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AUTOS AND CLEAN AIR: TIME FOR REASSESSMENT

INTRODUCTION

Federal mobile source controls regulate emissions from automobiles, trucks, and other mobile sources of pollution. Continuation of these mobile controls, as they are currently mandated, imposes a great cost on the American consumer and the American automobile industry. The automobile is practically insignificant as a contributor to this nation's total ambient pollution problem--though its contribution is significant in urban areas. During America's twelve-year struggle to attain cleaner air, most of the facts upon which the mobile source controls are based were, and remain, questionable.

A congressional investigation is needed to review, among other issues, the scientific validity behind the existent mobile source standards, the overall validity of the federal automobile testing procedure, the effectiveness of the state monitored inspection and maintenance system, and the relevance of most pollution control devices.

The standards promulgated in 1970 and 1975 were based generally not on hard scientific data but on a need to "do something quick" without regard to cost or energy waste. These controls remain in use, and by conservative estimate, for automobiles alone, will cost the American consumer $5.4 billion in 1983. In addition, the "no lead in gas" regulation will cost consumers $9.76 billion more. Eliminating some of these regulations could reemploy as many as 152,000 workers in the automobile and related industries.

The current mobile source provisions have effects far beyond the American automobile market. Some pollution control devices may contribute to acid rain. In addition, the main supplies of rhodium, palladium, and platinum--the three rare strategic metals

used in the catalytic converter--are located in and subject to the political vagaries of South Africa and the USSR.

Both environmentalists and industry continue to aim for attainment of the Clean Air Act's goals. Some maintain that the various required mobile source pollution control standards are absolutely necessary and should not be softened. But there are also increasingly persuasive arguments for regulatory reform aimed at preserving the current mobile source pollution control system while readjusting the various emission standards in light of environmental and economic reality.

The motor vehicle emission standards in the Clean Air Act aim at controlling nitrogen oxides, carbon monoxide, particulate matter, hydrocarbons, and lead. This policy reflects the belief that control of these ambient pollutants can be accomplished best by using control devices such as catalytic converters, oxygen sensors/air pumps, and electronic carburetors on autos and other vehicles. Such a premise was believed to be valid when the Act was originally passed twelve years ago. This policy is now being seriously questioned by the scientific community, as reflected in studies by John J. McKetta, Professor of Chemical Engineering at the University of Texas in Austin, and Dr. Lawrence E. Hinkle, Jr., of the Cornell University Medical College in Ithaca, New York.

A plethora of allegedly innovative pollution control devices has been devised and mandated for all American cars built since 1975 (cars manufactured for export are exempt) for the purpose of burning and reburning these pollutants before they are emitted from the automobile's tailpipe.

On its face, this program seems logical and easily justifiable. This is not the case. In fact, the present mobile source pollution control system is ineffective and replete with many archaic regulations. What is more, as alleged in some quarters, it has produced a bureaucracy within the Environmental Protection Agency with a vested interest in the current system's retention.

PROBLEMS WITH THE DATA BASE

The data base on which the mobile source pollution control program rests is scientifically questionable and in need of reexamination.

The rationale behind the mobile source program should be reexamined by an independent scientific body, such as the National Academy of Sciences or the Office of Technology Assessment. The study should determine the threshold level, if there is an identifiable one traceable to mobile sources, at which ambient concentrations of the regulated pollutants comprise a health hazard to the public sufficient to warrant the current multibillion dollar program. Several recent studies, for example, cast considerable

doubt on the adverse effect of mobile source pollutants when compared with the enormous quantities of pollutants--such as carbon monoxide, nitrogen oxides, and hydrocarbons--produced by nature.

According to an analysis by Lawrence E. Hinkle, Jr., M.D., of the Cornell University Medical College, limiting mobile source pollutants through pollution control devices will not control any of the major deleterious substances found in America's atmosphere. The study, entitled "Automobile Emissions in the Perspective of Human Health, Health Benefits and Social Costs of Pollution Control," arrived at some revealing conclusions about the actual sources of atmospheric nitrogen oxides, carbon monoxide, and hydrocarbons/particulates.

