REPORT BY THE

Comptroller General

OF THE UNITED STATES

8908

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RELEASED

Better Enforcement Of Car Emission Standards--A Way To Improve Air Quality

According to the Environmental Protection Agency, about 80 percent of an estimated 100 million cars on the road are not meeting the Federal air quality emission standards. This is largely because of maladjustments, tampering, deterioration, and insufficient maintenance of car emission control systems by owners and car service organizations.

An effective inspection and maintenance program is needed to identify and correct the problem. This appears to be a long way off because of State and local reluctance to start such programs. Other programs to enforce emission standards before cars get on the road are generally effective but need some improvements.

Recall efforts--over 12 million cars have been recalled--appear to have only a limited immediate effect in improving air quality from emissions. Many car owners simply do not return their cars to the dealers for correction.

Report retract

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

B-166506

The Honorable Edmund S. Muskie
Chairman, Subcommittee on Environmental
Pollution
Committee on Environment and Public Works
United States Senate

Dear Mr. Chairman:

As requested in your September 22, 1977, letter, this report discusses how effectively the Environmental Protection Agency has implemented programs to reduce air pollution resulting from automobile emissions. We found that the Agency's

--automobile prototype certification program did not fully consider the effects of engine system deterioration and other "real world" factors which can cause cars to exceed emission standards once they are placed in use,

--selective enforcement auditing program in which cars leaving the assembly line are tested for compliance with emission standards had been effective, but the number of cars tested represented only a small fraction of the 8,700 car model configurations, and

--recall program has had only a limited impact on air quality improvement because many owners simply did not return their cars for correction.

Inspection and maintenance programs required under the Clean Air Act could identify for corrective action those cars in use not meeting the Federal emission standards. State and local authorities, however, have been slow or reluctant to start such programs.

COMPTROLLER GENERAL'S REPORT TO THE SUBCOMMITTEE ON ENVIRONMENTAL POLLUTION COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

BETTER ENFORCEMENT OF CAR EMISSION STANDARDS--A WAY TO IMPROVE AIR QUALITY

D I G E S T

The Environmental Protection Agency estimates that about 80 percent of the 100 million cars on the road exceed the emission limits set in Federal emission standards. Generally, over one-half exceeded the limits within 1 year of manufacture, and the failure rate increased with the car's age. Most of the cars fail to meet the standards mainly because of improper maintenance and adjustments by owners and car service organizations after the cars leave the factory.

The Agency has estimated that failures are due to

--maladjusted engine settings, 47 percent;

--deterioration due to premature parts failure, the illegal use of leaded fuels, and improper car use, 25 percent;

--tampering, or the removal or tendering inoperable of emission control systems, 18 percent;

--lack of or insufficient car maintenance, 7 percent; and

--manufacturer design and poor production practices, 3 percent. (See pp. 4 to 6 and p. 8.)

INSPECTION AND MAINTENANCE PROGRAMS, WHERE NEEDED, ARE THE ANSWER

Car inspection and maintenance programs --requiring at least an annual inspection-- offer a comprehensive way to identify and correct maintenance and other emission problems. (See p. 9.)

Selective enforcement auditing--assembly line testing

In January 1977, the Agency started testing cars for compliance with Federal emission standards as they came off the assembly line. This program is referred to as selective enforcement auditing. The testing was limited to a small number of cars--only 324 cars representing 31 of the approximately 8,700 car model configurations produced in 1977 were tested--primarily because of the length of time required to run the tests. Although the Agency requires only 60 percent of the cars manufactured to meet the Federal standards, of the 324 cars tested, 75 percent met all three standards. This program, however, has motivated manufacturers to improve assembly line procedures and testing techniques. (See pp. 23 to 28.)

Manufacturer recall for corrective action

From model year 1972 to May 10, 1978, about 12 million cars have been recalled either voluntarily or through a mandate by the Agency for correction of defective emission controls by the manufacturer. At the time of GAO's review, about 11 million additional 1973-78 model years cars were under investigation.

Because of the limited number of vehicles involved, the recall program has had only a limited direct effect in reducing the large amount of excess auto emissions. Additionally, only about 65 percent of the cars recalled are returned by owners to the dealers for corrective maintenance and repair. The program is effective, however, in that it motivates manufacturers to achieve good emission system design and also encourages better assembly line quality control. (See pp. 29 and 30.)

RECOMMENDATIONS

The Administrator, Environmental Protection Agency, should:

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CHAPTER 1

INTRODUCTION

In a letter dated September 22, 1977, the Chairman of the Subcommittee on Environmental Pollution, Senate Committee on Environment and Public Works, requested that we evaluate the Environmental Protection Agency's (EPA's) auto emission certification program and its mobile source enforcement program dealing with automobiles from the end of the production line until they reached 50,000 miles. The Chairman was concerned about the difference between certification test results of prototype vehicles and the actual emissions of automobiles in use.

CLEAN AIR ACT

The Clean Air Act and subsequent amendments gave EPA the authority and responsibility for establishing programs pertaining to each general phase of a car's overall life--design, production, and inuse service. These programs include:

--State and local inspection and maintenance (IM) programs approved by EPA and directed toward reducing auto emissions in areas where needed to meet national ambient air quality standards.

--Certification testing of prototypes to assure that cars are designed so that, if properly operated and maintained, they will meet Federal emission standards for 5 years or 50,000 miles.

--Selective enforcement auditing (SEA)--the testing of selected cars as they come off the assembly line--to determine conformity to emission standards.

--Recall investigations and testing of classes of cars in use to identify defects for justifying recall and repair by the manufacturer of cars not meeting Federal emission standards.

The 1970 amendments gave EPA responsibility for determining emission standards for carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NOx). The amendments required EPA to develop a test for emission testing that could be coordinated with Federal emission standards--since designated by EPA as a short test--and

Clean Air Act, and (3) ensuring compliance with IM program requirements. This division is also responsible for the development and enforcement of Federal regulations for the removal of lead from gasoline. Division expenditures for fiscal year 1977 activities totaled $3.7 million. Budgeted expenditures for fiscal year 1978 totaled $4.1 million.

SCOPE OF REVIEW

We reviewed EPA's vehicle prototype certification program and other enforcement efforts in selective enforcement auditing, recall, and inspection and maintenance program areas. We examined legislation, documents, reports, and records relating to these programs, including automobile manufacturers' comments on proposed EPA regulations.

We examined and reviewed testing records and reports; met with agency officials at EPA headquarters in Washington, D.C., and at EPA's Mobile Source Air Pollution Control Laboratory, Ann Arbor, Michigan; and examined contractor records and discussed our views with EPA testing contractor personnel.

Oral Agency comments were obtained and appropriate changes made in the report. The agency generally agreed with our conclusions and recommendations.

To determine emission performance levels of vehicles in use, EPA started its emission surveillance program in 1971. Emission data is gathered annually from about 2,000 cars in use selected randomly in about seven urban areas throughout the country. The cars are tested for Federal emission standards in an as-received condition; that is, as maintained by the owner at the time of delivery for testing. Cars selected included a variety of model years as well as various makes and vehicle configurations.

