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**REPORT TO THE SUBCOMMITTEE 096740
ON CONSERVATION AND
NATURAL RESOURCES, COMMITTEE
ON GOVERNMENT OPERATIONS
HOUSE OF REPRESENTATIVES**



LM096740

**Review Of The
Automobile Fuel Economy
Testing And Labeling Program**

B-166506

Environmental Protection Agency

**BY THE COMPTROLLER GENERAL
OF THE UNITED STATES**

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AUG. 15, 1974

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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The Honorable Henry S. Reuss
Chairman, Conservation and Natural
Resources Subcommittee
Committee on Government Operations
United States House of Representatives

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Dear Mr. Chairman:

In response to your request of April 30, 1974, we are submitting a report (see appendix) on our review of (1) the Office of Management and Budget's (OMB's) possible transfer of the fuel economy testing and labeling program from the Environmental Protection Agency (EPA) to another Federal agency, and (2) EPA's actions on findings and conclusions in the May 15 and June 12, 1972, GAO reports on the the motor vehicle emission testing and certification program.

Following is a summary of information we obtained on the areas of interest mentioned in your letter, excluding the authority of EPA and the Departments of Commerce or Transportation to conduct fuel economy tests, or phases of such tests, and to publish the results. We have received information from these agencies concerning this authority, but clarification is needed before we can make a judgment. As agreed to by your office, we will provide this information at a later date.

FUEL ECONOMY TESTING AND LABELING PROGRAM

In his Energy Message to the Congress on April 18, 1973, the President announced the development of a voluntary labeling program for major energy-using appliances and automobiles. The labels were to contain information on the product's energy consumption. EPA was assigned responsibility in April 1973 for developing and implementing the automobile labeling program. In response, EPA published fuel economy data for 1973 and 1974 model year cars on the basis of information from its program to test and certify automobiles' air-pollutant

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emissions. In addition, on August 27, 1973, EPA published procedures for implementing a voluntary automobile labeling program in which most manufacturers agreed to participate.

Critics contend EPA's testing procedures and data presentations do not give a realistic and understandable representation of automobile fuel economy. For example, the fuel economy data for 1973 and 1974 model year vehicles was derived only from an urban driving test cycle and did not reflect economies which would be realized if a highway driving test cycle were used. Also some critics claim that generating fuel economy data by a dynamometer¹ in lieu of a test track is an inaccurate representation of automobile performance because such data does not reflect a vehicle's aerodynamic characteristics which affect its mileage.

In May 1974, the Director, OMB, stated that to strengthen the automobile energy labeling program OMB has proposed legislation (The National Appliance and Motor Vehicle Energy Labeling Act of 1974, S. 3255, 93d Congress) which would establish a mandatory labeling program for motor vehicles and certain appliances. He stated that OMB believes there is a need for a coordinated effort to determine and label the energy efficiency of motor vehicles. He said OMB recognizes the possible validity of some of the criticisms of EPA's program and that, to begin implementation of the mandatory program for automobiles, OMB has directed the National Bureau of Standards, Department of Commerce, to develop acceptable test procedures for determining fuel economy. EPA will continue to conduct fuel economy testing for 1975 and possibly 1976 model year vehicles depending on the availability of the Bureau's test procedures.

¹A mechanical device allowing an automobile to be tested in a stationary position with its drive wheels placed on revolving rollers which provide resistance to simulate actual driving conditions.

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According to the Director, OMB, beginning with 1977 model year vehicles, the proposed mandatory labeling program would involve:

- The Bureau's publication of test procedures.
- Manufacturers' self-certification of the fuel economy of their vehicles with confirmatory testing by the Federal Government.
- Federal enforcement action against those parties who fail to label products in accordance with Federal specifications.

OMB will select the Federal agency which is to conduct the confirmatory testing when the Bureau completes its review and has developed the appropriate test procedures. An OMB official said this responsibility could go to EPA, the Bureau, or the Department of Transportation.

Your letter raised several questions concerning

- the relative merits and costs of determining fuel economy by using road tests and dynamometers, and
- the safeguards needed to insure that cars tested for fuel economy meet emission standards.

Fuel economy may be determined by using either a dynamometer test or a road test. The Departments of Commerce and Transportation and the major automobile manufacturers favor a road test procedure while EPA favors a dynamometer test procedure. Both tests have advantages but, in our opinion, neither is decisively superior to the other.

EPA informed us that fuel economy data for 1974 automobiles was obtained from existing emission test data and most of the cost incurred was for publishing three pamphlets on the nature and results of the EPA fuel economy testing and labeling program. These costs amounted to \$26,000.

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An EPA official informed us that EPA is testing on the highway cycle all 1975 prototype vehicles that are tested in its emission certification program. We estimate the incremental cost to conduct the highway portion of the fuel economy test to be about \$168,000 for fiscal year 1975, or about \$73 per test. We further estimate that, for fiscal year 1976, the cost per test will be \$81 primarily due to increased personnel compensation.

If the confirmatory and compliance testing responsibility is assigned to Commerce, it estimates that tests will be performed on 200 to 400 automobiles by contracting for use of existing road test facilities. Commerce estimates that contract costs would equal about \$400,000 for fiscal year 1976, or \$1,000 to \$2,000 a test. Commerce officials told us that this estimate is very provisional because of the uncertainties of test methods, sampling requirements, and number of vehicles to be tested.

EPA believes that automobiles tested for fuel economy under either method should also be tested for compliance with emissions standards. An OMB official agreed that automobiles tested for fuel economy should be automobiles known to meet emissions standards.