Hinkle stated that "attempts to enforce maximum permissible concentrations of automobile emissions in the outdoor air (through the use of pollution control devices) are highly costly, and they have very little probability of preventing any disease or significant disability in people." As reflected in the following chart from Hinkle's study, the prevalence of the various pollutants in the ambient atmosphere emanating from nonautomotive sources is extremely high.

Sources of Some Atmospheric Pollutants Found in Automobile Emissions

Pollutant	Natural Sources	Manmade Sources		Other	Total %
		Stationary	Mobile		
Carbon Monoxide	88.89%	3.37%	6.09%	1.65%	100%
Nitrogen Oxides	95.63%	2.12%	1.75%	.50%	100%
Particulates/ Hydrocarbons	63.20%	36.15%	.65%	-	100%

According to the study, 94 percent of the carbon monoxide in the ambient atmosphere comes from the oceans, forest fires, plant synthesis/degradation, methane oxidation, solid waste disposal, agricultural burning, and other nonmobile sources. It is estimated that only 6 percent comes from automobile emissions. According to the Hinkle study, over 98 percent of the ambient nitrogen oxides comes from bacterial action, forest fires, and other biologic sources. Estimates are that less than 2 percent comes from automobile emissions. Over 99 percent of the hydrocarbon/particulates comes from stationary and natural sources of pollution--most of those that are inhaled by people come from tobacco smoke.

A similar study by John J. McKetta, Professor of Chemical Engineering at the University of Texas in Austin, probed the validity of the current mobile source regulatory scheme. Among other things, McKetta's study concluded that 93 percent of the carbon monoxide and 97 percent of the oxides of nitrogen are caused by natural phenomena and are not man-made. He states:

> The public has not been getting all of the facts on matters relating to ecology...a large percentage of pollution is natural pollution and would be here whether or not man was on this earth.

These new studies raise fundamental questions about the scientific rationale for much of the mobile source pollution control program. They also point to the need for an exhaustive study on the relevance of pollution control devices as a cost and health effective means of decreasing what is quite possibly a minimal man-made contribution to atmospheric air pollution.

TESTING PROBLEMS

The Federal Testing Procedure (FTP) used for measuring gas mileage and exhaust emissions does not accurately reflect actual driving conditions and therefore produces invalid statistical results.

This procedure should either be modified to reflect reality or be eliminated. In addition, a congressional investigation should be conducted of the Environmental Protection Agency's Ann Arbor, Michigan, Federal Testing Procedure facility.

The Federal Testing Procedure is supposed to check a specific vehicle's speed versus a time-cycle representation of normal urban driving. It is conducted on a dynamometer, a device which when placed and used in a building (a controlled environment) permits the simulation of what occurs on the street.

The test procedure used on the dynamometer was developed on a Los Angeles, California, road route and based on a single trip. This route is termed either the Urban Dynamometer Driving Schedule or the LA-4. In the Federal Testing Procedure, the driver is provided with a speed vs. time chart that represents this cycle. The driver then operates the vehicle in accordance with this chart.

Test cars supplied by the automobile manufacturers are mounted on the dynamometer and tested for exhaust emission and gas mileage compliance. EPA certifies these cars as acceptable for domestic sale if they are within the mobile source standards of the Clean Air Act or the published gas mileage standards provided for in the 1975 Energy Conservation Act.

The regulations governing the Federal Testing Procedure must be made more realistic than those currently in use. This does not mean more regulations, just sensible, scientifically supportable ones. For a number of reasons, the Federal Testing Procedure fails to reflect a car's "real life" exhaust emission and gas mileage compliance.

1. The driving cycle's average speed and acceleration rates at which the test cars are driven are artificially low and need to be adjusted. The average speed is 19-20 miles per hour, which hardly represents an average everyday driving speed and leads to high gas mileage ratings and low emissions. The acceleration rates used were set at a maximum of 3.3 miles per hour/sec. because of the limitations of the belt driven dynamometer used at the time standards were set. The belt dynamometer was eliminated in 1972-73. But the underlying driving and acceleration rate cycle was never changed, just "adjusted." General Motors has stated that most motorists accelerate at a rate of about 5.5 miles per hour/sec. from a stop. Given this information, as soon as the acceleration rate increases beyond 3.3 miles per hour/sec., the Federal Testing Procedure would indicate invalid test results. At the statutory standard of 3.3 mph/sec. rate, it is doubtful that cars tested today at an actual rate of 5.5 mph/sec. would pass the emission test. A change in the test procedure must be accompanied by a corollary change in the emission standards so as to maintain the stringency of the regulations in compliance with the way the law is written.

