PROGRAMS TO CONTROL MOTOR VEHICLE EMISSIONS

IN

THE STATE OF TEXAS

Results of the H.B. 726 Harris County Pilot Vehicle Emissions Testing Program and Study

A Report

Prepared by the

Texas Air Control Board

for the

67th Session of the Texas Legislature

November 21, 1980

Preface

The following is taken from a statement made by Otto R. Kunze, Ph.D., P.E., Chairman of the Board's Ad Hoc Committee for Harris County Pilot Vehicle Emissions Testing Program, in conjunction with the Board's acceptance of the following report, presented at the November 21, 1980 meeting of the Texas Air Control Board.

"The Ad Hoc Committee for Oversight of the Harris County Pilot Vehicle Emissions Testing Program, appointed by Mr. John L. Blair, met from time to time during the past fifteen months or so and in each one of its meetings tried to see that this program was on track and moving in the proper direction. Recently, we met in Austin on October 27, we met in Houston on November 19, and we met this morning to provide further guidance along these lines. Representative Tim Von Dohlen's Oversight Committee also held at least two meetings within the last few months to determine whether this program was on track and whether it was moving in the right direction.

"We have now put together a report and some support documents. As has already been mentioned, the comments that have been very recently received that perhaps are not addressed in the report are included in the support documents for the report. I think the agency staff and certainly our committee would be willing to address these comments further, if this were desirable.

"Relative to the report, there is really no clear-cut best type of I&M program. In Atlantic City, at the Eighth Annual Motor Vehicle Emissions Control Conference, we heard from one state after another the way their programs were progressing. You find states that maybe were centralized, are going to be decentralized, or vice versa. In other words, I don't believe we really can come up with a conclusion at this time on one of the things that we were looking for: What is the way to go? The selection of a specific program will involve trade-offs in costs, effec-

tiveness, consumer acceptance and consumer protection. A lot of these decisions are going to be political considerations. The program features need to be decided by the elected officials in the Texas Legislature.

"There is considerable uncertainty regarding the ability of the vehicle repair industry in Harris County to accommodate effectively an inspection and maintenance program. The Ad Hoc Committee held two meetings in Houston, and on both occasions we had people there from the automotive service industry who expressed concern saying, 'You folks need to help us get trained mechanics. We need trained mechanics for the work we've got now, let alone anything additional that might come along.'

"The report points out that any successful I&M program is going to need public support, public acceptance and trained mechanics who will be able to service a car to reduce the emissions, and at the same time give the customer the performance that he wants.

"We feel that the recommendations of the Ad Hoc Committee follow the instructions of House Bill 726, perhaps contrary to what has been said in comments provided this morning by the Environmental Protection Agency. The bill directs the Texas Air Control Board to preserve and facilitate the range of choices available to the Legislature regarding emissions inspections and maintenance programs. Our goal was to present as many facts as possible in the report and the technical support documents without restricting any options that might be available.

"We feel that our recommendations are amenable with the letter of the Mayor of the City of Houston and also to the statement that was made by the Houston Chamber of Commerce relative to TACB recommendations that the matter be considered by the 67th Texas Legislature.

"Briefly, this is my summary of the situation and unless there

are other speakers, I would move for the acceptance of the report and the technical support documents that have been prepared."

Mr. Fred Hartman seconded the motion, and the motion passed unanimously.

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Summary

Introduction

- During 1980 TACB, with DPS and SDHPT conducted a pilot program and study of vehicle emissions testing programs. Twelve alternative programs were studied and compared against criteria specified by H.B. 726.

- Pursuant to H.B. 726, findings of the study are presented in such a way as to "preserve and facilitate the range of choices available to the 67th Legislature as to the direction and further development of a motor vehicle inspection and maintenance program for the State of Texas."

- A private contractor performed data analysis for TACB, and produced a technical support document which forms the basis for many of the findings of this report. Additional details and discussion of other issues is contained in this document.

Recommendations to the 67th Texas Legislature

- The Board is unable to recommend implementation of a vehicle emissions testing program as a prudent air pollution control strategy at this time.