MOTOR VEHICLE EMISSIONS TESTING AND CERTIFICATION PROGRAM

In our May 15, 1972, report to the Congress, we noted that EPA needed to establish programs to measure emissions of cars as they come off the assembly line and while they are in use by the public. In our June 12, 1972, report to the Chairman, Subcommittee on Air and Water Pollution,¹ Senate Committee on Public Works, we concluded that EPA needed additional staff assigned to its certification

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¹Presently the Subcommittee on Environmental Pollution.

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activities and needed to increase its surveillance and monitoring of auto companies' certification procedures, practices, and records. We also concluded that EPA should require that auto companies prepare and submit written procedures for their certification activities and that EPA personnel be able to enter auto company facilities unannounced to monitor the manufacturer's certification activities.

EPA has made progress in improving its automobile emissions testing and certification program since our reports of May 15 and June 12, 1972. An EPA official told us that EPA plans to have an assembly-line testing program fully implemented for 1976 vehicles. Some pilot testing of assembly-line vehicles is planned for late in the 1975 model year.

EPA informed us that, as part of its effort to insure that cars meet emission standards while they are in use by the public, it has continued to develop and analyze various approaches and test procedures for States' use in conducting highway inspection programs. EPA has also provided technical and financial assistance to States for developing highway inspection programs. Also, for 3 fiscal years EPA has contracted for emission tests of privately owned vehicles. If a number of cars from a given vehicle family fail to meet the emission standards under which they were certified, EPA can require manufacturers to recall them for emission correction under authority of the Clean Air Act (42 U.S.C. 1857).

The number of personnel assigned to the certification and laboratory staffs directly involved in certifying light-duty vehicles has increased since our June 1972 report. The light-duty certification staff increased from 10 to 28 between June 1972 and June 1974. The light-duty laboratory staff increased from 7 to 21 during the same period. An EPA official told us, however, that retaining qualified employees in the laboratory continues to be a problem, primarily due to the low salaries for these positions.

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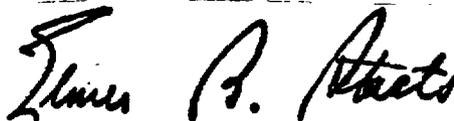
An EPA enforcement official said inspections of manufacturers' procedures, practices, and records are conducted by staff of the EPA Mobile Source Enforcement Division. We were told also that the increased size of the certification staff has enabled it to visit manufacturers more frequently. About 270 visits were made during the year ended April 30, 1974; whereas, according to an EPA official, relatively few were made before 1973. Also, EPA enforcement officials told us that manufacturers have either developed or are in the process of developing written procedures on their certification activities and that EPA inspections include an audit of how well such procedures are followed.

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We made our review at OMB, EPA, the Federal Trade Commission, the Departments of Commerce and Transportation in Washington, D.C., and the EPA Motor Vehicle Emissions Testing Laboratory in Ann Arbor, Michigan. We talked with various agency officials, reviewed documentation, and examined testimony on the proposed transfer.

As you requested, the information in the appendix to this letter has been discussed with EPA officials, but formal written comments have not been obtained. We do not plan to distribute this report further unless copies are specifically requested, and then, only after you agree or publicly announce its contents.

Sincerely yours,



Comptroller General
of the United States

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POSSIBLE TRANSFER OF THE FUEL ECONOMY TESTING PROGRAM FROM EPA TO ANOTHER FEDERAL AGENCY AND EPA EFFORTS TO IMPROVE ITS MOTOR VEHICLE EMISSIONS TESTING AND CERTIFICATION PROGRAM

The present voluntary fuel economy testing and labeling program was established in direct response to the President's assignment of responsibility to the Environmental Protection Agency (EPA) in April 1973 for developing and implementing such a program. In his Energy Message to the Congress on April 18, 1973, the President announced the development of a voluntary labeling program for major energy-consuming home appliances, automobiles, and auto accessories. He directed that standard testing procedures for appliances be developed by the National Bureau of Standards (NBS), Department of Commerce, and test procedures for automobiles be developed by EPA.

EPA's interest in automobile fuel economy began in 1971 when it began receiving severe criticism that emission control devices were causing all types of problems in late model cars, including reduced fuel economy. Although EPA believed these allegations to be largely unfounded, it could not respond to this criticism due to the absence of sound fuel economy data.

In attempting to obtain valid fuel economy data, EPA realized that its own automobile emissions testing and certification program could provide the necessary information. In this program, EPA tests hundreds of automobiles, each in precisely the same way, under highly controlled environmental conditions and under a test procedure which provides information for calculating fuel economy data.

EPA's Federal Emissions Test Procedure specifies that the test will be run on a dynamometer. An EPA official stated that a dynamometer test is used to determine emissions because measuring equipment requirements make a road test impractical. While operating on a dynamometer, an automobile remains stationary but its drive wheels are allowed to turn on revolving rollers which provide resistance to simulate actual driving conditions.

EPA's test procedures specify that the automobile will be driven the equivalent of 7.5 miles at an average speed of 20 miles per hour

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using a driving cycle which simulates driving conditions in a typical urban area. An urban cycle was selected for emissions testing because automotive-caused air pollution is essentially an urban problem. Also, EPA believes that, because urban driving accounts for approximately 55 percent of the automobile miles driven each year in this country, the test is appropriate for determining and comparing fuel economy.

The EPA emissions test begins after the automobile has been carefully preconditioned and parked for at least 12 hours. The automobile is then moved onto a dynamometer where it is started and driven over the 7.5-mile driving cycle. The driver follows a graph printed on a strip-chart which traces actual speed against time. The complete test is voided if the driver deviates from the printed graph by more than 2 miles an hour for more than 2 seconds. The test is performed at temperatures of 65 to 85 degrees, and results are adjusted for humidity.