Based on the data obtained from the emission surveillance program, EPA has concluded that most cars on the road do not meet the Federal emission standards they were designed and built to meet. As shown on the following page 1971, 1972, 1973, 1974, and 1975 model cars tested by EPA generally had an increased failure rate as they grew older.

year cars from the St. Louis, Missouri, and Washington, D.C. areas also did not meet Federal emission standards for the first year and the failure rate increased for the second year.

Emission Surveillance Program--St. Louis and Washington, D.C. Cars on the Road Failing Federal Emission Standards

Year tested	Number tested	Number failed	Percent failing Federal standards
		1975 Models	
1975	185	110	59.4
1976	76	55	72.4

IMPROPER MAINTENANCE AND ADJUSTMENTS CAUSE EXCESS EMISSIONS

Cars on the road are exceeding the Federal emission standards primarily because of maladjustment, tampering, and excessive deterioration of the emission system and other components. Because the results of the emission surveillance program showed a high failure rate of 1975 and 1976 model year cars, EPA contracted for a study to determine the reasons for the high failure rate. In a test of 1975 and 1976 model year cars, the EPA contractor found that 58 percent of the 300 cars tested had maladjustments and disablements of their emission system components. Maladjustments and disablements included such things as the idle mixture, idle speed and timing of the engine not set according to the manufacturer's specifications; plugged, disconnected or rerouted vacuum lines and damaged valves that could not provide proper air circulation for the emission system; and dirty air cleaners and spark plugs that were not changed at the specified intervals.

Only 42 percent of the cars tested met the Federal standards when tested in an as-received condition, yet 73 percent passed after corrections were made for maladjustments and disablements. After disabled and defective emission system components were repaired and the cars were tuned, 81 percent met the standards. The 19 percent that failed after being adjusted failed only the NOx standard, and their average emissions were only 3-percent higher than the NOx Federal standard.

EPA determined that most cars that initially failed to meet Federal standards were in compliance with the standards after relatively simple corrective measures were taken to adjust the car components to manufacturer specifications.

IM PROGRAMS ARE THE MOST EFFECTIVE MEANS FOR ENSURING THAT CARS ON THE ROAD MEET EMISSION STANDARDS

IM programs offer the most direct and effective method of encouraging the proper use of emission control systems and bringing cars exceeding Federal emission standards into compliance. Where needed, all cars in a prescribed area should be inspected on a regular basis and the owners should be required to make the necessary repairs. Currently, only IM programs offer much potential for reducing excess emissions of cars in use caused by maladjustments, tampering, excessive deterioration, and insufficient maintenance.

State and local IM programs required by EPA, however, have been of limited effectiveness in the overall enforcement of Federal emission standards because:

--Few programs have been implemented due to resistance by the States.

--IM programs test cars for compliance to local rather than Federal standards.

Effective IM programs require (1) at least annual inspection of cars and (2) the necessary enforcement retesting of failed cars to assure that the needed corrective maintenance has been taken. According to a recent assessment on the need for and benefits of IM programs, prepared by EPA's Mobile Source Enforcement Division, IM programs would have a comprehensive impact on maintenance problems and other underlying causes of excess emissions from cars in use by providing incentives

--to car owners to get the needed maintenance done,

--to the service industry to do maintenance work more effectively, and

--to the manufacturers to encourage the development of cars that are more serviceable.

Additionally, the assessment concluded that IM programs would provide important assistance to all other EPA enforcement programs. By identifying car models that frequently fail emission inspection tests, IM programs would enable the selective enforcement auditing and recall programs to better focus on problem car models. Also, the threat of failing an emission inspection would be a serious deterrent to tampering, making IM a major factor in EPA's antitampering program. IM programs are also considered important in the enforcement of

An IM program has also been approved by the Colorado State legislature for the Denver area but will not be implemented until 1980. IM is also planned in California for change of ownership cases in the Los Angeles metropolitan area. In addition, voluntary IM programs have been established in Clark County, Nevada, which includes Las Vegas and Reno; the State of Rhode Island; the Kentucky suburbs of Cincinnati; and Jefferson County, Kentucky, which includes Louisville. The State of Connecticut is planning to implement IM in 1980. Pursuant to the provisions of the 1977 amendments, EPA has recently listed a total of 104 areas of the country that will be required to implement IM programs.

IM programs have generally not been operational because the States have resisted their implementation. Four States are in the courts challenging EPA's authority to require IM programs.

Resistance by the States is attributable to a combination of factors. Although the 1970 amendments authorized States to establish IM programs, the States could, if they chose, set aside the program. Further, EPA's actions of allowing States in some cases to delay or even put aside the development of program plans had a negative impact on IM programs until these actions were overruled in January 1973 by the U.S. Court of Appeals for the District of Columbia. This decision required States adversely affected by mobile-source-related pollutants to develop and submit plans which provided for meeting ambient air quality standards between 1975 and 1977. Limited time frames, the controversial nature of many of the measures contained in State implementation plans, and the magnitude of the pollution problem in many metropolitan areas made meeting the 1975-77 date extremely difficult.

The public has not generally accepted the need for IM programs primarily because car owners bear the cost to correct cars failing inspection. Although the Clean Air Act contains a warranty provision whereby manufacturers are required to correct defects that are not the fault of the owner, EPA has not been able to make this provision enforceable because a means to coordinate IM tests with Federal emission standards has not been established.

1977 AMENDMENTS PROVIDE MORE TIME AND INCENTIVES TO IMPLEMENT STATE PROGRAMS

The 1977 amendments to the Clean Air Act are intended to resolve the legal and enforcement problems EPA has experienced in trying to implement IM programs. In summary, they

quality standard, and if they are in violation it is generally because of stationary and not mobile sources of pollution.

In addition, IM programs test primarily at idle speeds, while under FTP, tests are made at varying speeds, with hot and cold starts and an extended period for preparation. While FTP normally takes 19 hours to complete, idle mode tests can be performed in a few seconds.

EPA BELIEVES CURRENT SHORT-TEST TECHNOLOGY CAN COORDINATE LOCAL EMISSIONS WITH FEDERAL STANDARDS

Section 207(b) of the Clean Air Act requires EPA to develop short-test procedures capable of being correlated to FTP. EPA believes it has developed short-test procedures which meet the statutory requirements of availability, correlation, and good engineering practice. On May 25, 1977, EPA published its proposed regulations containing these procedures.

Comments were received from 89 sources, including the car manufacturers, tire companies, State and local governments, auto clubs, and private persons. Although many comments were favorable and expressed the need for such a short test, the car manufacturers disputed EPA's claim that short-test technology is now available.

The manufacturers contended that EPA did not have the authority to promulgate section 207(b) regulations because a short performance emission test, capable of being reasonably correlated with FTP and based on good engineering practice, does not exist at this time. Among the manufacturers contentions were the following:

--It is not possible to develop a short test that correlates to FTP for all the various combinations of vehicles, engines, and emission control systems.

--EPA has not adequately supported the determination that there are available testing methods and procedures to ascertain whether each vehicle complies with applicable emission standards throughout its useful life.