- Nevertheless, in view of the threat of Federal Clean Air Act economic and no-growth sanctions the Board recommends that the Legislature consider whether the State's interest is best served through implementation of mandatory vehicle inspection or by accepting the risk that EPA may impose sanctions.

- The Board is prepared to assist the Legislature with further study or as instructed.

Background Information

- 1977 Federal Clean Air Act Amendments

    - Required states to identify nonattainment areas, revise SIP's, demonstrate attainment by 1982 or request extension to 1987 for CO or ozone. Extension carries additional requirements.

- Provided for federal economic and no-growth sanctions against states without EPA-approved plans.

- Texas Situation

  - Texas identified nonattainment areas for CO, TSP, and ozone. SIP provided emission reductions required to satisfy EPA requirements by 1982 in each, except for Harris County where an extension to 1987 was requested to provide additional time to accomplish the HC emission reductions needed to satisfy EPA requirements for ozone nonattainment areas. Extension to 1987 triggers requirement to schedule vehicle emission testing program in Harris County.

  - On May 16, 1979, the Texas Legislature passed, and on June 13, 1979, the Governor signed H.B. 726 requiring TACB, with the State Department of Highways and Public Transportation and the Department of Public Safety, to conduct a pilot vehicle emissions testing program in the Harris County area, perform studies of such programs, analyze results, and provide a report to the Legislature by December 1, 1980. EPA approved the extension request in December, 1979, but specified that if a mandatory program is not implemented after completion of the H.B. 726 program, economic and no-growth sanctions will be applied.

General Characteristics of Vehicle Emissions Control Inspection and Maintenance Programs

- Federal Motor Vehicle Control Program is designed to reduce emissions from new vehicles. Vehicle emission standards established by this program become more stringent over time.

- Three characteristic vehicle populations have emerged as a result of federal new car controls: 1968-1974 models, 1975-1980 models, and post-1980 models. The first group experienced adverse effects on drivability and fuel economy, thus affecting public attitude toward vehicle emission controls. The second group relieved these problems to some extent, but increased cost reinforced negative public attitude. The third group is designed to incorporate emission controls into overall engine design so that little opportunity will exist to maladjust or disconnect emission controls without degrading drivability or fuel efficiency.

- Programs are designed to identify high emitting vehicles through use of a consumer level short test: idle exhaust, loaded exhaust, parameter check.

- Mandatory maintenance is required for vehicles identified as high emitters.

- A maximum repair cost is generally established to limit consumer financial liability. This may substantially reduce emission reduction potential.

- Administrative options include centralized government-operated, centralized contractor-operated or decentralized programs conducted in private garages. Methods to provide quality assurance needs vary among administrative options.

- Programs may be applicable only to certain classes of vehicles (light duty only) or to certain model years (current model year only, 1975 and later, 1981 and later). Characteristics of the vehicle population, turnover, average age, percent contribution to vehicle miles travelled and to fleetwide emissions, should be taken into account. Typically, five-year-old and later model vehicles comprise approximately 60 percent of the current registered vehicle fleet. These vehicles contribute about 66 percent of total vehicle miles travelled. Currently, late models do not account for a majority of total fleet emissions, but as the number of pre-control technology vehicles in the fleet declines, recent models will account for an increasingly higher percentage of total emissions.

- Program cutpoints (rejection rates) have little effect on program effectiveness.

- Enforcement options include as a combination with the safety inspection, as a prerequisite to vehicle registration or by establishment of a separate sticker system.

- Vehicle inspection programs may be operated by municipal, county, or state government.

Design and Operation of H.B. 726 Harris County Pilot Vehicle Emissions Testing Program

- The program was designed and conducted to examine specific testing and administrative options, and compare them against criteria also specified in H.B. 726.

- Major elements of the program included design of the study, a public information/participation campaign, field data collection, and analysis of data.

- A project design study conducted in late 1979, provided technical information used by TACB in preparing final study design.