During the test, the amount of carbon monoxide, unburned hydrocarbons, and carbon dioxide account for the total amount of carbon emitted by the automobile over the 7.5 miles. This data is used in determining emission levels; however, since the amount of carbon contained in a gallon of gasoline is known, it is also possible to calculate the fuel burned.

In response to the President's Energy Message, EPA published fuel economy data for 1973 and 1974 model year cars on the basis of its emission testing data. It also published procedures on August 27, 1973, for implementing a voluntary automobile labeling program in which most automobile manufacturers agreed to participate. The procedures provide for one of two types of labels to be attached to an automobile.

One type, which most manufacturers used for 1974 model year cars, contains a table grouping automobiles into weight categories and showing comparative fuel economy and fuel cost for each category. (See figure 1, p. 10.) The data used on this type of label is from EPA's certification testing and is provided to the manufacturers by EPA at the beginning of the model year.

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A second label, which only a few manufacturers use, presents, in addition to the comparative fuel economy data by vehicle weight, specific fuel economy information on the particular car labeled. (See figure 2, p. 11.) The data for this label is either from EPA certification tests or additional manufacturer testing using the EPA specified test procedure.

The labels for 1975 automobiles will show urban and highway fuel economy data for specific vehicle configurations.

Several major criticisms have been raised on EPA's testing and labeling program:

- The fuel economy data for 1973 and 1974 model year vehicles do not accurately portray vehicle performance since it only indicates mileage on an urban driving cycle and does not consider highway driving which accounts for about 45 percent of the mileage driven in this country.
- The 1973 and 1974 data is not readily understandable to the consumer.
- EPA's 1973 and 1974 tests were run starting with a cold engine, which adversely affects fuel economy.
- The EPA test cycle presently derives mileage data as a by-product of emission testing and is not well suited to fuel economy testing.
- The generation of fuel economy data by a dynamometer in lieu of a test track is an inaccurate representation of automobile performance because such data does not show the aerodynamic characteristics which affect mileage.
- The selection of test cycle specifications and measurement methods should be delegated to an agency whose primary role is the development of measurement methods and instrumentation.

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FIGURE 1

ILLUSTRATIVE LABEL FOR 1974 VEHICLES--COMPARATIVE INFORMATION



The fuel economy values listed below were determined from tests conducted by the U.S. Environmental Protection Agency.

The table shows miles per gallon (MPG) performance and fuel costs for vehicles in different weight categories. These results were developed using a test procedure which simulates commuter-type driving. They are not indicative of highway-type driving.

The fuel economy numbers for the weight category in which this vehicle falls are circled.

<u>Vehicle Test Weight (lbs.)</u>	<u>Range of MPG</u>	<u>Average MPG</u>	<u>Fuel Costs (10,000 mi. and 40¢/gal.)</u>
2,000	22-27	25	\$160
2,250	19-23	21	\$190
2,500	18-23	20	\$200
2,750	14-21	18	\$220
3,000	13-18	15.5	\$260
3,500	10-18	14	\$285
4,000	8-13	11	\$365
4,500	8-14	10	\$400
5,000	8-11	9.5	\$420
5,500	7-10	8.5	\$470

The actual fuel economy of this vehicle will depend on factors such as individual driving habits, the maintenance conditions of the vehicle, and the optional equipment chosen. Additional fuel economy information is available from your dealer and from the U.S. Environmental Protection Agency, Washington, D.C.

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FIGURE 2

ILLUSTRATIVE LABEL FOR 1974 VEHICLES--SPECIFIC INFORMATION



Based on the results of tests conducted or certified by the U.S. Environmental Protection Agency, the fuel consumption of this vehicle is estimated to be:

13.5 Miles Per Gallon

on an EPA test cycle which simulates commuter-type driving.

The table below shows miles per gallon (MPG) performance and fuel costs for vehicles in different weight categories. The test weight and the measured fuel economy of this vehicle are circled. These figures are not indicative of performance during highway driving.

<u>Vehicle Test Weight (lbs.)</u>	<u>Range of MPG</u>	<u>Average MPG</u>	<u>Fuel Costs (10,000 mi. & 40¢/gal.)</u>
2,000	22-27	25	\$160
2,250	19-23	21	\$190
2,500	18-23	20	\$200
2,750	14-21	18	\$220
3,000	13-18	15.5	\$260
3,500	10-18	14	\$285
4,000	8-13	11	\$365
4,500	8-14	10	\$400
5,000	8-11	9.5	\$420
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The actual fuel economy of this vehicle will depend on factors such as individual driving habits, the maintenance condition of the vehicle, and the optional equipment chosen. Additional fuel economy information is available from your dealer and from the U.S. Environmental Protection Agency, Washington, D.C.

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-It is inappropriate to give the regulatory agency, whose authority is to control emissions, the authority to specify test procedures for energy labeling.

EPA has made several changes in its program to overcome some of these criticisms. It has developed with assistance from the Society of Automotive Engineers, a highway test cycle to be run on a dynamometer which it believes to be typical of 45 percent of the miles driven in this country. That test cycle is being used on the 1975 model year cars, and the results, along with the urban cycle mileage data, will be made available to manufacturers for voluntary labeling. After the urban test cycle is completed on an automobile, the EPA highway test cycle is run with the same automobile. The test begins with a hot engine and simulates actual driving conditions over a 10.2-mile highway cycle with an average speed of 48.2 miles an hour.

