exist, and if they constitute an imminent endangerment to the health and welfare of any persons, the Secretary now has authority to abate them under the provisions of Section 108(k) of the Clean Air Act of 1967.

Several bills before this committee deal with the subject of motor fuel additives. In general, we feel that the present knowledge is inadequate for the effective abatement of photo-chemical smog through regulation of the composition of fuels or use of additives. Almost two and one-half years ago, the Congress, in the Air Quality Act of 1967, authorized the Secretary to require the registration of fuels and additives (Section 210(b)) and to set standards for the limitation of contaminants in vehicle emissions that he found a hazard to the health and welfare of any persons (Section 202(a)). The fact that, to date, he has exercised neither authority with respect to any fuel additive (or exhaust product thereof) would seem to indicate that either the knowledge necessary for the effective utilization of this authority or the need therefor is lacking.

The Secretary has represented that he has not proceeded under Section 210(b) because the informational items authorized in that section are inadequate for his purposes. The fuels and additive industries, however, have freely offered to supply, on a voluntary basis,

available information that he may request. We know of no instance in which any such request has been refused. We reiterate our views that the informational requirements for registration of fuel additives not be subject to abuse as an indirect licensure mechanism, and urge that Section 210(b) in the act be retained without amendment. If Congress is unwilling to leave the filing of additional informations on a purely voluntary basis, we would suggest that any additional requirements be incorporated in a separate subsection of the act, and be enforced by the application of civil penalties.

We believe that the authority proposed in Section 5 of H.R. 15848 to be given the Secretary to regulate the use and composition of fuels and additives is premature. The basic justification offered by the supporters of this provision is that, by the elimination of lead alkyls from motor fuel, more effective and longer-lasting emission control devices could be developed for general use. We are sure that the testimony already presented here has convinced this committee, as a minimum, that expert opinion on this point is divided. We ask your careful consideration of the technical evidence on this point that has been and will be brought before this committee.

Although the long-term significance of the problem is inescapable, the present urgency for a decision on lead is debatable. The massive economic and technological implications inherent in any regulatory intervention are obvious to all of us. Under these circumstances discretion would dictate that we tread cautiously in this area in which improper judgments would have such far-reaching and difficult reversible effects.

Should Congress reject the views we have just expressed and deem it necessary for the Secretary to have, in ready reserve, authority for the regulation of fuel composition and additive use, we would urge that such authority be circumscribed with safeguards to minimize the likelihood of promulgation of regulations inappropriate for the purposes they are designed to achieve. To that end, we suggest language requiring the Secretary to hold public hearings before adopting any such regulations, and to make findings, based on evidence presented at such hearings, to the effect that:

(1) The emissions proposed to be controlled constitute a significant risk to the public health and welfare;

(2) There are no feasible alternatives for the control of these emissions other than through the control of fuel composition or additive use; and

(3) The proposed regulations may reasonably be anticipated to be effective in abating the risks to the public health and welfare cited in the first finding.

We would further urge that, in any challenge of regulations issued subsequent to such findings, these findings be subject to judicial review, and that the court be required to find that the weight of the evidence submitted in the hearings supports the findings of the Secretary before it sustains the challenged regulations.

Again, should authority be granted and regulations issued, we would hope that the problem of motor vehicle emission control would be recognized as requiring the cooperation, as equals, of the engine, control device, fuel, and additive manufacturers. The language of section 5(b) of H.R. 15848, requiring subservience of the fuel and additive industry to the demands of the makers of control devices,

seems particularly inappropriate. Furthermore, the requirement there proposed for universal compatibility among all fuels and additives and all control devices may unduly restrict innovative research and development. Although we would not suggest that the petroleum industry be required to proliferate the number of fuel grades it distributes, neither should it arbitrarily be prohibited from offering alternative types of fuel for use in vehicles with dissimilar kinds of control devices.

We now digress from the bills already before this committee to comment briefly on a provision of S. 3229 that may later reach this body. This would add a new section to the Clean Air Act providing the Secretary with authority to regulate solvents and other materials. Although the language of the bill, as introduced, is extremely broad, its intent, as explained in the news release accompanying its introduction, is to authorize a "Federal Rule 66."

The adoption of solvent control regulations in a number of western jurisdictions to help ameliorate their photochemical smog problems has been widely advertised. The extent to which similar restrictions in other areas may become necessary or desirable will depend in large part upon the speed with which automotive emissions are brought under control.

At the present time, this is a problem peculiar to a limited number of localities, and subject to control at the local level. Where restrictions upon solvent vapor discharges are necessary, industrial operations should be given the option of solvent substitution or vapor control. A somewhat different problem exists with respect to compounded, consumer end-use items. Retail buyers generally have neither the knowledge nor the opportunity to influence the solvent systems used in the polishes, paints, and insecticide sprays they purchase. Of these, only the architectural coatings constitute a sufficient volume of solvent use to justify consideration of possible controls.