--The methods and procedures proposed by EPA have not been proven under actual use (real world) conditions and, therefore, the determination made by EPA can only be speculative.

Car owners that currently fail IM tests must correct any defects entirely at their own expense. An effective warranty would lessen owner expense by shifting to the manufacturer the corrective maintenance cost of those defects reasonably attributable to the manufacturer.

CONCLUSIONS

Based on the data available, most cars on the road that failed to meet the Federal emission standards did so because of maladjustments, excessive deterioration, tampering, and insufficient maintenance of emission control systems. The available data indicates that cars exceed Federal emission standards as early as 1 year after leaving the factory and that a substantially larger percentage of cars fail as they become older. (This is discussed in more detail in chapter 3.)

While most cars may exceed the Federal standards, not all areas of the country are effected to an extent requiring action to reduce their level of emissions. The quality of air in EPA designated air quality control regions is also affected by pollutants from other sources, such as electric power plants, smoke stacks on industrial plants, and solid waste refuse incinerators. As a result, IM programs are needed only in those areas of the country where EPA has determined that car emissions contribute significantly to air quality problems. To date, the efforts by EPA to require IM programs have had only moderate success. Certain legal questions concerning EPA's authority to mandate IM programs remain unresolved. The 1977 amendments offer both incentives and penalties to encourage the States to cooperate with EPA in implementing IM programs. Their effectiveness at this time cannot be fully determined.

EPA efforts to correlate test results from local IM programs with Federal emission standards and to require that manufacturers effectively warrant emission control systems should remove a major reason for State and public resistance.

Because short-test technology is the key to enforcing the manufacturer performance warranty for emission control, meeting the deadline for publishing the final short-test procedures is vital.

If manufacturers can be required to correct deficiencies in emission control systems that fail because of manufacturing deficiencies, IM programs may become more acceptable. It should be noted, however, that most cars do not meet the standards because they have not been properly

CHAPTER 3

CAR PROTOTYPE TESTING DOES NOT ADEQUATELY CONSIDER ON-ROAD DRIVING CONDITIONS

Although certification testing assures that cars are designed to meet Federal emission standards, the testing done does not adequately consider the conditions under which cars will be driven by the owner after they leave the factory. Certification testing addresses preproduction prototype models or cars that are specially built and individually assembled to specifications as near as possible to those to be used in mass production. These prototypes are tested under controlled laboratory conditions that do not reflect actual conditions that can contribute to excessive deterioration and other maintenance problems after cars are in use. EPA recognizes that the prototype program could be improved to better consider on-road operations and has initiated action to revise prototype certification test procedures.

VEHICLE CERTIFICATION PROCESS

Certification testing is the first step in EPA's efforts to control air pollution from automobiles. Section 206(a)(1) of the Clean Air Act requires EPA to test new vehicles and issue a certificate of conformity if they meet Federal emission standards. Without a certificate, new vehicles cannot be offered for sale or sold by a manufacturer. When EPA certifies a class of vehicles, it acknowledges that such vehicles are designed so that they will meet Federal emission standards for a specified number of years if properly operated and maintained. (See p. 1.) Certification testing is a valuable program because

- --it eliminates or corrects vehicle design that does not meet Federal emission standards before car production is underway and
- --it is the only EPA emissions program that includes all basic vehicle configurations and tests the durability of emission control systems.

In the first phase of certification, each manufacturer's product line is divided into engine family emission control system combinations which have similarities in emission and deterioration characteristics. One preproduction prototype--a durability vehicle--from each family is driven 50,000 miles to establish the rate of emission control system deterioration for the family.

Engine Family Combinations (note a)
1978 Vehicle Prototype Certification Program
Status at March 30, 1978

Manufacturer	Approved for testing	Canceled by the manufacturer	Certification activity Incomplete (note b)	Certified
American Motors	14	1	5	8
Audi	4	0	0	4
BMW	4	0	0	4
Checker	5	0	1	4
Chrysler	57	6	31	20
Datsun	7	0	0	7
Fiat	6	0	0	6
Ford	55	1	23	31
General Motors	59	25	0	34
Honda	2	0	0	2
Isuzu	2	0	0	2
Jaguar	4	0	3	1
Mazda	11	2	1	8
Mercedes Benz	15	0	0	15
Mitsubishi	4	0	0	4
Peugeot	4	0	1	3
Porsche	6	0	0	6
Renault	4	0	2	2
SAAB	3	0	0	3
Stutz	8	0	2	6
Subaru	2	0	1	1
Toyota	6	0	0	6
Volkswagon	8	2	0	6
Volvo	5	1	0	4
Other (note c)	8	0	4	4
Total	303	38	74	191

a/ Engine families are groupings which have similar emission characteristics.

b/ EPA said that engine families with incomplete certifications will probably be canceled by the manufacturers.

c/ Consists of eight manufacturers.

--Would complicate design certification, manufacture, and the servicing of cars.

--Would foster additional administrative and judicial confrontation.

Despite the above manufacturer comments, EPA expects to overcome these objections and to publish the final regulations to apply to 1981 model cars.

Real world driving conditions are not fully considered in durability test procedures

Emission system components are tested for durability on prototype cars under conditions not representative of on-road conditions experienced by cars in use. In durability testing, a prototype car is operated over a test track or on a dynamometer for 50,000 miles. Most cars are tested on the dynamometer, however, because these tests are cheaper and fewer mistakes and accidents occur in completing the driving cycle. Although (1) a strict speed pattern is maintained, (2) all maintenance prescribed by the manufacturer is performed as scheduled, and (3) exhaust emissions are measured at specified intervals to gather data to compute deterioration factors, the impact of variables such as extreme hot or cold temperature, repeated cold starts, and vibrations because of poor roads are not assessed. Consequently, significant deterioration factors--primarily caused by mileage accumulation--are not adequately considered for the 50,000-mile driving period.

EPA recognizes that its prototype test procedures could be improved and has initiated in-house studies to provide more realistic alternatives. An alternative under consideration is the use of durability data from vehicles in use.

CONCLUSIONS

Prototype certification testing is a useful and vitally necessary emission control compliance technique. It is the first step in EPA's effort to control air pollution from automobiles and assures that manufacturers are designing cars that meet Federal emission standards. Certification testing is also especially important because it is the only EPA emission program that reviews for emissions purposes all basic engine family combinations.

Prototype certification testing does not, however, assure that once cars are used on the road they will meet Federal emission standards. Many cars are not driven or

CHAPTER 4

ALL NEWLY MANUFACTURED CARS DO NOT MEET FEDERAL EMISSION STANDARDS

The assembly line testing of cars as they come off the production line--selective enforcement auditing (SEA)--does not ensure that every car produced complies with the Federal emission standards. Currently, EPA regulations require compliance by a minimum of only 60 percent of the cars of a configuration tested. The program as presently operated is intended to provide only a check on the manufacturers' quality control processes and not to show what overall percentage of total cars produced meet the standards. The amount of testing done is limited to only a small sample of cars of a relatively few configurations primarily because a practicable short test for emissions has not been developed.