- Field studies included a decentralized study, centralized study, City of Houston mobile van testing, a Federal Test Procedure Study and surveys and spot checks performed by the Department of Public Safety.

- A public relations contractor informed the public and recruited participants through paid and public service advertising and media contact. City of Houston and SDHPT assisted with a direct mail campaign, and local elected officials also provided recruitment assistance.

Technical Results and Findings of the Study

- Generally, the major factors which determine program effectiveness are mechanics' skills and the attitudes of both mechanics and the public regarding vehicle emission controls. If properly designed and implemented, any of the wide range of program options available should be expected to yield similar emission reductions, but each has different advantages in terms of cost, consumer acceptance and administrative efficiency.

- Vehicle testing programs are largely ineffective on pre-1975 vehicles. A typical vehicle inspection program can reduce emissions by 5-7 percent from a current technology vehicle fleet. This would amount to a reduction of about 2-2.8 percent of total HC emissions in Harris County. EPA, however, is willing to grant extremely liberal emission reduction credits (25 percent) for implementation of EPA-preferred programs. Effectiveness for future technology vehicles cannot be predicted with confidence.

- Costs are incurred by the administering agencies, the inspector, the mechanic and the consumer. Range of costs for the inspection are between about $1.00 and $6.00 per vehicle tested, not including cost of repairs. For full implementation, total annual program cost in Harris County is estimated to range from about $18,000,000 to almost $30,000,000, depending largely on number of vehicles tested.

- A substantial percentage of persons questioned in Harris County expressed support for some form of vehicle emissions testing or emissions control if such programs can be implemented at extremely low costs.

- Phase-in options should be included in any consideration of emission-related vehicle inspection for Harris County.

- At the present it would appear appropriate to consider implementation of a program only in Harris County.

- At least 100 weeks is required to schedule implementation of a vehicle inspection program.

- Mechanics ability to repair vehicles to optimize emission reductions is critical to the effectiveness of an emissions testing program. The tendency for mechanics to perform "late and lean" adjustments must be minimized.

- EPA has published regulations to allow consumers access to the FCAA emissions systems performance warranty. They apply only to 1981 and later model vehicles and may be triggered only by specific exhaust emissions measurements approved by EPA.

- Increasing costs and decreasing availability of petroleum based fuels may force substantial technology shifts in engine types that may diminish the need to control emissions from transportation sources.

- The FCAA is scheduled for Congressional review in 1981.

- EPA policy relative to vehicle emissions testing programs is not statutory. It has been established via internal memoranda. Change in EPA administration could result in substantial revisions.

- EPA has announced the intent to publish new specifications which state or local vehicle emissions testing programs must meet to be acceptable. Requirements of the new policy are not currently known.

Discussion of Three Representative Vehicle Emissions Control Programs

- H.B. 726 requires consideration of twelve combinations of administrative and testing options, variables including testing protocol, administrative options, and enforcement mechanisms.

- H.B. 726 further required consideration of these options against six criteria: consumer protection and acceptance, effectiveness including costs and benefits, social and economic impacts, geographic applicability, operation in other states of vehicle registration and safety inspection, and additional factors deemed appropriate.

- Three basic enforcement options are: incorporation into the safety inspection system, the vehicle registration system, or an entirely separate system. The first two are linked closely with administrative considerations also, since DPS and SDHPT respectively, currently administer these systems.

- Additional considerations include waivers and exemptions, retest requirements, establishment of referee test facilities, model year vehicles to be tested, quality assurance, mechanics training, and consumer access to the emissions performance warranty.

- This report evaluates three primary program options which are representative of a range of scenarios. These are:

    - Decentralized program combined with the safety inspection system, utilizing a parameter check applied to current (as of implementation date) model vehicles. Advantages are that functional testing is the least expensive protocol; overall costs would be less because of model year phase-in approach; consumer acceptability and protection would be enhanced by phase-in; administrative problems would be minimized by incorporation with safety. Disadvantages include an additional administrative burden placed on DPS, and potential problems with EPA-approvability. In addition, since parameter checks have not been accepted by EPA as equivalent to the exhaust gas analysis for triggering the emissions performance warranty, consumer access to the warranty could be difficult.