The argument has been offered that, should the regulation of such coatings be left up to local authorities, the multiplicity of the varying requirements in various jurisdictions would constitute a serious burden upon the industry. However, because of the transportation costs, paints and related products are generally compounded locally, and distributed only in a limited area surrounding the factor, and we question the validity of the basic argument.

While we do not presume to speak for the architectural coatings industry in this regard, we have grave misgivings about control authority that may be adopted on these grounds but in effect result in the unjustified and arbitrary regulation of a wide range of chemical products. If and when this proposal comes before this committee, we ask that any regulatory authority granted be carefully phrased to limit it to those cases for which both need for control in a substantial number of areas can be shown, and for which valid commercial considerations preclude effective control at the local level.

An additional consideration that mitigates against the imposition of Federal solvent controls at this time is our lack of knowledge to implement such authority with any confidence that the net effect of the solvent substitutions required will be beneficial. A 2-year study of the photochemical reactivity of selected solvents, sponsored

at the Stanford Research Institute by a segment of our industry, demonstrated the difficulty of predicting, and the substantial impossibility of even measuring, the effects of slowly photoreactive solvent vapors upon irradiated simulated automotive exhaust mixtures.

With respect to other legislative proposals on which we have not commented, and that are now or later may come before this committee, we ask that you judge them by the degree to which they will result in abatement programs meeting the following criteria:

(1) Adopted ambient air quality standards are rationally related to the atmospheric effects they are intended to abate.

(2) The emission restrictions imposed are necessary for, and adequate to attain, the desired ambient air quality.

(3) The emission restrictions constitute an efficient and equitable distribution of allowable emissions among the sources in the area.

(4) The controls are placed upon the character and quantity of the emissions, leaving to the source operator the maximum opportunity to select technology and equipment most appropriate to the control of his processes.

(5) The administrative and enforcement procedures provide reasonable protection against arbitrary and capricious administrative action, and adequate authority to secure expeditious abatement of the pollution.

An additional goal that should be sought is that the statutory language of any proposal you may endorse reveal the legislative intent with sufficient detail and precision that the control agencies, industry, and the courts may all agree on its interpretation. This last point deserves special comment. We regard as inappropriate for the purposes of pollution control legislation, any delegation of authority couched in terms relating only to the judgment or opinion of any single appointive officer. We have touched upon this point with respect to specific legislative proposals, and ask that comparable circumspection be exercised in drafting the terms in which any quasi-legislative authority is delegated to an administrative agency.

The summary, we wish to reaffirm the commitment of the Manufacturing Chemists Association and the industry it represents to the protection of our environment and the restoration of the quality of our atmosphere. Our testimony here today has been offered in the sincere hope that it will aid the committee in the formulation of legislation effective in furthering these goals.

We thank you for the opportunity of presenting these views to you. If we can be of any assistance as your consideration of this legislation proceeds, we would be glad to have you call upon us.

Mr. ROGERS. Thank you, Mr. Anthony, for your statement. It was very comprehensive.

Mr. KYROS, do you have any questions?

Mr. KYROS. Do I understand that you object to setting Federal standards for emissions in the air? Is that right?

I refer to page 7 of your testimony where you state, "We oppose granting the Secretary new authority to exercise federal controls over 'emissions extremely hazardous to health'."

Mr. ANTHONY. Yes.

Mr. KYROS. In other words, you would leave the Act as it is currently?

Mr. ANTHONY. We think the Secretary has the power at the present time to control these hazards to health.

Mr. KYROS. Did you listen to the testimony just given by the biologist, Dr. Commoner?

Mr. ANTHONY. Yes.

Mr. KYROS. Wasn't that alarming to you?

Mr. ANTHONY. In a measure.

Mr. KYROS. Do you dispute any parts of it?

Mr. ANTHONY. Well, I happen to be a biologist myself. There are some things that I, personally, would not quite agree with.

Mr. KYROS. What didn't you agree with?

Mr. ANTHONY. Well, some of the alarming effects of sulfur dioxide and of particulate matter. I think we are all agreed that in sufficient concentration these are very harmful things. But I am also reminded of a drive I made through Sudbury, Ontario, a few years ago, where there are a number of smelters. The landscape resembled the moon to the extent that it was completely devoid of vegetation because of the sulfur dioxide fumigation.

I did some checking to learn whether or not the residents suffered adverse health effects because I had seen references to the SO₂ damage to their pine trees. The checking revealed no evidence at that time of an adverse health effect upon these people. Yet in a community with mining and industry there must have been particulates associated with the sulfur dioxide.

What I am saying is that there may be real doubt as to how toxic these materials are at the concentrations now being found in the atmosphere. I am not a physician; I cannot comment in detail on this.

Mr. KYROS. Don't you believe that the Secretary under Section 8 should indeed have the power to look at stationary source emissions and determine whether they substantially endanger the public health so that he can act? Don't you think he needs that power?