2. The invalid driving test cycle does not represent actual driving patterns. This is because of the lack of basic regulatory review. Congress should not just authorize a new set of regulations but should mandate a comprehensive study by a disinterested and qualified organization of how cars are actually driven so that the Federal Testing Procedure could be modified to reflect reality.

3. If EPA were to make the Federal Testing Procedure more realistic, then fuel economy estimates and the emission rates derived from the new procedure would be of greater value to the consuming public due to the improved accuracy of the numbers. To explain this relationship--the force needed to propel an automobile is equal to the mass of the car times the acceleration applied. Assuming that the mass of a car stays constant, if the acceleration used in the FTP is increased (i.e., from 3.3 mph/sec. to the more valid 5.5 mph/sec.), the force needed to move the car will increase. This force exists in direct correlation with energy utilization. Therefore, the higher the force needed, the greater the energy used to move the car at the same speed. As this energy utilization increases, fuel economy decreases.

4. The test vehicles furnished to EPA by the automobile manufacturers are not representative of those sold to the public. Allegations have been made that the weight of the test vehicles is lightened in order to artificially increase the gas mileage

and decrease measurable exhaust emissions. Examples of objects removed would be such equipment as the rear seats, spare tires, and jacks.

Allegations have also been made that the test cars are not the same as those offered for sale to the American public. The "prototype" vehicles are provided with components to reduce drag and increase engine efficiency, such as specially prepared bearings, lubricants, valve springs, piston rings, and test tires.

A possible solution to these charges would be to permit the manufacturers to state to EPA that their "model" vehicles, as they are introduced into the nationwide retail market, are already in compliance with the exhaust emission and gasoline mileage standards. EPA could then pick sample cars at random from dealer's lots around the country and ship them to Ann Arbor for testing. If the automobiles tested were found to be not in compliance, then the auto manufacturers in question would pay for the recall costs. Assuming that the vehicles would normally be in compliance, this would decrease the uncertainty and delay that automobile manufacturers experience when introducing a new "model" line and increase the legitimacy of the FTP's results. Since the actual number of cars tested is in the low hundreds, the minimal cost of this program to the government would be more than outweighed by the savings involved to both the consumer and the automobile industry.

5. The transmission shifting pattern used in the Federal Testing Procedure does not always reflect accepted shifting patterns. The recommended shifting pattern of some manual transmissions has been altered, for example, to skip third gear. Generally, when a car is shifted at lower speeds or a gear is skipped at a lower speed, fuel economy increases. This change in pattern artificially increases engine efficiency and decreases exhaust emissions. This practice must be eliminated. The shifting pattern used in testing must reflect the way in which cars are actually driven.

INSPECTION AND MAINTENANCE SHORTCOMINGS

A questionable inspection and maintenance program, coupled with an inequitably levied set of punitive sanctions for noncompliance, creates an unnecessary regulatory burden. As such, the testing program should measure a car's actual "real-driving" emissions or be eliminated.

Most Americans are familiar with the annual or biannual automobile inspection. These state monitored reviews generally have two parts: an exhaust emission inspection and a safety inspection.

The exhaust emission inspection program consists of hooking up an exhaust analyzer to the automobile's tailpipe and measuring

the emittant pollutants while the car is idling. The safety inspection consists of checking the air filter, all pollution control devices, the air injection reactor, the exhaust gas recirculator, the choke, and other engine parts.