EPA is also changing its presentation of the fuel economy data for 1975 automobiles to make it easier to understand. For example, before 1975 EPA reported urban fuel economy data by grouping automobiles into weight categories and in order of decreasing fuel economy. For 1975, it will report urban and highway fuel economy data for automobiles grouped by manufacturers. The manufacturers will be listed alphabetically. In addition, beginning with publication of 1975 model year fuel economy data, the urban cycle fuel economy test figure for each vehicle will show a composite of results obtained when the test is begun with a hot as well as a cold engine.

In May 1974, the Director, Office of Management and Budget (OMB) stated that, to strengthen the automobile energy labeling program, OMB proposed legislation (The National Appliance and Motor Vehicle Energy Labeling Act of 1974, S. 3255, 93d Congress) which would establish a mandatory labeling program for motor vehicles and certain appliances. He said OMB believes there is a need for a coordinated effort to determine and label vehicles' energy efficiency. He stated that OMB recognizes the possible validity of some of the criticisms of EPA's program and that to begin implementing the mandatory program for automobiles, OMB has directed NBS to develop acceptable test specifications for determining fuel economy. EPA will continue to conduct fuel economy testing for 1975 and possibly 1976 model year vehicles, depending on the availability of NBS test procedures.

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According to the Director, beginning with 1977 model year vehicles, the proposed mandatory labeling program would involve:

- NBS' publication of test procedures.
- Manufacturers' self-certification of the fuel economy of their vehicles with confirmatory testing by the Federal Government.
- Federal enforcement action against those parties who fail to label products in accordance with federally published specifications.

OMB is to select the Federal agency which is to conduct the confirmatory testing when NBS completes its review and has developed the appropriate test procedures. An OMB official stated that this responsibility could go to EPA, NBS, or the Department of Transportation.

QUESTIONS RAISED ON THE POSSIBLE TRANSFER OF THE FUEL ECONOMY TESTING PROGRAM FROM EPA TO ANOTHER FEDERAL AGENCY

"We understand that the President's budget for fiscal year 1975 includes a request of \$300,000 for EPA to conduct fuel economy testing including the highway cycle of this testing program and that this includes a sum of about \$100,000 for an additional dynamometer. Is this additional dynamometer needed?"

EPA informed us that purchasing an additional dynamometer to conduct the high speed highway cycle is not now necessary. During the summer and fall of 1973, EPA converted its light duty vehicle dynamometers at its Ann Arbor, Michigan, facility from belt-driven to clutch-driven dynamometers because of maintenance problems. The conversion cost about \$112,000 and enabled vehicles on the dynamometers to be driven at a high-speed cruise, which is necessary for conducting the highway cycle of the fuel economy test.

The \$112,000 was obligated in June 1973 using fiscal year 1973 funds. The fiscal year 1975 budget justification requesting the

\$100,000 for the cruise dynamometer was prepared by the EPA staff in Washington headquarters, on the basis of initial program plans submitted by the Ann Arbor staff, without reconfirming whether purchasing the cruise dynamometer was necessary.

After its fiscal year 1975 budget request of \$300,000, EPA analyzed its budget needs for the fuel economy testing and labeling program. It estimated that the costs for additional testing in fiscal year 1975 would total \$275,700. (See p. 18.)

"We understand that there are two test procedures that can be used to determine fuel economy--the dynamometer test and the road test. Please ascertain for us the relative merits and deficiencies of the two test procedures."

EPA and the leading auto manufacturers agree that both the dynamometer and road test have advantages and disadvantages. EPA favors the dynamometer test because fuel economy results can be obtained as a byproduct of the Federal emission test with little additional cost. The Departments of Commerce and Transportation, the Corporations of General Motors, Ford, and Chrysler, and the Society of Automotive Engineers favor a road test procedure. Information provided by these groups is presented below.

Advantages of dynamometer testing

According to EPA the advantages of a dynamometer test are:

1. Tests can be conducted in a laboratory any day despite weather conditions.
2. Every vehicle is tested under nearly identical conditions; the exact same driving cycle and closely controlled ambient conditions are used for every vehicle tested, and the human element of driving the vehicle is virtually eliminated.

3. Fuel economy and emission tests can be run concurrently to insure the vehicle is calibrated according to manufacturers' specifications and meets emission standards.
4. Many organizations are now equipped with dynamometer and emission measurement equipment. Other than major automobile manufacturers, very few have test tracks.

General Motors and Ford agree that item 1 represents an advantage over road testing where testing may be precluded by weather conditions.

Disadvantages of dynamometer testing

EPA agrees to the following shortcomings of the dynamometer:

1. Adjustment for road load may not accurately duplicate the rolling resistance and aerodynamic drag experienced on the road. This may have little effect on the urban cycle but could distort results on the highway cycle.
2. The cooling fan airflow characteristics do not exactly reproduce the airflow characteristics of a moving vehicle. This could affect vehicle warmup.
3. The method of accounting for vehicle air-conditioning may not precisely account for its overall impact on fuel economy.

More disadvantages, according to auto manufacturers and the Society of Automotive Engineers, are:

4. Tire slippage and carcass distortion may affect the validity of speed and distance measurements.
5. The terrain and road surface are not measurable variables with the dynamometer test.

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6. Testing fuel economy on dynamometers adds to the workload of manufacturers' dynamometers, already in short supply because of the heavy volume of emission testing required.

The Department of Commerce believes that at the present time, no dynamometer test is capable of showing all factors which influence automobile fuel consumption. Its preference of a road test is based on the test's ability to integrate all such factors, including aerodynamics and rolling resistance which, according to Commerce, can influence fuel consumption by as much as 25 percent at highway speeds.