SEA PROGRAM EFFORTS

EPA began the SEA program--an important second step in the enforcement of emission standards--in January 1977. It is an important program because mass-produced cars may have a higher level of emissions than the preproduction prototype cars tested under EPA's prototype certification program, even though their designs may be identical. Mass production techniques also cause a large degree of variability in the cars produced.

In 1977, only 1 vehicle configuration of the 34 SEAs conducted failed to meet the Federal emission standards. Of the 324 cars tested, 75 percent met all three standards--HC, CO, and NOx. While the scope of the current SEA is limited, it is a useful tool for promoting industry compliance with the standards since it (1) motivates manufacturers to provide effective production quality control and (2) enables action to remedy emission control defects before cars are distributed to the public.

EPA DOES NOT REQUIRE ALL NEW CARS TO MEET STANDARDS

The Clean Air Act provides that each car built is to comply with Federal emission standards. Section 207(a), of the act requires that the manufacturer warrant to each purchaser of a car that, at the time of sale, it is designed, built, and equipped to conform to the Federal emission standards. EPA believes that the act intended eventual compliance by all production cars with the standards and did not intend immediate compliance.

During the SEA program's first year of operation--January through December 1977--EPA completed 34 SEA test procedures on 324 cars from four U.S. and three foreign manufacturers. Only 31 of the approximately 8,700 car model configurations produced in 1977 were included in the SEA test program. The projected annual sales of the tested cars were about 2.2 million.

A typical SEA test procedure takes about 1 week to complete. It covers a small sample of cars--usually less than 20--of one car configuration. It is intended to assess, on a sample basis, the compliance of only 1 week's production of a particular configuration and the results should not be projected beyond that week's production.

Under EPA regulations during a model year for any manufacturer the number of SEAs is not to exceed 1 car per 300,000 projected to be sold, with an additional SEA test program for each configuration that fails the test. Additional SEA tests can be completed once this limit is reached, but only for configurations for which evidence exists indicating probable noncompliance with the emission standards. Assuming no configurations failed a test or warranted a test because of probable noncompliance, these provisions would limit the number of SEAs to 31 in a model year in which the four largest domestic manufacturers expect to sell 9 million cars.

The limit was established because, when the program was initially proposed in 1974, manufacturers claimed that the lack of a limit on the number of SEAs would make the ultimate administrative and economic burden imposed impossible to manage. EPA selects the configurations to be tested and monitors the tests, but the tests are actually performed by manufacturer personnel at the manufacturer's facilities. Assembly line testing apart from those ordered under the SEA program are not required, and manufacturer testing was limited at the time EPA proposed the program. Since 1974, however, manufacturers have substantially increased their own assembly line testing programs. (See pp. 26 and 27.)

EPA officials have stated that they consider the extent of testing done to be adequate. They informed us that the SEA program was designed not to measure overall compliance, but to promote compliance by motivating effective production quality control. They pointed out that they had selected for test those configurations having relatively high emissions--the ones that most likely would not meet the standards.

The program has motivated manufacturers to make significant improvements in their quality control. Since 1974, when EPA initially proposed the SEA program, manufacturers have increased their assembly line testing from 1,400 cars by 2 manufacturers in model year 1974 to 19,000 cars by 19 manufacturers in model year 1977. The manufacturers' tests include approximately the same procedures and take about the same amount of time as FTP. Manufacturer increases in testing is shown below

Manufacturer Emission Testing of Cars

	Model year			
	1974	1975	1976	1977
Number of manufacturers completing testing	2	5	15	19
Total cars tested	1,440	5,548	10,729	18,634

According to EPA, two U.S. manufacturers tightened their internal criteria for judging 1977 model year car emission performance. Based on the new criteria, the production of four model configurations was halted.

EPA believes that the program has also prompted manufacturers to make many more engineering changes for emission control to preclude failure in a SEA test. EPA's analysis showed that the engineering changes for improved emission performance by the three largest U.S. manufacturers increased from 12 in model year 1976 to 46 in model year 1977.

SEA ENHANCES ENFORCEMENT CAPABILITY

The SEA program enables EPA to stop the distribution of cars that fail the SEA test until their deficiencies are corrected. It also provides a basis for ordering the recall and correction of cars that have been delivered to dealers and owners.

For the car model configurations that initially failed SEA in 1977, EPA revoked the certification and caused the manufacturer to correct its assembly line production on about 91,000 cars. EPA also ordered the recall of about 54,000 cars of the configurations previously shipped to dealers--some of which were already sold. In revoking certification, production was not seriously disrupted because, pending retests, EPA conditionally recertified the modified cars. After the retests, EPA performed an additional test on the corrective actions taken and the configuration was officially certified.

CHAPTER 5

RECALL EFFORTS HAVE LIMITED DIRECT IMPACT ON REDUCING EMISSIONS

EPA's recall program is limited to remedying defects in emission equipment caused by manufacturer design, production, and unanticipated deterioration of parts. Although it has little direct impact on reducing excess emissions, recall motivates manufacturers to correct faulty design in emission system components. EPA is attempting to make recall more effective by broadening its scope--making manufacturers responsible for maladjusted emission systems caused by designs that require excessively complex adjustments and maintenance.

EPA'S RECALL EFFORTS

Section 207 of the Clean Air Act provided that if EPA determines that a substantial number of a particular class of vehicles, although properly used and maintained, do not conform to the Federal emission standards throughout their useful life--5 years or 50,000 miles--EPA shall order the manufacturer to recall the vehicle and remedy the nonconformity at the manufacturer's expense.

Under the recall program, EPA seeks to identify classes of cars having manufacturer-related emission deficiencies by reviewing information from a large variety of sources, including manufacturers' test data, complaints from car owners, and data from EPA's prototype certification and SEA assembly-line testing programs. EPA investigates prototype "suspect" classes of cars and often, through discussion with the manufacturers, has succeeded in having the manufacturer voluntarily recall certain classes of cars for corrective action. In other cases where disputes arose EPA has ordered the manufacturers to recall cars and take corrective measures as specified in the act. Under this program, from model year 1972 to May 10, 1978, about 12 million cars were recalled by the manufacturers for repairs of emission system defects.

When an investigation indicates that a class of cars has a serious emissions-related manufacturing defect, EPA notifies the manufacturer. The manufacturer generally cooperates with EPA in negotiating a voluntary recall. This process works to the advantage of both EPA and the manufacturer since EPA avoids costly and time-consuming recall testing and the manufacturer receives a more favorable public image. As of May 10, 1978, EPA had negotiated the voluntary recall of about 9.3 million cars for the correction of emission system defects by the

--The manufacturer was responsible for the maladjustments because it should have foreseen that its maintenance and adjustment procedures would cause widespread maladjustments.

--An agency relationship existed between the manufacturer and its authorized dealers making the manufacturer responsible for the actions of the dealer.

EPA is thereby trying to establish that manufacturers are responsible not only for designing and manufacturing cars which meet standards when set to recommended specifications, but which can also be reasonably expected to be maintained in the condition required to meet the standards. This is important in that it would encourage manufacturers to design cars in a way to reduce the likelihood of maladjustments and inadequate maintenance.