The exhaust emission inspection program is set out in the 1977 Amendments to the Clean Air Act, which require that all or certain parts of twenty-eight states plus the District of Columbia have such programs in operation by December 31, 1982. Such exhaust emission programs currently exist in nine areas comprising two states, Rhode Island and New Jersey, and seven municipal or regional areas in Arizona, Colorado, Georgia, New York, Oregon, Virginia, and Washington State. Twenty additional states/regions have statutorily mandated inspection and maintenance programs. Many of these areas, due to noncompliance with the National Ambient Air Quality Standards, have become subject to extremely costly "non-attainment area" sanctions.

According to EPA figures, "about 70-80 percent of cars pass emission tests." Owners of cars that fail typically have some sort of tune-up work done on their cars, then pass on reinspection. There are two reasons why the number of cars to pass these emission tests is much higher than expected. First, the engine pollutants are measured while the car is at idle, not being driven. Second, the car's engine is warm and therefore less likely to give off "cold-start emissions."

It is commonly believed that some cars that do not pass the exhaust emission inspection can be brought into compliance by a simple carburetor adjustment--normally an adjustment of the "idle screw" that controls the fuel to air mixture. This adjustment is only effective for controlling emissions at idle. The percentage of the average American automobile's operating time spent in idle, however, is minimal, which raises a fatal flaw in the premise upon which the exhaust emission test is based: the fact that a vehicle in an idle mode that meets the I&M exhaust emission standards still could be a gross violator in the world of real driving.

The higher the amount of force needed to move an automobile, the greater the energy expended. The greater the energy expended, the greater the amount of pollutants emitted. Since an idle engine does not reflect an automobile's actual use, the readings on the exhaust gas analyzer are fallacious.

Another questionable aspect of the inspection and maintenance program stems from the engine and the ambient temperatures at which cars are tested. According to a February 1981 study by EPA's Ann Arbor Office:

> The pollutants given off during the first few minutes of cold start operation, when the vehicle's control system is warming up, are known as "cold start emissions" and can account for the vast majority of all carbon monoxide emitted through the vehicle trip.

Therefore, once the engine is warmed up and put on the vehicle inspection exhaust analyzer, the readings will be skewed since the bulk of the carbon monoxide, at least, has already been emitted.

In addition, it seems that the catalytic converter is geared toward operating in the 68-86 degree Fahrenheit range. At ambient temperatures outside this range, particularly colder temperatures, carbon monoxide emittants increase dramatically. Therefore, cars tested within the 68-86 degree range, which are to be driven in colder climates, could be on the road "legally" only because of a flaw in the testing procedure.

Dr. David Potter, Vice President of the General Motors Corporation, told the Senate Environment and Public Works Committee in June 1981 that:

> The short run tests upon which the Inspection and Maintenance program is supposed to be based do not correlate sufficiently well with the federal emissions test procedure to justify their use.

CATALYTIC CONVERTER POLLUTION

Pollution control devices, especially the catalytic converter, are a source of sulfur dioxide which, among other elements, becomes a factor in acid rain. Because of this, and other reasons, it is becoming increasingly apparent that the liabilities outweigh the assets in any accounting of the value of the catalytic converter and air pump. An independent scientific study by the National Academy of Sciences or the Office of Technolgy Assessment should review the relationship of the catalytic converter, the air pump, and acid rain composition, for there is considerable evidence that the catalytic converter, etc., contribute substantially to acid rain.

According to a July 1980 report of the Environmental Protection Agency's Office of Research and Development, sulfuric acid constitutes 65-70 percent of the atmospheric rain's acidity--the rest being nitric acid. The majority of the sulfuric acid is formed when sulfur, a component of gasoline, interacts with oxygen creating sulfur dioxide or sulfur trioxide. Sulfur dioxide is a gas at ordinary temperature and pressure and oxidizes into sulfur trioxide, which is a liquid. This liquid has an affinity for water vapor in the atmosphere, with which it reacts to form sulfuric acid. This mixture ultimately affixes itself to particulate matter in the air and normally falls as acid rain.

A 1975 study by Chrysler Corporation indicates that in the absence of the catalyst practically no oxidation of sulfur dioxide to sulfur trioxide occurs and, therefore, no mobile source related acid deposition falls. The Chrysler study found several factors that affected the production of sulfuric acid in the catalyst.