Advantages of roadtrack testing

The Department of Commerce and auto manufacturers favor road testing for the following reasons:

1. Characteristics of the vehicle are fully shown in the test results, including such things as road load and airflow. Also, the test results would show the actual impact of the terrain, road surface, tire friction, and air-conditioning.
2. Instrumentation for fuel economy measurements would be minimal--about \$5,000 according to a General Motors official.
3. Under the test track procedure, fuel economy measurement is inherently much simpler than the method used under dynamometer testing, and therefore less subject to variability and other testing problems.

EPA agrees that road-load characteristics of the vehicle and effect of air-conditioning can be more readily shown in road test results.

Disadvantages of roadtrack testing

EPA believes the following disadvantages outweigh the advantages of the road test procedure.

1. Adverse weather conditions (highwinds, rain, or snow) would reduce the number of testing days.

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2. Driver habits could cause variations in results.
3. A correction factor to show cold-start results has not been developed for road testing.
4. Few test tracks exist today. The cost to build one would be more expensive than purchasing dynamometers.
5. Without dynamometer testing, an agency would have little insurance that a vehicle meets emission standards.

The auto manufacturers and the Society of Automotive Engineers agree that the number of testing days would be reduced because of adverse weather conditions. Also, auto manufacturers agree that driver habits could cause some variations in results. Ford and the Society of Automotive Engineers believe that a cold-start procedure should be developed for road testing.

"What does it cost for EPA to conduct its fuel economy tests?"

EPA informed us that, since fuel economy data for 1974 model year automobiles was obtained from existing emission testing data, most of the cost incurred in providing 1974 model year fuel economy data was for publishing. These costs amounted to \$26,000 to publish three pamphlets on the nature and results of the EPA fuel economy testing and labeling program.

On the basis of our analysis of EPA budget and cost data, we estimated the incremental costs to conduct the highway portion of the fuel economy tests, as follows:

<u>FY</u>	<u>Cost</u>	<u>Number of tests estimated by EPA</u>	<u>Cost per test</u>
1974	\$ 44,700	715	\$ 63
1975	168,400	2,304	73
1976	178,400	2,202	81

The cost per test in fiscal year 1976 is greater than that in fiscal year 1975 primarily due to increases in personnel compensation.

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After the fiscal year 1975 budget request of \$300,000, EPA estimated that the costs for additional testing in fiscal year 1975 would total \$275,700. Our computation of fiscal year 1975 costs shown above differs from EPA's primarily because we did not include, as EPA did, an allowance for travel and other indirect expenses for technicians because they would not ordinarily incur such costs. EPA also included one-time costs of \$25,000 for an outside contractor's review of the highway test procedure, and \$46,000 for in-house studies on the effects of cold starts and road load on dynamometer fuel economy testing. Had we included the one-time costs, the fiscal year 1975 cost per test would have been about \$104 and the total cost about \$239,400. EPA officials agreed with our method of calculating the incremental costs. An EPA official said the difference between the budget request and the current estimate will be reprogramed for salaries and contracts.

"If the program were transferred to DOT [Department of Transportation] or Commerce--

What would be the start-up costs for either agency to conduct the testing using (i) the dynamometer test, or (ii) the road test, and what would be the cost per test?"

Department of Transportation officials told us that they do not have estimates for startup costs or costs per test for a fuel economy testing program on either a dynamometer or a test track.

The Department of Commerce provided the following cost estimates for fiscal years 1975 and 1976 assuming that (1) proposed mandatory labeling legislation will be enacted, (2) NBS will conduct all aspects of the program by fiscal year 1976, and (3) NBS will develop a fuel economy test procedure using a road test. Commerce estimates assume that, during fiscal year 1975, NBS will evaluate and develop road test procedures and begin to staff the various program elements. By fiscal year 1976, NBS will be prepared to undertake a full-scale program which would include publishing test methods and label specifications, developing and monitoring test methods, confirmatory and compliance testing, consumer education, and supporting research and development.

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<u>Program element</u>	<u>FY 1975</u>		<u>FY 1976</u>	
	<u>Technical positions</u> (000 omitted)	<u>Cost</u> (000 omitted)	<u>Technical positions</u> (000 omitted)	<u>Cost</u> (000 omitted)
Product identification	1	\$ 45	1	\$ 45
Specification and label development	1	45	3	435
Road test method development	2	290	2	390
Inspection of manufacturer testing	1	45	7	315
Confirmatory and compliance testing	1	45	3	^a 535
Consumer education	-	-	2	240
Standardization activities	1	45	1	45
Research and development	2	190	5	425
Management and administration	4	180	10	450
Other (travel, equipment, consultants)	-	175	-	200
	<u>13</u>	<u>\$1,060</u>	<u>34</u>	<u>\$3,080</u>

^aThis estimate is very provisional because of the uncertainties of test methods, sampling requirements, and number of vehicles to be tested. About \$400,000 of the FY 1976 estimate represents contract costs for confirmatory and compliance tests on 200 to 400 automobiles.

Commerce estimates that confirmatory and compliance tests will be performed on 200 to 400 automobiles by contracting for existing road test facilities. It estimates that contract costs would equal about \$400,000 for fiscal year 1976 resulting in \$1,000 to \$2,000 per test.

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EPA could not provide cost estimates for road track testing. On the basis of its experience in conducting dynamometer tests at its facility in Ann Arbor, EPA estimated that startup costs for a single dynamometer test cell would be \$456,300.

Equipment	\$110,000
Facilities	171,000
Utilities	18,000
Data processing	110,000 (includes \$10,000 for software)
Other (fuel, supplies)	<u>47,300</u>
	<u>\$456,300</u>

Included in the equipment costs were the purchase price and installation of a dynamometer (\$30,000), an analytical system (\$40,000), and a constant volume sampler to measure exhaust gases (\$25,000). The balance of \$15,000 would be used to purchase peripheral equipment.