    - Decentralized program combined with safety inspection, utilizing the idle exhaust test applied to 1981 and later model vehicles. A disadvantage is that the equipment costs are high, and may cause about 20 percent of certified PMVI stations to drop out of the program. This option would, however, take advantage of the emission performance warranty. However, since only 1981 and later models are included EPA approvability is questionable. Additional

tests or inspections might be included in an effort to obtain more reductions, but such additions would make the program much more complex. EPA approval of a program including additional tests is questionable. Earlier model vehicles would probably have to be included to receive full 25 percent credit.

- Centralized contractor-operated testing as a prerequisite to vehicle registration, employing an idle exhaust test applied to 1975 and later models. A 25 percent reduction credit may be demonstrated for this program using EPA methods. It also has the advantage of being less costly to the state, since contractor would assume a large portion of initial capital expense. Combination with registration is feasible, but would place significant burden on the Harris County Tax Assessor-Collector. It has potential for consumer benefit by allowing for registration, safety and emissions checks at one centralized location. However, with fewer stations travel time and waiting time are increased, adding inconvenience to the consumer. This also would increase the administrative burden substantially. The inclusion of 1975-1980 model vehicles increases program costs substantially, while providing marginal benefits in terms of emission reductions.

A Report on Results of the H.B. 726 Harris County
Pilot Vehicle Emissions Testing Program
and Study

Introduction

During the spring and summer of 1980, the Texas Air Control Board, with the cooperation and assistance of the Department of Public Safety (DPS) and the State Department of Highways and Public Transportation (SDHPT), conducted a pilot program and study of vehicle emissions testing with emphasis in the Harris County area. Pursuant to Section 3.30 of the Texas Clean Air Act, as amended by House Bill 726, the study examined possible alternative means for controlling motor vehicle emissions in the State of Texas. As specified by Section 2 of H.B. 726, twelve alternatives were considered and compared against the following criteria:

- Acceptance by and protection of consumers
- Overall effectiveness including costs versus benefits
- Resulting social and economic impacts
- Appropriate geographic areas of applicability
- Additional factors deemed by the Texas Air Control Board to be appropriate.

Also as a part of the study, the operation in other states of motor vehicle emissions control programs and related programs, such as vehicle registration and safety inspection, were reviewed and analyzed.

As specified by H.B. 726, the twelve options considered were:

- Tailpipe testing operated in conjunction with the current safety inspection in:
  - existing inspection stations;
  - state-operated inspection centers;
  - contractor-operated inspection centers.

- Tailpipe testing operated independent of the current safety inspection in:
  - existing inspection stations;
  - state-operated inspection centers;
  - contractor-operated inspection centers.
- Parameter inspection and adjustment operated in conjunction with the current safety inspection in:
  - existing inspection stations;
  - state-operated inspection centers;
  - contractor-operated inspection centers.
- Parameter inspection and adjustment operated independent of the current safety inspection in:
  - existing inspection stations;
  - state-operated inspection centers;
  - contractor-operated inspection centers.

This report has been prepared in accordance with provisions of H.B. 726 Section 2(a) that the results of the pilot program and study be reported to the 67th Texas Legislature by December 1, 1980. Findings of the study are presented in such a manner as to "preserve and facilitate the range of choices available to the 67th Legislature as to the direction and further development of a motor vehicle inspection and maintenance program for the State of Texas...." (TCAA, 3.30(d)(3), also specified by H.B. 726.)