The manufacturer has contested the recall. On February 10, 1978, an EPA administrative judge upheld EPA's recall decision, but the manufacturer planned to ask for a review of the decision by the EPA Administrator. At the time of our review, the issue had not been settled.

CONCLUSIONS

The major benefit of EPA's recall program is that it motivates better design, development, and manufacture of car emission system components. There is a benefit also in that it identifies design and production defects that become apparent only after cars are in use by the car owner. The program is most effective when it utilizes various sources of emissions data to encourage manufacturers to recall cars without the need for time-consuming recall testing. Its immediate impact on reducing the volumes of excess emissions is limited, however, because of the relatively small number of cars involved and because all car owners do not comply with the recall notice and return their cars for corrective maintenance by the dealer. The program also does not address the major cause of excess emissions--the maladjustment and improper maintenance of cars that are in use.

RECOMMENDATION

We recommend that the Administrator, EPA, together with the auto manufacturers, initiate followups to the notice letters sent by the manufacturer, to encourage car owners involved in recalls to return their cars for corrective maintenance. State and local government licensing and enforcement agencies should be enlisted in such efforts.

SUMMARY OF STATE INSPECTION AND MAINTENANCE PROGRAMS

Areas where inspection and maintenance programs are required	Status of inspection and maintenance programs as of Dec. 31, 1977
Alaska:	
Fairbanks	None implemented.
Arizona:	
Phoenix Tucson	Mandatory testing began in January 1976, and maintenance became mandatory in Jan. 1977.
California:	
Los Angeles Sacramento San Diego San Francisco San Joaquin Valley	A pilot program began Sept. 2, 1975, in Riverside, California. This program has mandatory inspection and voluntary maintenance. Programs have not been implemented in any other area of the State.
Colorado:	
Denver	State has enacted legislation providing for implementation in 1980.
District of Columbia:	
Washington, D.C.	Despite the lack of enacting legislation, funds have been appropriated and facilities are operating in the District for voluntary emissions testing of cars. Required programs for the Maryland and Virginia suburbs have not been implemented.
Illinois:	
Chicago	Mandatory inspection began in June 1973. Because there is no enforcement, recent figures show less than 20 percent of the vehicles being inspected.

APPENDIX II

Areas where inspection and maintenance programs are required	Status of inspection and maintenance programs as of Dec. 31, 1977
Texas:	
Houston	None implemented.
San Antonio	
Utah:	
Salt Lake City	State legislature has authorized inspection and maintenance program but has not authorized the fees to support the program.
Washington:	
Seattle	None implemented.
Spokane	

FEDERAL TEST PROCEDURE REQUIREMENTS

To begin FTP, the car is placed on a dynamometer for a short-test run of simulated driving, after which it is parked in a controlled storage area for a period of not less than 12 hours, and not more than 36 hours. The car is then pushed onto the dynamometer for a cold start test and is driven over a 7.5 mile simulated driving schedule consisting of various stops, slow and fast starts, and speed variations simulating an average trip in an urban area.

After the cold start test is completed, the engine is shut off and 10 minutes later the car is started and run through the same 7.5 mile urban cycle from a hot start. Samples of exhaust emissions to determine HC, CO, and NOx levels are collected during both the hot and cold start tests. The entire exhaust test takes about 43 minutes to complete.

When the hot test is completed, the car is pushed into an airtight enclosure and parked for 1 hour. At the end of this period, the vapors which were emitted within the enclosure are analyzed for hydrocarbons. This same procedure, called the evaporative emission test, is also performed 1 hour before the cold start test.

To assure that all cars are tested under the same conditions, the temperature is controlled between 68 and 86 degrees throughout the test cycle. The humidity is controlled. It takes about 19 hours to complete FTP.

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APPENDIX II

Areas where inspection and maintenance programs are required	Status of inspection and maintenance programs as of Dec. 31, 1977
Indiana:	
Indianapolis	None implemented.
Maryland:	
Baltimore	None implemented.
Massachusetts:	
Boston	None implemented.
Springfield	
New Jersey	The Nation's longest ongoing inspection and maintenance program covers the entire State of New Jersey. It began in July 1972 and became mandatory Feb. 1, 1974.
New York:	
New York	Mandatory inspection and maintenance programs apply only to taxicabs in New York City. A program is in effect for the New Jersey suburbs.
Ohio:	
Cincinnati	Mandatory inspection and maintenance began in Cincinnati on Jan. 1, 1975.
Oregon:	
Portland	Voluntary inspection and maintenance began Jan. 1974. Program became mandatory on July 1, 1975.
Pennsylvania:	
Philadelphia	None implemented in Philadelphia and Pittsburgh. However, a program is in effect in the New Jersey suburbs of Philadelphia.
Pittsburgh	

FEDERAL EMISSION STANDARDS

The 1970 amendments to the Clean Air Act gave EPA the authority and responsibility for establishing programs to provide for:

--A 90-percent reduction by the 1975 model year of HC and CO emissions that were allowable on 1970 model cars.

--A 90-percent reduction by the 1976 model year of NOx emissions measured on 1971 model cars.

To reach the above goals, EPA established in grams per mile, the following Federal emission standards--HC, 0.41; CO, 3.4; and NOx 0.4.

Realizing that technology was not available to meet these standards, the automobile industry was permitted to meet reduced standards for the 1975, 1976, and 1977 model years. Implementation of the final standards established in 1970 was postponed until introduction of 1978 models. However, the automobile industry stated that its 1978 models could not meet the standards either. Consequently, in August 1977 the Congress amended the Clean Air Act to set new standards for 1978 and 1981 models as follows:

Model year	HC	CO	NOx
	(grams per mile)		
1978	1.5	15.0	2.0
1979	1.5	15.0	2.0
1980	.41	7.0	2.0
1981	.41	3.4	1.0

Under certain conditions, EPA can waive the more stringent CO and NOx standards for 1981 models.

manufacturers. EPA had also ordered recalls on about 2.7 million cars. At the time of our review, about 11 million additional 1973-78 model year cars were under investigation for possible recall.

RECALL HAS A LIMITED IMPACT ON REDUCING EMISSION VOLUME

A June 1977 EPA management study draft report concluded that EPA's recall program had limited direct impact on excess auto emissions because it involved only a limited number of car classes and primarily addressed manufacturer design and production defects. The report stated that (1) the total volume of emission reduction directly due to recall is small, (2) the major emission reductions are achieved by recall when changes in designs of future models are effected which otherwise would not have taken place, and (3) recall provides manufacturers with an incentive for bettering the design of emission systems since it is more cost effective to change a design than to risk a future recall action or a denial of certification.

The program has also been successful in getting manufacturers to repair, at their expense, emission system defects identified under the program. A problem aspect of the program, however, is the fact that not all car owners return their cars to the dealer for repairs when notified. Only about 65 percent of the cars recalled were returned to the dealers for repairs.