EPA estimated that 3,600 square feet of laboratory space, including lights and controlled environment, would be required and would cost about \$171,000. About 600 square feet at \$60 per square foot was estimated as the space needed for the actual testing area.

Part of EPA's estimated startup costs for dynamometer testing, particularly for computer processing and supplies and materials, were based on conducting 1,000 tests a year--the capacity of a single test cell (roughly 20 tests per week on a 40-hour basis). For example, the costs for computer processing is estimated at \$100 per test for 1,000 tests, and the cost per test would decrease as the number of tests increase.

EPA's estimate was based on the assumption that either Commerce or Transportation would have to also conduct emission tests to insure that vehicles meet Federal emission standards. As discussed on page 24, however, agency officials believe that emission tests may not be necessary.

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The above costs exclude manpower, which varies with the workload, and do not consider

- time required to procure equipment;
- limited time allowed to obtain results from tests, which may necessitate more than one cell;
- additional burden on the manufacturers resulting from the requirement to submit vehicles to EPA for emission tests and to another agency for fuel economy tests;
- instrumentation and maintenance support;
- chemical analysis support; and
- manpower training.

EPA estimates that the cost of any other agency running the Federal emission test, which generates as a byproduct the fuel economy data for urban driving, would be \$731 per test. It estimated the incremental cost of conducting the highway test to be \$53 per test. Both of these estimates include manpower costs.

Several manufacturers, in hearings held on May 17, 1974, before the Senate Commerce Committee, Special Subcommittee on Science, Technology and Commerce, said equipment costs for the road test, excluding the test track itself, would be less than for dynamometer testing because generally the only equipment needed would be:

- A fifth wheel to indicate vehicle speed and to record distance traveled.
- A calibrated volume displacement fuel meter to measure the quantity of fuel consumed.
- A stop watch or other timing device for sections of the test schedule as required.
- A thermometer, thermocouple, or other suitable means to measure fuel temperature.
- A barometer and thermometer to measure atmospheric pressure and temperature.

--An accelerometer to indicate vehicle accelerations and decelerations as defined by the test schedule.

According to a General Motors official, this equipment can be purchased for not more than \$5,000.

Commerce officials told us that, if they are required to conduct confirmatory testing using a road test method, they would lease existing facilities rather than build new ones. As discussed on page 19, Commerce estimated that contract costs for confirmatory and compliance testing would be about \$400,000 for fiscal year 1976.

"If the program were transferred to DOT or Commerce--

Can either agency conduct the necessary testing and publish the results before the 1975 model year vehicles are available for public sale in September 1974? If the answer is no, who would conduct those tests and publish the results for these cars?"

According to the OMB Director, EPA is to continue to conduct fuel economy testing for 1975 and possibly 1976 model year vehicles.

"If the program were transferred to DOT or Commerce--

Since EPA must conduct its emission testing program as required by the Clean Air Act, to what extent would the transfer of its fuel economy testing program to DOT or Commerce reduce EPA's testing program costs?"

There is no incremental cost attributable to the urban driving cycle of the fuel economy test since the data is generated as a byproduct of the emissions test. EPA estimates fiscal year 1975 and 1976 costs to conduct the fuel economy highway driving cycle to be \$239,400 and \$178,400, respectively. If the fuel economy testing program were transferred from EPA the cost reduction would equal the costs of conducting the highway driving cycle.

However, EPA officials told us that any cost reduction could be offset because EPA needs to have more highway emission data for long-range air pollution control planning. They said they have been gathering such data on a limited scale and more data is needed to detect defeat devices, such as those that manufacturers were installing in some 1973 model vehicles. The devices rendered emission controls inoperable when the vehicles reached speeds above those attained in the urban test cycle. Highway emission data will also be needed to quantify vehicle emissions under driving conditions not included in the current certification test cycle.

"If the road test procedure is followed, what safeguards should be included to insure that the test results accurately reflect the requirements of Title II of the Clean Air Act concerning emissions?"

EPA officials believe that vehicles tested for fuel economy must, at the time of the fuel economy test, be proven to actually meet emissions standards. They informed us that vehicles certified by EPA are described in detail in manufacturers' applications for certification. Each application specifies vehicle parts which are likely to affect emissions, such as the carburetor and distributor, and lists the calibration and production tolerance of each part. EPA issues a certificate of conformity only for those vehicles whose calibrations are within the ranges specified in the application.

EPA maintains that the optimal calibrations for fuel economy may differ from the optimal calibrations for emissions. It maintains also that a fuel economy testing program must include a procedure for verifying that the vehicle is calibrated within the tolerances to which it was certified. Theoretically, one could check every part specification, such as distributor curves, carburetor flow, and camshaft timing. One EPA official told us, however, that checking some parts would necessitate almost a complete engine teardown, which would be time consuming and costly.

According to EPA, the easiest and by far most cost-effective method of determining whether the calibrations are correct is to make the Federal emission test. Therefore, any valid road test

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procedure should include a dynamometer emission test to insure that vehicle calibrations conform to EPA certification standards.

An OMB official stated that strong controls in the NBS test procedure will be needed to insure fuel economy certification data is derived from cars meeting emissions standards. A Commerce official said it would be possible, but perhaps not necessary, to arrange for emission compliance tests on automobiles. The official said Commerce will have to depend primarily on manufacturers' assurances that automobiles used for mileage tests, like all automobiles offered for sale, comply with emission control regulations. She said Commerce's proposed confirmatory tests would involve selecting automobiles at random with no opportunity for manufacturers to perform special tuning or modification designed to improve fuel consumption at the expense of emission control.