The report is divided into six sections:

I. TACB Recommendations to the 67th Texas Legislature

II. Background Information on Requirements for Vehicle Emissions Control Programs

III. General Characteristics of Vehicle Emissions Control Inspection and Maintenance Programs

IV. Design and Operation of the H.B. 726 Harris County Pilot Vehicle Emissions Testing Program

V. Technical Results and Findings of the Study

VI. Discussion of Three Representative Vehicle Emissions Control Programs.

As part of this study, TACB employed a private contractor to perform detailed statistical analyses on data generated by this program and studies conducted in other areas relative to techniques for in-use vehicle emissions control. Results of these analyses are contained in the attached report, Technical Support Document for the Harris County Pilot Vehicle Emissions Testing Program and Study. Detailed information included in the technical support document may be of assistance should the Texas Legislature choose to consider vehicle emissions control programs in greater detail than is provided in this report, or wish to consider inspection or testing alternatives not specifically addressed here.

I. TACB Recommendations to the 67th Texas Legislature

Because of the results set forth in Section IV of this report, "Technical Results and Findings of the Study," the Texas Air Control Board cannot at this time recommend that the Legislature require implementation of a vehicle emissions control testing program in Texas as a prudent air pollution control strategy. Nevertheless, in view of the threat of Federal Clean Air Act (FCAA) economic and no-growth sanctions, the Board recommends that the Legislature consider whether the State's interest is best served through implementation of mandatory vehicle inspection or by accepting the risk that the Environmental Protection Agency (EPA) may impose sanctions. The authority for EPA to impose sanctions was established in 1977 Amendments to the FCAA. These sanctions include a nondiscretionary ban on construction of major new industries in Harris County and may include the withholding of federal highway funds and federal monies for construction of sewage treatment plants as well as cancellation of air pollution control program grants. Should all of these sanctions be applied, an estimated $200,000,000 is at stake annually in loss of federal highway and sewage treatment plant construction funds in Harris County, and $5,500,000 for state and local air pollution control programs. In addition, applications for permits to construct new sources in Harris County costing about $73,000,000 were received by TACB during the first half of 1980. However, because of criteria for applying these sanctions outlined in the FCAA, not all of these sources would be restricted by the construction ban. Recently, officials in two counties in Kentucky, where EPA is now in the process of imposing these sanctions, have estimated the cost of implementing a vehicle emissions testing program to be greater than cost of the EPA sanctions.

As reflected in Section IV of this report, a number of uncertainties currently exist regarding the operation of vehicle emissions

testing and control programs. TACB intends to continue studying and analyzing data and information now available or which may become available in the near future in an effort to provide additional insight into requirements and alternatives which may be available to satisfy the FCAA vehicle emissions control requirements. Any additional information obtained will be made available to members of the 67th Legislature.

II. Background Information on Requirements for Vehicle Emissions Control Programs

1977 Federal Clean Air Act Amendments

In 1977, Congress adopted major amendments to the Federal Clean Air Act to require states to identify areas where measurements in excess of ambient air quality standards for six nationally regulated pollutants have occurred, nonattainment areas, and to develop revisions to State Implementation Plans to provide emission reductions sufficient to satisfy EPA policies for such areas by 1982. The Act further provided for an extension to 1987 for areas where sufficient reductions in emissions of transportation related pollutants (carbon monoxide and hydrocarbons) could not be demonstrated by 1982. EPA has approved as adequate provisions for emission reductions contained in the Texas SIP revisions for all areas in Texas designated as nonattainment for national standards except Harris County where an extension to 1987 to provide for additional hydrocarbon emissions reductions needed to satisfy EPA requirements for ozone nonattainment areas has been granted. Major uncertainties exist regarding the appropriate control measures needed to reduce high ozone ambient concentrations, but EPA regulations nevertheless continue to require reductions in hydrocarbon emissions to achieve this objective. The extension to 1987 carries with it additional requirements, including the establishment of a schedule for a vehicle inspection and maintenance program in Harris County.

The 1977 Amendments to the Federal Clean Air Act empower the Administrator of EPA to impose economic and no-growth sanctions in areas where states do not submit State Implementation Plan revisions acceptable to EPA. EPA has stated that failure to implement an inspection and maintenance program in Harris County will trigger these sanctions, including a ban on construction of certain major

new sources of industrial air pollution in Harris County. Under the Act, EPA is required to apply this moratorium. Sanctions also may include withdrawal of a portion of currently available federal highway construction funds in the area and restriction or denial of federal funds for the construction of sewage treatment works in Harris County.