They indicated that the larger the catalyst and lower the operating temperature, the higher the production of sulfuric acid. Utilization of the air pump to help pre-burn unburned fuel actually increases sulfuric acid emissions.

An EPA internal report dated November 20, 1978, indicates a further connection between sulfuric acid and the catalytic converter:

> A hard acceleration with a hot catalyst (especially a pellet catalyst) will probably produce large amounts of sulfuric acid due to the storage/release mechanism.

As almost every car built since 1975 has had these pollution control devices installed, the data suggest that the catalyst probably produces localized situations of high sulfuric acid based rain.

Congress is considering several "acid rain" bills introduced for the purpose of controlling, at a multibillion dollar cost, sulfuric acid emissions from stationary source industrial plants. Given the evidence that automobile catalytic converters and other mobile pollution control devices could contribute significantly to acid rain, it seems foolish to arbitrarily penalize stationary sources of pollution without a concrete idea of the percent of acid deposition attributable to them. It makes more sense to consider the mobile source contribution to acid rain and the environmental and economic savings that would emanate from a cutback in pollution control devices.

Catalytic converters, moreover, do not seem to have contributed to the nation's cleaner air. Indeed, much of the improvement in air quality is due to the shrinking average car size. Nearly half of the cars in use are mid-size and subcompacts, which get better mileage and emit a lower amount of pollutants than larger cars because of their lighter weight and smaller engines. This part of the improvement is based on turnover of the fleet, not on the installation of artificial pollution inhibitors.

Today's cars have engine combustion technologies far superior to those of ten years ago. These engines have a lower horsepower and come equipped with an electronically regulated carburetor, which controls the fuel to air ratio and thus limits polluting emissions.

The amount of mobile source pollution emitted, moreover, is normally a function of miles driven, and Americans are driving fewer miles per day, primarily because of the sharp increase in gasoline prices. This decrease in miles driven translates into a decrease in automobile exhaust emissions.

Analysts cannot state for certain what percent of the reduction in pollutants is due to these factors. Many agree, however,

that pollution control devices--specifically the catalytic converter--are not a major factor at all.

THE CASE FOR REGULATORY REFORM

Changes in the mobile source pollution control regulatory structure could save the American consumer between $5.4 and $15.2 billion and put some 152,000 idle automobile workers back to work. $5.4 billion could be saved through the rapid phaseout of most pollution control devices and their requisite imported strategic metal requirements. Repealing the "no lead in gasoline" regulation could save an additional $9.8 billion in 1983. Eliminating pollution control devices could increase automobile sales by at least 7.6 percent. These are not cosmetic improvements but tangible benefits, which the American people, automobile industry, and government sorely need.

Eliminating all recently introduced pollution control devices, except the low-cost, effective positive crankcase ventilation (PCV) valve and the exhaust gas recirculation (EGR) device, could add up to a savings of between $700-$820 (average $760) for the American consumer in the purchase price of a car. The low point on the range represents the pollution control devices portion of the sticker price of a General Motors built car, while the upper point represents a similar estimate by the Chrysler Corporation. According to a Motor Vehicle Manufacturers' Association extrapolation of a late March 1982 study by Data Resources Inc., the net expected domestic automobile sales for 1983 will be 7,315,000 vehicles. Given a reasonable time for minor engine modifications, 1983 models could be stripped of these devices while giving the American consumer an almost immediate cost savings of $5.4 billion. That is just the immediate consumer cost savings.

Eliminating these pollution control devices could create 152,000 jobs in the automobile and related industries. According to General Motors, "each $100.00 worth of increased costs per car...will have an adverse impact on new car sales in excess of 1 percent." The logical converse of this is that a $760.00 decrease in the cost of a new car could translate into at least a 7.6 percent increase in automobile sales. More specifically, F. James McDonald, President of General Motors, stated in the May 1982 American Automobile Association Magazine, "Your Motor Club," that for every 1 percent reduction in the cost of a new car there will be a new gain of up to 4,500 jobs in the auto industry and 9,500 jobs in related industries. Assuming, for example, that the average price of a 1983 automobile is $7,000.00--then according to GM, a $760.00 decrease in the price of new 1983 car would result in an increase of 152,000 auto industry and related jobs.