RECALL PROGRAM ENCOURAGES BETTER CAR DESIGN

Until recently, the recall program was limited to classes of cars that exhibited identifiable defects in design, production, or durability--defects immediately and directly attributable to the manufacturer. EPA is now attempting to extend the program's focus to include excess emissions of cars in use primarily caused by maladjustments by car service organizations and car owners.

In its tests of 1975 suspect class cars, EPA determined that a substantial number of cars from one manufacturer exceeded the Federal emission standard for CO due to a carburetor idle maladjustment, even though the owners had the cars serviced by dealers. EPA concluded that dealers routinely maladjusted the carburetors as a result of the manufacturer's carburetor idle system design and carburetor adjustment procedures. EPA ordered the manufacturer to recall the cars and remedy the defect. EPA contended that:

CONCLUSIONS

SEA is a valid program in EPA's efforts to promote compliance with Federal emission standards because it serves as a check on manufacturer quality control at a critical point before cars are fully distributed to the public and defects can be easily remedied. The amount of SEA testing done, and the number of cars tested were limited. In addition, although only 60 percent of the cars tested under EPA requirements must meet the standards, of the cars tested 75 percent met all three standards.

Even in its current form, SEA motivates manufacturers to provide more effective quality control; however, its effectiveness is limited because certain configurations selected for testing consist of car models with a low volume of sales.

RECOMMENDATIONS

We recommend that the Administrator, EPA, revise SEA program regulations to:

--Provide for (1) a larger number of SEA tests at a frequency of more than once a model year and (2) routine selection of higher volume car model configurations for SEA testing.

--Require a Federal emission standard compliance rate more indicative of the current rate for car configurations tested, which is well in excess of the 60-percent passing rate required.

MOST CARS TESTED MET STANDARDS

Only 1 of the 31 configurations of cars sampled in EPA's SEA program in 1977 failed to meet Federal emission standards. Most of the 324 cars tested passed each standard. While individual cars in some configurations failed to meet one or more of the standards, their failing did not prevent the configuration from passing since, under EPA's sampling procedure, only a projected 60 percent of a sample must meet the standards.

Cars Meeting Standards

Standard	Number	Percent
HC	299	92.3
CO	294	90.7
NOx	292	90.1

Of the 324 cars, 75 percent tested met all three standards. Reported average emission levels were generally lower than the maximum levels allowed by the standards, ranging from 46 to 80 percent of the allowable maximums.

EPA's analysis of major manufacturer assembly line testing program results for model year 1977 showed that passing rates, by individual standard, ranged from 83 to 98 percent. The reported average emission levels were generally much lower than the maximum levels allowed by the standard and ranged from 51 to 80 percent of the allowable maximums. Manufacturer overall test results were in general agreement with SEA results.

SEA IMPROVES PRODUCTION PRACTICES AND QUALITY CONTROL

SEA is to motivate the manufacturers to build cars to the prototype standards and improve quality control by subjecting all car configurations to the possibility of testing. Tests are to be made with little or no notice, and EPA does not inform manufacturers of the configurations to be tested during the model year. To heighten the program's deterrent effect, EPA gives priority to testing configurations most likely not to meet emission standards. Configurations are identified for testing by the analysis of manufacturers' reports, certification data, and data from other sources.

Initially, in December 1974, EPA proposed that a configuration would pass the SEA test if the results of tests on sample cars showed, on a projection basis, that at least 90 percent of the cars in the configuration tested met the standards--allowing a 10-percent margin for measurement error and production variances. The manufacturers objected and contended that:

--The act requires only that the average of overall emissions from a car population meet the standards.

--A 90-percent compliance requirement would be economically disastrous because the majority of cars would lose certification.

--Even if the requirement could be met, more emission control equipment would have to be added, causing decreased fuel economy and increased costs.

To provide time and flexibility for the manufacturers to bring all cars into compliance on a reasonable schedule, EPA established 60 percent as the criterion for passing SEA. In doing so, EPA stressed that compliance by all cars continues to be the goal. EPA plans to increase the compliance percentage as the manufacturers' capability improves.

The rationale for the pass/fail criteria was set forth by EPA's General Counsel in a January 1976 memorandum. The Counsel concluded that the Congress intended that, eventually, all cars coming off the assembly line should meet emission standards, but that the act allowed for a "period of phasing in" of an assembly line test program as long as the ultimate goal of full compliance was not abandoned. The Counsel pointed out that the act did not require EPA to implement assembly line testing within any fixed deadline or take enforcement action where such testing showed a nonconformity. In his opinion, the act did not require EPA to implement SEA in what could be regarded as an unreasonably burdensome manner.

SEA TESTING PROVIDES LIMITED DATA ON CAR EMISSION PERFORMANCE

About 11.2 million new cars went on the road in calendar year 1977--9.1 million produced in the United States and 2.1 million imported. The extent to which these cars were tested at the end of the assembly line for compliance with Federal emission standards was limited because EPA had not established an emission short-test procedure. (See p. 13.)

maintained in the controlled manner and environment used in certification testing and, as a result, once in use they exceed Federal emission standards within a short time.

EPA recognizes that its prototype certification procedures should be revised. Although optimistic that it can overcome the manufacturers' objections to its proposed revision, the nature of the objections and court tests may delay the publishing of the final regulations.

RECOMMENDATION

We recommend that the Administrator, EPA incorporate factors such as weathering, extreme hot or cold temperatures, repeated cold starts, and road vibrations in EPA's durability testing for prototype certification.

EPA CORRECTIVE ACTION ON PROTOTYPE CERTIFICATION TESTING

On-road vehicles are not driven or maintained in the ideal manner assumed during prototype certification testing. EPA has recognized this and initiated action to (1) test emission control systems at variable emission settings and (2) devise ways to better assess emission control system durability.

EPA studies show that maladjustments, tampering, and excessive deterioration of emission systems components account for 90 percent of excess emissions from cars on the road. A primary reason given for maladjustments and tampering with the emission system is to correct driveability problems perceived by car owners.

Currently, EPA tests cars with parameters for ignition timing, idle, air/fuel mixture and others set to the manufacturer's specifications. In an effort to obtain better performance these parameters may be adjusted on cars in use to other than the specified manufacturer settings which causes the particular car to exceed the emission standards.

EPA is currently considering actions to alleviate the problem of maladjustment and tampering with emission control systems and, in October 1977, proposed a revision to the certification testing procedures that would enable it to test prototype vehicles with variable adjustments in engine settings. With this revision, EPA hopes to motivate manufacturers to design emission systems limiting the number of possible engine adjustments.

Most manufacturers commented unfavorably on the proposed revisions to the certification test procedures. They contended that the proposed revision:

--Was vague and poorly defined and would not accomplish its intended purpose.

--Was too broad in scope since the primary cause of maladjustments, as shown by EPA data, was the idle air/fuel mixture, and that the revision covered all emission system components.

--Would create substantial costs for motorists without a proportionate improvement in air quality.

For the 50,000 mile accumulation, the manufacturer drives the durability vehicle on a test track or dynamometer--simulated driving--following a strict speed pattern with fast and slow starts, stops, and speed variations established by EPA. Maintenance prescribed for the car is performed by the manufacturer at scheduled intervals and monitored by EPA. Exhaust emission tests are made at 5,000 mile intervals by the manufacturer using the FTP. EPA confirms the manufacturer's results by testing at the 5,000 and 50,000 mileage points. If Federal emission standards are met over 50,000 miles, the vehicle passes.