Mr. ANTHONY. I think what we are saying is that he has that power under the present Act.

Mr. KYROS. Under Section 108(k)?

Mr. ANTHONY. That is right.

Mr. KYROS. Do you have that in front of you?

Mr. ANTHONY. Yes.

Mr. KYROS. What does it say?

Mr. ANTHONY. "Notwithstanding any other provisions of this section——"

Mr. KYROS. Don't read the whole section. I think Section (k) provides the power here.

Mr. ANTHONY. Yes.

Mr. KYROS. The same power as in Section 8 of this present bill, H.R. 15848.

Mr. ANTHONY. Yes. It permits him through the Attorney General to bring suit on behalf of the United States.

Mr. KYROS. Precisely. However, he can set standards after hearing and notice; is that right?

What I am saying to you is that under Section 108(k) he is forced to go to the U.S. Attorney for a lawsuit; is that correct?

Mr. ANTHONY. I am not an attorney but I assume that is correct.

Mr. KYROS. In any particular instance or particular locality.

Mr. ANTHONY. Yes.

Mr. KYROS. Whereas, under the new power that he would have he can from time to time by regulations establish standards with regard to emissions. So that is considerably different. You understand that, don't you? It is a lot different to go the route of a lawsuit than to sit back and deliberately establish regulations. Isn't that right?

Mr. ANTHONY. Yes. But after you establish regulations you have to enforce them, do you not, perhaps through a lawsuit. So there is not too much difference.

Mr. KYROS. Yes. I find most times industry wants regulations established so that there does not have to be any lawsuit, whereas, in this case you really have to go through a lawsuit. I think there is a difference. What worries you about giving him this power? Are you scared that the Secretary of Health, Education, and Welfare will misuse this power given to him?

Mr. ANTHONY. I would personally be concerned about that.

Mr. KYROS. How?

Mr. ANTHONY. Well, he may be acting on information that is not complete for he may not have all the story.

Mr. KYROS. Why would he not have all the story? He can go there and establish standards by conducting hearings and take evidence and have his people check.

Mr. ANTHONY. If that is done and it is done in a thoroughly scientific manner such as we had proposed some time back, as Dr. Sterner suggested. We would then get people who are recognized authorities, representing societies, who really are technically competent. If these people set the standards, that is all right. But as the proposed legislation is presently worded, I don't understand that standards will be set in that way.

Mr. KYROS. Mr. Anthony, do the individual and separate States now have themselves the kind of people you talk about, all 50 States have that kind of group to make those kinds of studies and reach decisions any better than the Secretary of Health, Education, and Welfare does?

Mr. ANTHONY. No; not if the Secretary uses that information that is available to him.

Mr. KYROS. The point I want to make with you is, what is there in the back of your mind suggests to me that you are recalcitrant in coming forward and saying that you are not afraid of his abusing the authority granted him? In what particular instance has the Secretary of Health, Education, and Welfare acted in a manner that makes you so reticent to agree with what is stated in this bill, section 8?

Mr. ANTHONY. I have seen some instances at the State level where actions were taken that seemed to be a little bit beyond what I thought was the intent of the law.

Mr. KYROS. We are talking about the feds now, talking about the Secretary of Health, Education and Welfare, not the State level.

Mr. ANTHONY. I understand that the Secretary of Health, Education, and Welfare has NAPCA as his agent to take these actions. That is the way it has worked out in practice.

Mr. KYROS. Now, the other thing you said on page 8 of your statement, will you pay attention to that, please?

Mr. ANTHONY. Yes, sir.

Mr. KYROS. You said that the fact that to date the Secretary has exercised neither authority with respect to any fuel additive would seem to indicate that either the knowledge necessary or the need therefor is lacking.

Mr. ANTHONY. Yes.

Mr. KYROS. You know there must be more reason than that. What about sufficient funds and staff to do the job?

Mr. ANTHONY. It is my understanding, that they have had more money than they have been able to allocate so far.

Mr. KYROS. Were you here the last two days when the Chairman here was questioning?

Mr. ANTHONY. No, sir; I was not.

Mr. KYROS. I don't think that was the testimony. I don't think that was the testimony.

Mr. ANTHONY. It is my understanding that NAPCA has money but does not have adequate technical manpower. That is why so many of their surveys are being made at the present time under Federal contracts with private firms.

Mr. KYROS. You are saying, then, that we should not go any further in regard to additives, fuel additives, as is proposed in H.R. 15848?

Mr. ANTHONY. At the present time, we just don't think that it is necessary to go farther because there are so many unknowns.

Mr. KYROS. Who is going to do the research?

Mr. ANTHONY. I think it would be well, perhaps, to explore this idea that Dr. Commoner mentioned. Maybe there are university laboratories that would be available. Certainly, the Federal Government has research facilities. I agree wholeheartedly that there is a big research program that should be undertaken. We need to be guided by facts rather than emotionalism in control of air pollution.