Eliminating pollution control devices and their use of requisite strategic metals would decrease the risk that America could experience supply problems from South Africa and the USSR, the world's leading producers of rhodium, palladium, and platinum.

Many new 1982 and 1983 automobiles, under current regulations, are required to have an improved three-way catalytic converter. The purpose of this device is to control emissions of nitrogen oxides, unburned hydrocarbons, and carbon monoxide. Much of the device's component structure is dependent upon the availability of rhodium, palladium, and platinum. America imports 89 percent of these metals mainly from South Africa and the Soviet Union.

If Congress decides to phase out or phase down the use of unleaded gasoline, Americans could save 270 to 320 million barrels of petroleum per year. The cash savings involved, at today's price of oil, is more than $9 billion per year.

A great deal of controversy has arisen as to whether or not controlling ambient lead through pollution control standards is either health or cost effective. According to the Atlanta based Center for Disease Control, the chief sources of high-level exposure to lead are paint, roadside soil, and dust. Lead is also found in certain industrial and commercial processes, bootleg whiskey, certain plumbing pipes in soft-water areas, and poorly glazed earthenware.

To be sure, recent studies by a number of competent scientists, including Dr. Herbert Needleman of Children's Hospital in Pittsburgh and Vernon Houk of the Center for Disease Control, recommend that the ambient lead standard be retained even though their data mainly concern lead poisoning from ingestion of lead paint by inner city youth. The correlation between peeling lead paint in an inner city tenement and the ambient concentration of lead in the atmosphere is in question. Is the cost of controlling lead from automotive exhausts proportionate to the prevalence of lead related disease exposure caused by exhaust emissions?

Evidence seems to suggest that the health benefits to Americans from ambient lead standards alone are more than outweighed by the staggering economic costs imposed on American automobile drivers. Are equivalent regulatory costs imposed on other users of lead--the paint industry, for example? Spending close to $10 billion a year to control the possibility of lead poisoning on an ambient basis may be aiming at the wrong source of lead. The Center for Disease Control stated that "airborne lead, coming primarily from automobile exhaust, may account for 20 percent of the lead found in blood samples." CDC also indicated that airborne lead is the most easily controlled form of pollution. Does this mean that it should bear a disproportionate share of the compliance costs?

The evidence suggests that a review of this issue is needed. If a lead phase down in gasoline is warranted, the cost savings will be enormous. If such a phase down is ill-advised, then the thrust of the current lead regulatory structure should be retained. It should be noted that lead is not the only material that could be used to boost the octane of gasoline, especially if the catalyst is not involved. Such other additions might include alcohol.

CONCLUSION

The Clean Air Act's mobile source pollution control program is based on skimpy scientific data reflected in archaic standards, a questionable federal automobile testing procedure, an ill-conceived and wasteful state monitored inspection and maintenance system, and the retention of pollution control devices that work only on paper or in an artificial laboratory environment.

The program's data base is scientifically questionable. It should be reexamined to determine the threshold level at which ambient concentrations of the regulated pollutants comprise a health hazard to the public, traceable to mobile source emittants, sufficiently dangerous to warrant the multibillion dollar mobile source program now in existence.

The Federal Testing Procedure should be examined by Congress from the dynamometer test, the driving cycle, and the test speed to the type of vehicle utilized in the tests, the transmission shifting patterns, and the reason for the use of extremely high octane fuel.

A questionable state monitored inspection and maintenance program, coupled with an inequitably levied set of punitive sanctions for noncompliance, creates an unnecessary and enormous regulatory burden. The program should be modified to reflect reality or be eliminated.

A congressional investigation of the mobile source program along with a realistic regulatory reform program would have an almost immediate sizeable cost savings for the consumer and the industry. It might create scores of thousands of automobile industry and related sector jobs.

America wants and deserves clean air. If vehicles are polluting the atmosphere less than originally had been assumed, then regulators must focus less on mobile sources. If the cost of regulating mobile source pollution is imposing unreasonable burdens on the economy, then the Reagan Administration and Congress must find a fairer way of controlling pollution. What is needed, clearly, is reform of clean air regulations and procedures.

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