These sanctions could have a significant effect on the economy of Harris County. For example, the federally funded portion of the 1980-1981 fiscal year State Department of Highways and Public Transportation construction program totals approximately $100,000,000 in Harris County -- just under one sixth of the statewide total. Although the Federal Clean Air Act exempts from such sanctions funds which would provide safety, mass transit, or air quality related projects, it is unknown what portion of the total funds would be affected. It is certain that the sanctions would substantially affect the region.

Federal funds awarded for sewage treatment plants in Houston vary widely from year to year. From January through August, 1980, EPA funds for these plants in Harris County totalled more than $70,000,000. Federal funds for state and local air pollution control programs also are in jeopardy. TACB's FY 1981 FCAA Section 105 grant from EPA totals $5,370,000, although typically this grant is around $2,000,000. The City of Houston Health Department received an FY 1981 grant of $350,000 for air pollution programs.

The Texas Situation

In response to 1977 Federal Clean Air Act Amendments, Texas identified areas in the state in which measured concentrations of particulates, carbon monoxide, and ozone have exceeded a national ambient air quality standard. Subsequently, on April 13, 1979, the Texas Governor submitted to EPA State Implementation Plan revisions which, with the exception of one area, Harris County,

provided by 1982 the emission reductions required to satisfy the EPA requirements for nonattainment areas. However, calculations showed that application of reasonable control measures in Harris County would not provide enough hydrocarbon emission reductions to satisfy EPA requirements for ozone nonattainment areas by that date. The Texas Air Control Board therefore requested an extension of the 1982 deadline for Harris County.

On May 16, 1979, the 66th Texas Legislature passed and on June 13, 1979 the Governor signed H.B. 726 to amend the Texas Clean Air Act in response to a number of FCAA provisions. Included in the Amendments to the Texas Act was the requirement for TACB, in cooperation with DPS and SDHPT, to conduct a pilot vehicle emissions testing program, perform studies of such programs, analyze results and provide a report to the 67th session of the Texas Legislature on or before December 1, 1980. This requirement was contingent upon EPA approval of the Texas SIP. In December 1979, EPA granted the extension to December 31, 1987 for Harris County and granted final approval to those portions of the Texas Plan relative to vehicle emissions testing and control. In the approval notice, however, EPA stated that if a mandatory vehicle emissions testing program is not implemented in Harris County after completion of the H.B. 726 pilot program, EPA will impose the economic and no-growth sanctions described previously. Implementation of mandatory motor vehicle emissions inspection in Harris County is subject to mandate of the 67th Texas Legislature.

III. General Characteristics of Vehicle Emissions Control Inspection and Maintenance Programs

Each year millions of consumer dollars are spent for installation of motor vehicle air pollution control systems, required as a key feature of the Federal Motor Vehicle Control Program (FMVCP). This program establishes progressively stringent federal emission standards for motor vehicles manufactured for sale in the United States. Indications are, however, that emission control systems are not as effective, for current technology vehicles, as they might be, chiefly because this program has met with a negative public attitude and a mechanic population ill-equipped to maintain effectively vehicle emission control systems.

Federal emission standards increase in stringency over time, resulting in the production of vehicle populations, by model years, with certain common characteristics. Emission control systems first began appearing on new vehicles manufactured for sale in 1968. The first generation of emission controlled vehicles, model years 1968-1974, typically incorporated systems or devices which reduced polluting emissions but also adversely affected performance with respect to drivability and fuel efficiency. Compromises in these vehicle performance criteria resulted in an incentive to the general public and to mechanics to maladjust or tamper with emission control systems to improve drivability and fuel efficiency. Such adjustments were possible because early emission control systems were largely add-on devices, poorly integrated with other engine operating parameters.