A second phase of the prototype certification process involves testing an average of three additional preproduction vehicles in the same engine family as the durability vehicle. Using the FTP, the manufacturer tests emissions at the 0 and 4,000 mile points. EPA confirms the manufacturer's data by testing at 4,000 miles. The emission test results obtained at 4,000 miles are adjusted by the deterioration rate established by the durability vehicle. If all test vehicles meet Federal emission standards, the engine family is certified. Details of the FTP processes are discussed in appendix IV.

Certification testing of 1978 models

Based on EPA certification testing data, manufacturers are designing cars that meet Federal emission standards. For the 1978 model year, EPA performed 1,770 confirmatory tests on over 900 prototype model cars submitted by 32 manufacturers for certification testing. As shown on the following page, 191 engine families had been certified by March 20, 1978, for the 1978 model year.

maintained--not because of manufacturing defects. In such cases, the car owner would continue to be responsible for corrective action necessary to meet the standards.

The States and the general public resist IM programs primarily because of the cost to the individual car owner. Additionally, owners will continue to resist until they are assured that, where appropriate, the cost will be incurred by the manufacturer. As noted earlier, however, the causes of excess emissions are not generally attributable to the manufacturer.

--For years the manufacturers have tried unsuccessfully to develop a short test for screening purposes to lower their own emissions testing costs--which run into millions annually--and that even with this strong incentive no practical short test has been developed.

--It is obvious that no short test will ever be developed to accurately and repeatedly predict FTP results.

In late 1978, EPA was evaluating the comments received. EPA officials have stated that they fully expect to overcome the manufacturers' objections, and issue final short-test regulations.

SHORT-TEST PROCEDURES WOULD ALLOW ENFORCEMENT OF EMISSIONS PERFORMANCE WARRANTIES

The manufacturer emissions system performance warranty provision of the Clean Air Act can be enforced when EPA determines that short-test procedures are available for correlation with Federal emission standards. The warranty makes the manufacturer liable for the cost of repairs to bring a car--which has been properly operated and maintained--into compliance with Federal emission standards. To activate the warranty, the car owner must have been found in violation of emissions standards due to excessive emissions found through testing in an IM program.

On May 25, 1977, EPA published its proposed regulations for implementing the warranty. The proposed regulations are being redrafted because of revisions made to the warranty provisions in the 1977 amendments to the Clean Air Act.

The amendments reduced the warranty period for the entire emission control system from 5 years or 50,000 miles, to 2 years or 24,000 miles, whichever comes first. The warranty period of up to 5 years or 50,000 miles was limited to the repair or replacement of the catalytic converter, thermal reactor, or other components installed for reducing emissions.

EPA hopes to (1) publish the redrafted proposed regulations by the end of 1978, (2) promulgate the final regulations early in calendar year 1979, and (3) make the performance warranty fully applicable to 1980 model cars.

Implementation of the warranty provision may remove a major cause of the public's resistance to IM programs.

--provide a clearer mandate,

--give States more time and flexibility to adjust to the problems involved, and

--establish important new incentives for States to comply with EPA requirements.

The amendments provided that by January 1, 1979, States were to submit detailed implementation plans that provide for meeting the national ambient air quality standards by December 31, 1982. These plans were to include a schedule for the implementation of IM if a State could not attain and maintain ambient air quality standards by that date. If the January 1977 plan includes IM--as well as all other reasonably attainable measures--then the attainment date may be extended to no later than December 31, 1987.

To further clarify the Congress intent that the States carry out EPA's requirements and to provide greater incentive, the amendments require penalties for noncompliance. In air quality control regions where IM programs are necessary and for which States have not submitted the required plans by the specified dates, the amendments prohibit:

--EPA from approving projects or awarding grants authorized by the Clean Air Act.

--The Department of Transportation from approving projects or awarding highway grant funds.

While the amendments place EPA in a stronger position to bring about the needed IM programs, their ultimate impact cannot be assessed since the States may seek to contest these provisions on constitutional grounds, as has happened in the past. Further, a significant increase in the number of IM programs may not soon occur, since it will take the States several years to implement the program.

IM EMISSION STANDARDS AND FEDERAL STANDARDS DIFFER

Current IM programs compare emissions to local standards; these standards differ from area to area because of differences in local air quality problems. The results of local tests cannot as yet be correlated to the Federal test procedure (FTP). FTP measures CO, HC, and NOx in terms of grams per mile. IM programs measure CO as a percentage of total emissions, HC by parts per million, and have no measurement standard for NOx. EPA officials have stated that EPA does not require the NOx test for IM programs since most areas of the country are not in violation of the NOx air

the manufacturer performance warranty. Overall, the conclusion reached in the assessment was that without effective IM programs, all other EPA vehicle emissions enforcement programs were significantly weakened.

EPA does not presently have conclusive data on the volume impact IM programs would have in reducing excess emissions. Such programs have been too few and too recent to demonstrate their overall effect on pollution levels but the indications are that their impact would be substantial. In July 1978, EPA estimated--on the basis of computer simulation models--that IM programs could achieve at least a 25-percent reduction in both CO and HC emissions from cars. In 1977, New Jersey's Department of Environmental Protection attributed an improvement in air quality in the State--an average 26-percent reduction in ambient CO levels from February 1974--largely to the statewide IM program. Further, in a January 1977 assessment of IM programs prepared for the Oregon State legislature, the Portland, Oregon, IM program estimated a reduction of 14 percent in CO and 7 percent in HC emissions due to the first 2-year inspection cycle.

FEW AREAS OF THE NATION HAVE IM PROGRAMS

Under Section 110 of the Clean Air Act, each State must prepare and submit for EPA approval an air quality implementation plan to achieve national ambient air quality standards. An IM program is required to be in a State's implementation plan if the State, or a particular area within the State, cannot meet national ambient air quality standards by 1982.

Although EPA had determined that IM programs were needed in 26 areas of the Nation (see app. II), at the time of our review major programs had been established only in the following six areas:

--Chicago, Illinois (voluntary program).

--Cincinnati, Ohio.

--Phoenix, Arizona (Maricopa County).

--Portland, Oregon.

--Trenton, New Jersey (covers entire State).

--Tucson, Arizona (Pima County).

In the period 1976-77, EPA's internal management study group also analyzed the causes of cars in use not meeting Federal standards. The study group's findings were made available in a June 1977 draft report being circulated in EPA for comment at the time of our review. In its report, the study group estimated on a percent-of-emissions basis that the following factors accounted for the excess of emissions.

Total Car Emissions in Excess of Federal Standards

Reason for the excess	Estimated percent of excess car emissions
Maladjustment	47
Deterioration (due to improper vehicle use, the use of improper fuel, and premature parts failure)	25
Tampering (removing an emission control element or rendering it inoperable)	18
Insufficient maintenance (failure to replace or restore maintenance items)	7
Inadequate basic design and poor production practices	3
	100

The report concluded that car owners and service organizations were directly responsible for the maladjustments and tampering, primarly because of owner dissatisfaction with car performance and improper service by the car service industry.