Mr. KYROS. You agree that what Dr. Commoner said about lead seems to be striking terror into the hearts of everybody nowadays. Do you agree with some of those statements he made about lead as an emission from gasoline?

Mr. ANTHONY. Well, he made quite a number of statements about lead. Truthfully, I am not as familiar with the effects of lead. Our company doesn't happen to be interested in lead per se. Dr. Johnson may have some comments on lead.

Mr. JOHNSON. There are two basic arguments made in favor of the elimination of lead as a motor fuel additive. One is the allegation that the lead of itself constitutes a contamination to the atmosphere and to our environment and which will eventually, if it does not now, create a public health problem related to this lead in the environment.

Certainly, we cannot be complacent about this problem. With the continued growth of automotive fuel use, the increase in use of automobiles, the number of automobiles on the road, the number of miles driven by each car, we must consider the possibility of approaching the time when lead can no longer be tolerated in increased quantities in the environment.

The other problem is that the lead, by reason of its fouling of catalyst surfaces, interferes with the development of an effective catalytic afterburner for the control of hydrocarbon emissions, and possibly of oxide of nitrogen emissions. The technical evidence on this point is far less clear. Some catalytic afterburners have been developed. Most of them are based upon noble metals such as platinum

and platinum-type metals which just do not exist in adequate quantities in this world to support a technology based on that kind of afterburner.

The other problem touched on by Dr. Commoner is that our present motor vehicles, even with the turnback in compression ratios proposed for the next two or three model years, will require the substitution of a substantial quantity of material, such as aromatics, which are far more photoreactive than the hydrocarbons in present lead augmented fuels if we are to produce a satisfactory lead-free fuel.

Now even if we can obtain a decrease in emitted hydrocarbons by this technology, the greater reactivity of the hydrocarbons that are emitted through the exhaust pipe, or are lost in transportation, transfer, and the distribution system may result in at least as severe or possibly a more severe photochemical problem than we have today.

There is no clear answer on this. Our knowledge is just not adequate to permit us to formulate a rational program that we can have any confidence will result in an amelioration of the problem we are facing and trying to solve.

Mr. KYROS. What about the section in the bill, however, H. R. 15848, section 5, which provides certain powers to the Secretary about regulations he may promulgate concerning the use of fuel additives and the possibility of his limiting if he wants to, what goes into fuel?

What do you think of that section?

Mr. JOHNSON. As our testimony indicated we feel that the technical knowledge, is not now adequate to permit the effective and rational utilization of this authority. However, as our testimony also indicates, should the Congress not agree with our judgment on this point we offer language which we believe will reduce the probability or possibility that through inappropriate regulation a cure may be offered which is worse than the disease.

Mr. KYROS. You say not enough knowledge. If you will read the act you will see that under section 5(c) the Secretary has the power to require manufacturers to provide him with information necessary for him to determine the emissions resulting and the effect of the performance of emission control devices.

So he has the power to generate information. Why should he not do that? Why should he not be able to generate information and turn around and say we have something here that we can use?

Why do you want to deny him that power?

Mr. ANTHONY. Certainly we would not deny him the power to generate information. In fact our testimony clearly indicates that we would authorize the Secretary to acquire as a matter of law any additional information he needs to formulate rational strategies here.

We are all for the generation of more specific, more valid, more pertinent information on this very complicated question.

Mr. KYROS. Thank you very much.

Mr. ANTHONY. You asked me whether there were any other things on which I disagreed with Dr. Commoner.

Mr. KYROS. That is a considerable unfair question because it is so broad. I did not want to put you in a position where you thought I was limiting you to one or two items.

Mr. ANTHONY. Personally I think the committee is overlooking a very important thing if they deemphasize the population explosion.

Mr. KYROS. How do you know we are overlooking it here?

Mr. ANTHONY. He was deemphasizing population growth and saying this is a relatively minor problem.

Mr. KYROS. We don't think it is a minor problem. I want you to know that. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Anthony, I understand from your statements that the Manufacturing Chemists Association and the industry are for protecting the environment and restoration of the quality of air, of our atmosphere.

Mr. ANTHONY. Yes.

Mr. ROGERS. Yet throughout the statement I get the impression that you really don't want us to do much but more study the problem than anything else.

Mr. ANTHONY. We did not mean to leave that impression. We are only thinking we should do it in a rational and scientific way.

Mr. ROGERS. I do think we have enough knowledge to at least begin to do something about the smog problem.

We don't have all the knowledge yet but I think we have something that we can begin to take action on. As I understand from your testimony you are willing for the Secretary to have the right to establish the criteria for the quality of air nationwide.

Mr. ANTHONY. Right.

Mr. ROGERS. But you don't think he should have the right to control emissions nationwide. Is that basically it?