Catalytic converters first appeared on most domestically manufactured vehicles in 1975. This emission control technology characterizes a second generation of emission controlled vehicles consisting of domestically manufactured 1975-1980 model years. The catalytic converter oxidizes excess hydrocarbon and carbon monoxide

emissions prior to these pollutants being emitted into the atmosphere. This technology corrected many of the problems of the early generation of emission controlled vehicles by allowing a vehicle design that could be re-tuned for better performance and efficiency. Removal of or deactivation of the catalyst has no effect on vehicle drivability or fuel economy. However, carry-over negative attitudes toward the effect of emission controls on engine performance, the ease with which catalysts can be removed or disabled, and the increased cost and sometimes low availability of unleaded fuel required for catalyst controlled vehicles have resulted in a continuing perceived incentive to mechanics and vehicle owners to tamper with vehicle emission control systems.

A third generation of emission controlled vehicles has begun with production of 1981 model years. Vehicles with engine operating functions controlled by on-board microprocessors, or mini-computers, will comprise this third generation fleet. It is expected that performance criteria -- drivability, fuel efficiency and emissions control -- will be thoroughly integrated on these vehicles. Actual performance of these vehicles is not entirely predictable. It is expected that adjustments or maladjustments performed to affect any one of these engine characteristics would generally affect and/or degrade all three, and that the opportunity to improve performance or fuel efficiency at the expense of emissions is minimized if not eliminated.

State or local motor vehicle emissions testing programs are designed to identify vehicles which are emitting high volumes of pollutants through the use of a short test which can be performed while a motorist waits. No specific format for such a test has been accepted universally. Tests can consist of simple exhaust emissions measurement with the vehicle engine idling, others include an exhaust emissions check with the engine operating under

varying speeds and loads, and some rely wholly or partially on some form of a check of various engine equipment and operating characteristics or parameters related to emissions of air contaminants, a so-called functional or parameter check. A functional check can include a propane enrichment procedure to determine if the carburetor air/fuel mixture is properly set. This procedure includes injecting propane into the engine's carburetor. If the vehicle's idle rpm (revolutions per minute) rises, the air/fuel ratio in the carburetor generally is within manufacturer's specifications or is operating in a lean mode. Contaminant emissions, therefore, would be expected to be low. If no rpm rise is detected, the air/fuel mixture generally is too rich, indicating high emissions.

EPA has stated that any short test is acceptable, if it can be demonstrated to be as effective in identifying high emitters as an idle exhaust test. In most instances, vehicles identified as high emitters must undergo mandatory maintenance and undergo a retest in an effort to demonstrate reduced emissions.

Generally, in operating or planned programs, a maximum repair cost is established to limit the financial liability of vehicle owners who possess vehicles which do not pass emissions tests after appropriate maintenance or repair has been performed. While repair limits may be needed as a consumer protection measure, such limits may substantially reduce the emission reduction potential of vehicle inspection programs.

Administrative options for operation of inspection programs are many and varied. In states which have implemented or are considering implementation of mandatory vehicle inspection programs, actual inspections may be carried out by centralized facilities operated by a governmental entity, centralized stations operated

by a private contractor, or decentralized inspection stations operated in private garages and repair shops. Private garages are generally supervised and/or certified by a governmental entity. Means necessary to provide for quality assurance vary among these program types. Advantages and disadvantages of these administrative options are discussed in Section VI of this report, "Discussion of Three Representative Vehicle Emissions Control Programs."

Other issues which must be considered include applicability to vehicle types and model years. For example, a program could apply to all light duty automobiles and trucks, to light duty automobiles and trucks that are 1975 or later models or could be phased in beginning with new models only. Factors which may influence the selection of start-up or phase-in procedures include characteristics of the vehicle population, rate of population turnover, average age of the vehicle fleet, model year contribution to total vehicle miles travelled, fleetwide emissions by various age categories, and the potential for emission reduction from various vehicle age groups or control technology types. Also, since TACB recommends consideration of a program only as a means of avoiding potential sanctions, EPA approvability should influence selection of such procedures.