Deterioration was attributed only partly to manufacturer-related factors such as premature parts failures. Owner-related factors were also cited as causes for deterioration-including the use of leaded gasoline and the improper use of cars, such as pulling excessive loads.

Emission Surveillance Program-Cars on the Road Failing Federal Emission Standards

Year tested	Number tested	Average mileages	Percent failing Federal standards 1/
		1971 models	
1972	120	26,400	65.8
1973	108	37,400	50.9
1974	113	48,500	71.7
1975	119	63,100	72.3
		1972 models	
1972	140	14,800	57.9
1973	120	28,700	67.5
1974	176	41,900	75.6
1975	133	52,100	81.2
		1973 models	
1973	140	18,100	80.0
1974	128	29,000	81.2
1975	201	43,000	86.1
		1974 models	
1973	40	5,800	55.0
1974	193	20,800	77.7
1975	204	31,700	85.8
		1975 models	
1974	587	8,800	63.2
1975	203	22,400	70.0
		1976 models	
1975	515	11,500	52.8

More current EPA data shows that the trend toward increased excess emissions with increased age continued for 1975 model cars. As shown in the following table, 1975 model

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1/ Under the Clean Air Act manufacturers are required to build cars that meet with Federal emission standards for 50,000 miles.

CHAPTER 2

IMPROPER MAINTENANCE AND ADJUSTMENTS CAUSE MOST CARS ON THE ROAD TO EXCEED FEDERAL EMISSION STANDARDS

On the basis of EPA test data most cars on the road are not meeting Federal emission standards because of maladjustments, tampering, insufficient maintenance, or excessive deterioration of the emission system and other components. The establishment of IM programs requiring the periodic inspection of cars on the road for emission requirements, coupled with adequate enforcement efforts by State and local governments, could effectively correct most of these problems.

Where auto emissions are a major cause of an area not meeting national ambient air quality standards, EPA requires IM programs. In many cases, however, the State and local authorities have challenged EPA's authority to require IM programs and refused to implement them.

The States are concerned about the corrective maintenance cost to individual car owners who are required to bring their cars into compliance with emission standards. EPA is presently attempting to correlate the results of local testing programs with the Federal emission standards. In accordance with the warranty provisions of the Clean Air Act, EPA is attempting to develop a method to shift the cost of corrective maintenance from car owners who have properly used and maintained their cars as prescribed by the warranty to the manufacturer.

MOST CARS ON THE ROAD FAIL TO MEET FEDERAL EMISSION STANDARDS

EPA's emission surveillance program 1/ has shown that most cars in use exceeded Federal emission standards within 1 year after production and that the percentage of cars failing the standards increases with the age of the car. Overall, EPA estimates that about 80 percent of the 100 million cars on the road are not meeting the emission standards for which they were built.

1/ A program by which EPA, through the sample testing of cars in selected metropolitan areas, judges the effects that mobile sources of emissions have on air quality.

to prescribe regulations requiring manufacturers to guarantee auto emission control systems for 5 years or 50,000 miles. The establishment of specific Federal emission standards is discussed in appendix II.

The Clean Air Act was amended further in 1977 to

--broaden the prohibition against removing or tampering with auto emission controls to include independent auto repair operations,

--more specifically define manufacturer responsibilities under emission system warranties, and

--establish deadlines for States to implement IM programs.

States required to have IM programs were to submit by January 1, 1979, implementation plans to meet emission standards no later than December 31, 1982. If specific emission standards cannot be met by that date, the States are to submit schedules for implementing their IM programs by December 31, 1987. In addition, the act provides for stringent penalties against States that do not submit the required plans. These penalties prohibit certain types of Federal grants to such States.

EPA ORGANIZATIONAL RESPONSIBILITY FOR FEDERAL EMISSION STANDARDS

Two offices within EPA are responsible for assuring that Federal emission standards are being met. The Office of Mobile Source Air Pollution Control tests prototype vehicles to ensure that manufacturers design new cars to meet Federal emission standards. This office is also responsible for developing and recommending emission standards and related test procedures for mobile sources. In fiscal year 1977, the office spent $5.6 million for prototype certification testing activities. Expenditures for fiscal year 1978 are estimated at $5.1 million.

The Mobile Source Enforcement Division enforces compliance with the Federal emission standards. Its enforcement activities include (1) preventing the introduction into commerce of uncertified, new, domestic and imported vehicles, (2) enforcing both the vehicle assembly line emission test requirements and the recall, warranty, antitampering, and imports provisions of the

ABBREVIATIONS

CO	Carbon monoxide
EPA	Environmental Protection Agency
FTP	Federal test procedures
GAO	General Accounting Office
HC	Hydrocarbons
IM	Inspection and maintenance
NOx	Oxides of nitrogen
SEA	Selective enforcement auditing

--Incorporate factors such as weathering, extreme hot or cold temperatures, repeated cold starts, and road vibrations in the Agency's durability testing for prototype certification.

--Revise selective enforcement audit--assembly line testing program regulations to provide for (1) more tests at a frequency of more than once a model year and (2) a routine selection of higher volume car model configurations for testing.

--Require a Federal emission standard compliance rate more indicative of the current passing rate for configurations tested in the Agency's selective enforcement audit--assembly line testing program.

--Together with the auto manufacturers, initiate followups to the notice letters sent by manufacturers, to encourage car owners involved in recalls to return their cars for corrective maintenance.

--Enlist State and local government licensing and enforcement agencies in the auto recall effort. (See pp. 22, 28, and 31.)

Oral Agency comments were obtained and appropriate changes made in the report. The Agency generally agreed with GAO's conclusions and recommendations.

A practical short test, however, is needed to see if cars are complying with Federal standards. The Agency says it has developed such a test, although manufacturers dispute its applicability. (See pp. 13 to 15.)

The Clean Air Act requires inspection and maintenance programs in those areas of the country where car emissions contribute significantly to air quality problems. Although these programs were needed in 26 areas of the Nation, they had only been established in 6 areas. The Agency has recently identified a total of 104 areas as needing inspection and maintenance programs. (See pp. 10 and 11.)

OTHER ENFORCEMENT EFFORTS NEED SOME IMPROVEMENT

In addition to inspection and maintenance programs, the Environmental Protection Agency's enforcement efforts include programs that assess emissions performance in each stage of a car's life cycle--design, production, and in use. Although these programs, directed toward preventing and correcting basic design and production deficiencies have been reasonably successful they are too limited in their scope and application to be fully effective. (See p. 1.)

Car prototype certification

The Agency's prototype certification program does not consider all factors that contribute to cars not meeting emission standards, such as the deterioration of engine system components. Improvement action has begun and requirements, including design changes, that would limit possibilities for tampering and engine adjustments are under consideration. (See p. 17.)

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 3 days from the date of the report. At that time we will send copies to interested parties and make copies available to others on request.

Sincerely yours,

Comptroller General
of the United States