Mr. ANTHONY. We said as far as new installations are concerned we thought he should have that right in certain instances. For example, a large power plant located in the corner of one state, which has a high chimney. The effluent from the stack could go over a considerable area, and we think it would be all right for him to have the authority to control such a source.

But when it gets down to the control of individual small stacks, we think that their emission limits need to be then tied into the local conditions.

Mr. ROGERS. I thought you said on page 5 that the management of our remaining clean areas in accordance with a careful weighing of all the equities hardly conforms, and that you really would have—would leave this to the local areas to develop.

Mr. ANTHONY. Our thought there was that when getting back to these clean areas we should be looking at all the factors that go into environment as Dr. Commoner suggested. There is the question of employment and a lot of economic factors to be considered. I am speaking not about health for, we agree whole heartedly you must protect people's health as you must protect their property.

When you get into esthetics such as the little wisp of a plume from a stack, we think local economic factors ought to be taken into consideration.

Mr. ROGERS. Here is the thing I am concerned about. If it is bad for the environment and he is supposed to decide and I presume it is mainly a health function, I think this is generally the way they set their standards—

Mr. ANTHONY. Well, the law specifically points out that its purpose is to guard people's health and their welfare.

Mr. ROGERS. Yes.

Mr. ANTHONY. But as a matter of fact when you get out to the state level there has been a very strong insistence by NAPCA representatives on the control, for example, of the plume from a stack for aesthetic purposes.

Mr. ROGERS. The plumes have particulates in them?

Mr. ANTHONY. And a very small quantity in relation to the other particulates that may be in the area from a dust storm or something like that. We agree you should control the particulates.

Mr. ROGERS. Here is the thing.

If we pursue that philosophy where we say we are not going to do anything in the clean area where we know it will contribute to the environment then we simply set the stage for allowing that area to be polluted up to the point where we have to come in in a drastic way later, whereas if we start with any clean air areas and try to keep them clean then we don't have to go back like we are thinking of doing now to build up support to clean up the environment.

Mr. ANTHONY. We agree with you that we should try to protect those areas as far as we can in keeping with the other factors.

You can't put up a new factory and not have a certain amount of pollution. You are going to have roads coming in. Even the building of roads will create a certain amount of air pollution.

Mr. ROGERS. We want to do that—what can be done and reasonably done.

Mr. ANTHONY. We agree.

Mr. ROGERS. I am glad you make that clear because I got from your testimony just the opposite, I don't think the Congress can wait simply because there may be a difference of some expert opinion.

We have to take the preponderant expert opinion on some of these problems. If we did that we would never do anything because you can always find some who will disagree.

You take the cigarette thing, we never would have acted on this problem.

Mr. ANTHONY. The difference is that we are recommending that the experts that are selected be truly experts in the field involved, rather than having a biologist commenting about the power industry or medicine. We think the Secretary should be getting the advice of experts in the fields of their competence.

Mr. ROGERS. Well, do you think the engineer knows more about health than the biologist?

Mr. ANTHONY. The engineer would know more about what is technically possible as far as installation is concerned on a power plant or some other plant.

Mr. ROGERS. Now for health?

Mr. ANTHONY. No, but his knowledge is necessary.

Mr. ROGERS. I am saying of course for what is possible technically you have to get the experts but when we are talking about setting standards for the health of people, this is what I think we have to stress, the health angle. I realize we have to balance this, what is possible in our technology and our capacity to do.

But I would hope that we would get a stronger position for moving from your organization than I got from your statement.

Mr. ANTHONY. We did not mean to leave the impression we are not in favor of moving. We are very much in favor of moving but let us

do it in a rational way rather than taking the emotional approach and setting standards which are not at all possible to attain.

For example, I understand in the State of California they set a particulate standard at 60 micrograms per cubic meter of air. There are areas along the coast of the Pacific, relatively untouched by man, that have an annual average of 40 micrograms per cubic meter.

It is my understanding that 60 micrograms was set because New Jersey and Pennsylvania have 65, California is going to be a leader. Unfortunately no one in Pennsylvania or New Jersey at the present time knows the technology to meet that 65 micrograms standard.

Mr. ROGERS. Here is the thing. If California had not set high standards on automobile emissions—at the automobile industry I remember saying we can never meet those, we can never do it, yet they are meeting them because of the technology.

These are goals that we have to set sometime a little ahead of time but with our ingenuity we can often reach these.

Mr. ANTHONY. We agree one hundred percent but what we are afraid of is that sometimes the goals and standards are confused. In the State of Montana a government representative pointed out what the air quality goals should be but some of the local citizenry interpreted this as standards to be adopted at once. They are very, very strict. I approve ambitious goals.

Mr. ROGERS. Now you want us to turn it over to local people and here you say they are too strict.

Mr. ANTHONY. I did not understand you.

Mr. ROGERS. You say in Montana it is too strict by what they said.

Mr. ANTHONY. No, as far as the local people are concerned they accepted the recommendation of the Federal Government on fluorides, one part per billion.