According to a Transportation official, the agency responsible for fuel economy testing should also be authorized to conduct emissions tests. The official stated that it probably would not be necessary to perform an emissions test on every vehicle but that emissions testing could be performed on a sample basis.

"Is there adequate coordination between EPA and DOT in regard to each agency's responsibilities under their respective laws for encouraging or requiring pollution free, safe, and low fuel consumption vehicles?"

EPA said, although its technical staffs communicate closely with Transportation's National Highway Traffic Safety Administration and Transportation Systems Center in Cambridge, Massachusetts, the development of emission standards and vehicle safety standards is separate and does not require close coordination. EPA informed us that statutory requirements imposed on the two agencies do not conflict and the achievement of low emissions and vehicle safety is in no way incompatible.

Transportation officials agreed that their respective duties are separate and do not require coordination and that they communicate

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with EPA on various issues. For example, EPA requested Transportation to comment on the voluntary labeling program guidelines before they were issued.

According to EPA officials, the addition of emission controls and safety devices on vehicles has tended to reduce vehicle fuel economy in varying degrees. They informed us that both EPA and the National Highway Traffic Safety Administration have in the past year evaluated the fuel economy impact of standards issued under their respective laws.

"The August 27, 1973 Federal Register states (paragraph B Schedule): 'Initially EPA will bear the primary responsibility for data collection, data dissemination, and program operation. However, there will be a transference of this basic program responsibility to the automobile manufacturers in subsequent years.'

When does EPA plan to transfer this program to the manufacturers?"

EPA does not plan to transfer its testing functions to the manufacturers. EPA officials informed us that the statement made in the Federal Register refers to procedures available to manufacturers who participate in the voluntary labeling program. These procedures state that manufacturers can use fuel economy data supplied by EPA which show fuel economy by weight class. The manufacturers may also test specific vehicle models using EPA's test procedure and post the results on particular vehicles. EPA does not test a prototype vehicle of every possible configuration--engine, weight, transmission, and axle ratio--offered for sale by the manufacturer because compliance with emission standards can be demonstrated by testing selected configurations. However, manufacturers may want to test many configurations of a vehicle for fuel economy.

According to EPA the specific labeling part of the program can be partially turned over to manufacturers if they choose to participate. For 1974 models, four manufacturers--Honda, Mercedes Benz, Bavarian Motor Works (BMW), and Mitsubishi--requested specific

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labels for a total of 30 vehicle models. The manufacturers tested the vehicles for fuel economy and submitted the data to EPA. On the basis of a comparison of the manufacturers data to similar data obtained during Federal emission tests, EPA certified the mileage figures and allowed the manufacturers to display specific fuel economy labels on these particular models. EPA has the option of performing confirmatory tests on any or all specific label models if the manufacturer's results appear questionable.

"The August 27, 1973 Federal Register states (paragraph B Schedule): 'Initially EPA will bear the primary responsibility for data collection, data dissemination, and program operation. However, there will be a transference of this basic program responsibility to the automobile manufacturers in subsequent years.'

Under what authority can EPA transfer this statutory testing responsibility to a non-Federal entity?"

EPA has no intention to, nor can it legally, transfer its function of determining emission control compliance to the manufacturers. EPA informed us that, since the labeling program is voluntary and not statutory, it could accept test data from manufacturers for fuel economy purposes but will do so only if it determines manufacturers' data valid. EPA stated it could do this by confirming in its own laboratory some manufacturers' tests.

EPA EFFORTS TO IMPROVE ITS MOTOR VEHICLE
EMISSIONS TESTING AND CERTIFICATION PROGRAM

On May 15 and June 12, 1972, we issued reports on EPA's motor vehicle emissions testing and certification program.¹ In our May report we noted that EPA needed to establish programs to measure emissions of cars as they come off the assembly line and while they are in use by the public. In our June report we concluded that EPA needed additional staff assigned to its certification activities and needed to significantly increase its surveillance and monitoring of the auto companies' certification procedures, practices, and records. We also concluded that EPA should require auto companies to prepare and submit to EPA written procedures for their certification activities and that EPA personnel should be able to enter auto company facilities unannounced to monitor the manufacturer's certification activities.

Details concerning EPA's actions on these matters, since the prior reports, are discussed below.

Assembly-line test programs

During the review resulting in our May 1972 report, EPA officials said assembly-line testing would be delayed until at least the 1974 model year because a number of problems had to be resolved. As of May 1974 EPA had not implemented assembly-line testing.

An EPA official informed us that EPA presently plans to perform some pilot testing of assembly-line vehicles late in the 1975 model

¹Report to the Congress entitled "Cleaner Engines For Cleaner Air: Progress And Problems In Reducing Air Pollution From Automobiles" (B-166506 dated May 15, 1972), and report to the Chairman, Subcommittee on Air and Water Pollution (presently the Subcommittee on Environmental Pollution), Senate Committee on Public Works, entitled "General Accounting Office Examination Into The Adequacy Of The Environmental Protection Agency's Motor Vehicle Certification Activities" (B-166506 dated June 12, 1972).

year and to fully implement an assembly-line testing program in model year 1976. EPA's plan calls for testing a sample of automobiles selected as they come off the assembly line. Eight are to be selected from each of those engine families which had difficulty passing the emission certification tests, and tested for emissions using the Federal Test Procedure for certification. If any of the 8 fail the test, 16 additional vehicles from the same engine family are to be selected and tested. If any of the 16 fail to meet the emission standards, the assembly line is to be shut down until the problem is corrected.

Highway inspection program

The 1967 amendments to the Clean Air Act authorized Federal assistance to States for developing highway inspection programs to control emissions from cars on the road. During our prior review, however, EPA officials told us they had not aggressively promoted the establishment of highway inspection programs because they first wanted to analyze the costs and benefits of various program approaches.