Mr. ROGERS. Yes, but the regulation is presently under the local jurisdiction.

Mr. ANTHONY. Yes, but they were influenced by the one individual from NAPCA who came out there and testified?

Mr. ROGERS. Perhaps this goal can be reached?

Mr. ANTHONY. It may eventually.

Mr. ROGERS. Evidently the local people thought it should so. Federal standards could be set.

Mr. ANTHONY. Yes, they could set the standards. It is a question of timing. I think this is the difference. You can set goals on particulates, and ultimately you may reach those we are speaking about in California, and New Jersey, even though it is impossible at present.

When we are speaking about esthetics we must start considering costs.

Mr. ROGERS. We are not necessarily talking about the esthetics as we are really about matters that affect the health. This is what we are trying to get at.

Mr. ANTHONY. Yes. But in practice the standards that are being set relate to esthetics but they are being mistakenly justified on the basis of health. There seems to be a difference of opinion as to what constitutes health.

Mr. ROGERS. There always is some difference of opinion about what you say is the other man's emotion. He may say this is emotional with you because you work for a certain company that wants to take this position.

What is your company?

Mr. ANTHONY. Stauffer Chemical Company.

Mr. ROGERS. He may say you work for a chemical company therefore your job is tied up and you take their position. It is emotional with you.

Dr. Commoner, may I say I am not emotional at all. I have looked at the facts and we are going to run out of time if we don't do something.

This is difficult to say which expert we must take. I think we have to make a reasoned judgment and take the preponderant opinion.

Mr. ANTHONY. May I make this statement as far as health is concerned?

There are certain people who believe in the World Health Organization definition of health as anything that interferes with your sense of well being. If you go out and see a smoke stack with a wisp of smoke this interferes with your health.

This is not the local physician's idea of health yet it is the definition that has been involved in some areas.

Mr. ROGERS. I don't think it has been interpreted by the Federal Government.

Mr. ANTHONY. In effect it has worked out that way in certain States where there has been a threat to withhold funds if certain standards were not enacted which dealt specifically with esthetic rather than health factors.

Mr. ROGERS. They may be esthetic with you but to the people who are setting the standards the particulates from the plume is what they are concerned with as to health.

This is always difficult to say. But we do appreciate your presence here today and giving us your views. The committee will consider your suggestions and particularly when we write up the bill.

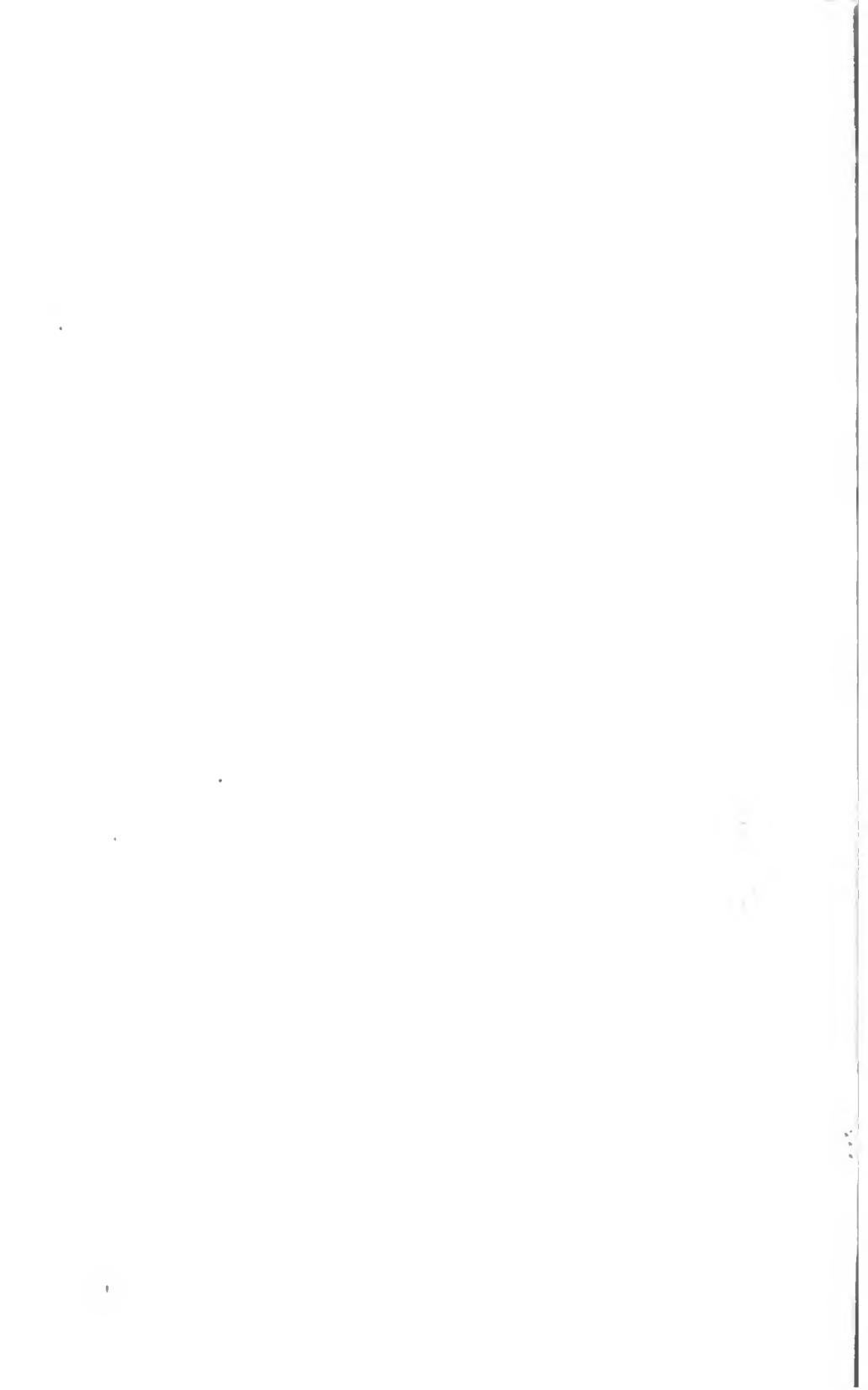
We do appreciate your presence.

Thank you so much.

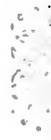
Mr. ANTHONY. Thank you, Mr. Chairman.

Mr. ROGERS. The committee will stand adjourned until 10 o'clock in the morning.

(Whereupon, at 12:30 p.m. the subcommittee adjourned, to reconvene at 10 a.m. Wednesday, March 18, 1970.)



ES-118



ES-118



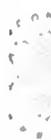
ES-118



ES-118

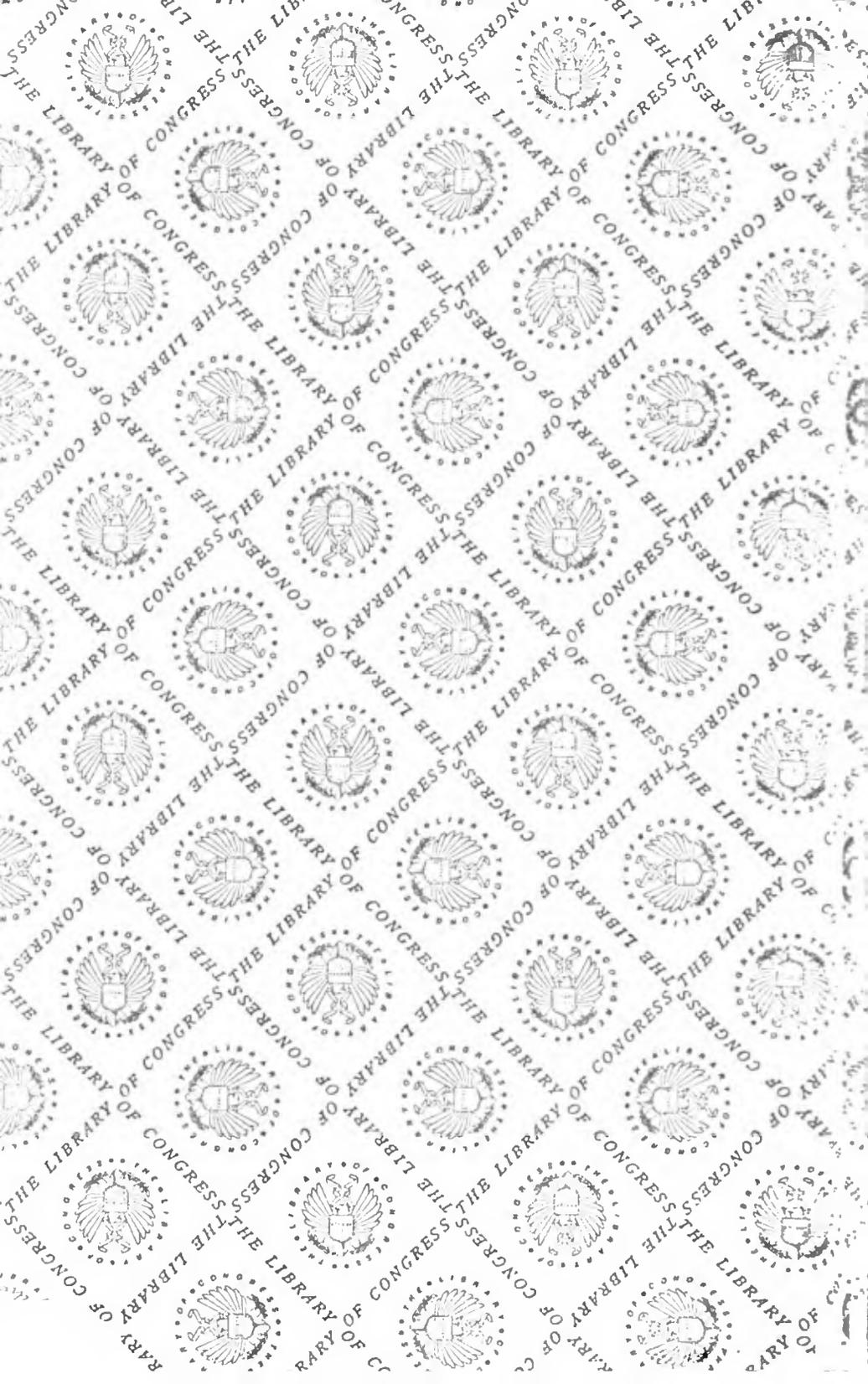


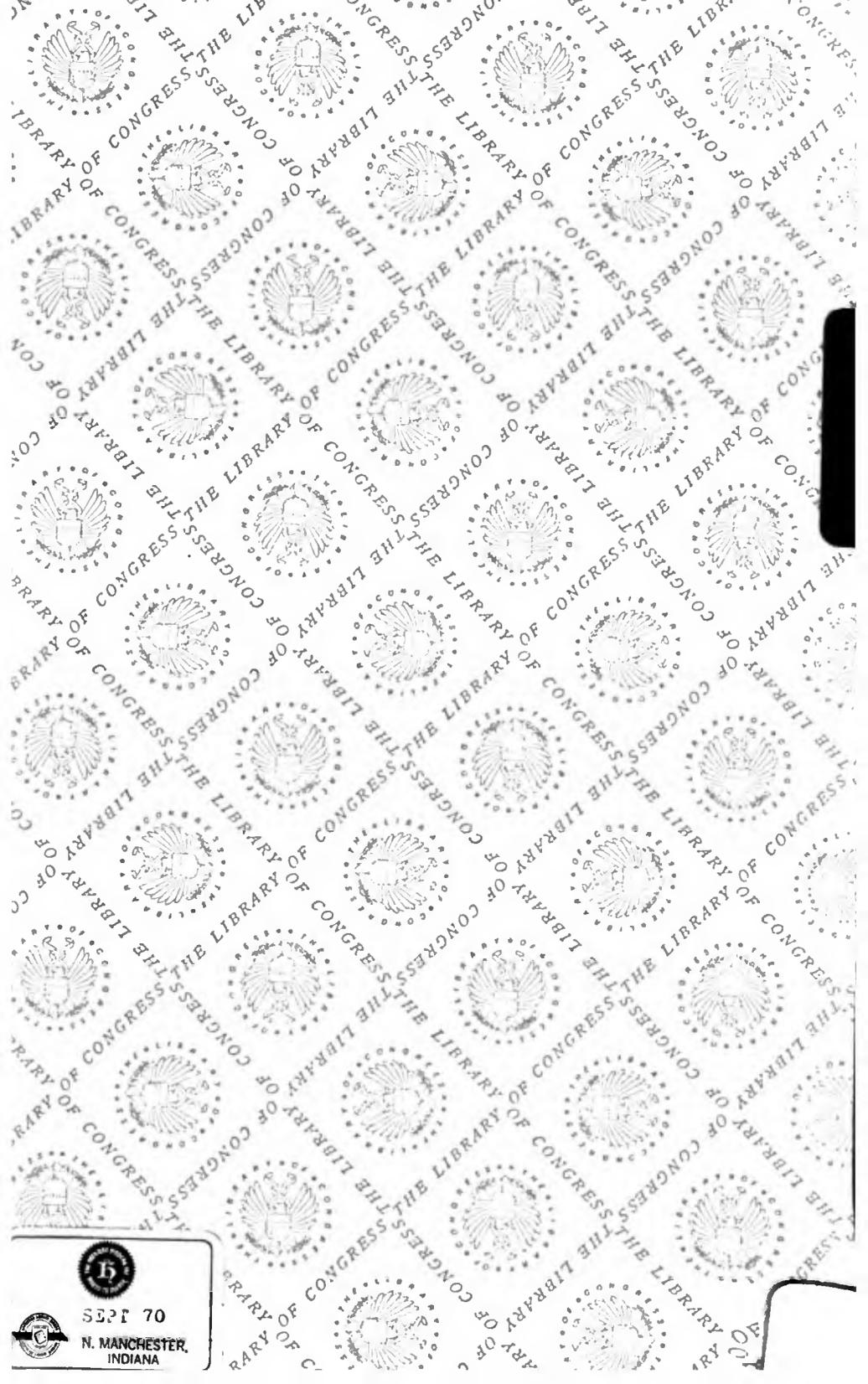
ES-118



ES-118







SEPT 70

N. MANCHESTER,
INDIANA