In May 1974, EPA officials informed us that they have continued their program to develop and analyze various approaches and test procedures which can be used in State-conducted highway inspection programs. Two approaches available to the States, according to EPA officials, include a publicly operated lane system and a licensed garage system. Under the lane system, a governmental agency would perform the inspection in publicly owned and operated facilities. The facilities could be devoted exclusively to emission testing or could include other types of required inspection, such as vehicle safety. Testing under the licensed garage system would be done by existing private service or repair agencies in the repair and maintenance industry. Their facilities would be certified, licensed, and controlled by the appropriate governmental agency. EPA has provided technical and financial assistance to the States for developing highway inspection programs.

Also, as part of its enforcement responsibility under Section 207(c) of the Clean Air Act which requires vehicles to meet Federal emission standards for 5 years or 50,000 miles, EPA's Ann Arbor laboratory has been conducting an in-use compliance testing program

for the past 3 fiscal years. Privately owned vehicles are tested by testing organizations under contract with EPA. If EPA determines that a particular engine family does not meet the standards, it can require the manufacturer to recall the vehicles and correct the problem. The fiscal year 1975 testing program calls for 3,600 tests at a contract cost of about \$2.9 million.

Increased staff assigned to certification activities

From June 1, 1972, to June 1, 1974, the light-duty certification staff increased from 10 to 28, while the number of personnel assigned to the laboratory increased from 7 to 21. The present certification staff levels are almost equal to the number of positions authorized; however, an EPA official told us that retaining qualified laboratory personnel continues to be a problem, primarily due to low salaries.

An EPA official responsible for the certification program told us that problems experienced in the past in hiring graduating engineers-- due to the low starting salary (GS-5)--have been reduced. In April 1973 EPA received authority to hire graduating engineers at GS-5 step 10 and at GS-7 step 7 (subsequently adjusted to GS-5 step 9 and GS-7 step 6) for those with good academic records or prior qualifying experience. He said EPA salaries are now more competitive with private industry, although some problems could be encountered if industry's demand for engineers increases.

During our 1972 review an EPA official told us that a newly hired college graduate engineer needs 12 to 18 months of experience before he can make a meaningful contribution. According to EPA records, the average length of employment of the 28 employees assigned to the certification staff was about 15 months; 15 had less than 12 months of EPA experience on the certification staff. We did note that the average grade level of the Certification Branch has increased from GS-7.95 to GS-8.28 since June 1972.

An official responsible for the laboratory testing operations told us that, although the testing workload has increased, 21 personnel could sufficiently conduct the light-duty emissions testing if they were experienced. He said that turnover of the laboratory

staff has been high because the low starting salary (GS-2 or GS-3) causes many employees to leave EPA for higher paying jobs.

We noted that the 21 personnel assigned to light-duty testing had been with EPA for an average of about 10 months and that 13 of the 21 were hired since January 1974. An EPA official told us that newly hired employees require close supervision for at least one testing season and that the large number of inexperienced staff has caused a high rate of voided emission tests. According to EPA estimates, each emission test costs about \$730. EPA records show that 148 emission tests were voided during the first 5 months of 1974 at a cost of about \$108,000.

Monitoring of automobile companies'
certification procedures, practices,
and records

An EPA enforcement official told us that his staff routinely inspects manufacturers' procedures, practices, and records. He said inspections include discussions with manufacturer personnel, visual inspection of vehicles on the production line for proper installation of emission control devices, and an audit (at least annually) of certification procedures with more frequent audits of major manufacturers. As of May 1974 General Motors Corporation had been inspected four times in fiscal year 1974 and Ford, Chrysler, and American Motors once each.

EPA enforcement officials said they announce all visits and give manufacturers at least a 24-hour notice. EPA attempted an unannounced visit in 1973, but the manufacturer contended that EPA was not authorized to do so. In February 1974 EPA regulations were issued which authorized the enforcement staff to make unannounced visits; however, as of May 1974 no such visits had been made. An EPA enforcement official informed us that the enforcement staff plans to use this authority only when they have some indication that something is out of order.

The enforcement inspection staff for automobiles presently has 14 personnel. EPA plans to add 12 to 15 more inspectors when it implements the assembly-line testing program.

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We observed that the EPA certification staff also monitors manufacturers' activities. The Ann Arbor light-duty certification staff is divided into six teams, each with four to six persons. Each team is responsible for specific manufacturers. An EPA certification official said when a manufacturer requests to perform unscheduled maintenance on a certification vehicle, the certification teams visit the company to insure that corrections or changes are made in accordance with the company's maintenance manual or that the manual is appropriately revised before certifying the vehicle. The leader of a certification team informed us that, during visits, team members observe tests, verify problems, check maintenance procedures, review records, and determine whether prescribed procedures are followed.

An EPA certification official told us that the increased certification staff size from June 1, 1972, to June 1, 1974, has resulted in a significant increase in the number of visits to manufacturers. Records of the number of visits made to manufacturers before 1973 were not available; however, a certification official informed us that few visits were made before that year. About 270 visits were made to domestic manufacturers during the year ended April 30, 1974. The EPA official told us that EPA plans to visit 10 foreign manufacturers during fiscal year 1975. In the past EPA visits have been to domestic manufacturers only.

Manufacturers' submission of written certification procedures

Rules and regulations spelling out more precisely the records and documents that manufacturers must maintain were published in the Federal Register in February 1974. EPA enforcement officials told us that the manufacturers have either developed, or are in the process of developing, written procedures on their certification activities. They said their inspections of facilities include an audit of how well manufacturers follow the established procedures in actual practice.