The contribution to overall fleet emissions by various sub-groups within the vehicle population is a consideration from the perspective of both consumer protection and program efficiency. Current figures indicate, for example, that about 60 percent of registered vehicles in any given fleet are five years old or less, and that 66 percent of fleet-wide vehicle miles travelled are generated by these recent models. While in the current population the late models do not account for a majority of emissions because of lower emissions characteristics, an increasingly high percentage of total emissions will be produced by recent model vehicles as the

percentage of pre-control or lower control technology vehicles in the fleet declines. Recent data from EPA studies suggest that emissions testing programs are not effective in reducing emissions from pre-1975 vehicles.

Another element of vehicle emissions testing programs is the establishment of cutpoints or rates of rejection for vehicles being tested. Cutpoint selection establishes program stringency but has little to do with program effectiveness, since a relatively small percentage of the vehicle fleet accounts for most of the fleet excess correctable emissions. Cutpoint selection is closely tied, however, to emission reduction credits EPA is willing to grant.

Various means are available to enforce a program to control vehicle emissions in Texas. An emissions testing system could be incorporated or combined with the current Periodic Motor Vehicle Inspection system operated by the DPS. Such a combination with the safety inspection program could involve an emissions test as a prerequisite for receiving a safety sticker, or the use of a separate sticker to certify that emissions levels have been tested and found to be within required limits. Similarly, an emissions test could be incorporated into the vehicle registration system currently conducted by SDHPT. Passing an emission test could also be used as a prerequisite for receiving registration stickers or plates, or it could involve issuance of a separate sticker in conjunction with registration. Another enforcement option which would involve coordination with the existing registration system is to require that vehicles pass an emissions test on change-of-ownership. A program could also be enforced separately from either of these existing systems by the use of an additional sticker system, operated under the authority of another governmental entity, state or local. Any of these alternatives appear feasible for Texas.

Currently operating vehicle inspection programs generally are conducted by state agencies in spite of whether the programs operate in all or part of the state, either directly or through private contractors. In some areas, however, similar programs are being implemented or contemplated for implementation by municipal or county governments.

IV. Design and Operation of H.B. 726 Harris County Pilot Vehicle Emissions Testing Program

The Harris County Pilot Vehicle Emissions Testing Program was designed and conducted to examine available testing and administrative options specified by H.B. 726 and compare them against various criteria, also specified in the legislation.

Major elements of the program included design of the study, field data collection, a public information/participation effort, and analysis of data. EPA contracted directly for three elements of the field data collection, and utilizing federal funds, TACB contracted for assistance with each of the other program elements.

In October, 1979, TACB entered into an Interagency Agreement with the Texas Transportation Institute of Texas A&M University to conduct a design study for the pilot vehicle emissions testing program. This study provided much of the technical background information used by TACB in preparing a final study design and in developing contracts for conduct of various elements of the pilot program.

The pilot program included four field data collection efforts: a decentralized study at five DPS-certified safety inspection stations, a mobile van study conducted by the City of Houston Department of Public Health, a centralized, contractor-operated study, and a Federal Test Procedure (FTP) study. The decentralized study was conducted under contract to TACB, and the other three were under direct contract to EPA. In addition, under an interagency contract with TACB, DPS conducted two surveys to measure attitudes of Periodic Motor Vehicle Inspection (PMVI) station owners and the public toward vehicle emissions testing. DPS also performed spot checks of emissions control systems on in-use vehicles.

Two of the field data collection efforts, the centralized study and the City of Houston study, relied on volunteer participation by the public. TACB contracted with a public relations firm for assistance with public recruitment. This effort focused on contact with Harris County media to disseminate information through paid and public service advertising, and was performed from April through August, 1980. SDHPT assisted with this information/recruitment effort by providing mailing labels for more than 15,000 letters sent to residents of zip codes in areas adjacent to the San Felipe test site. The City of Houston also assisted with recruitment by including statement stuffers describing the program in some 67,000 water bills mailed during July, 1980. Assistance with public recruitment also was provided by locally elected officials, particularly Harris County Judge Jon Lindsay and County Tax Assessor-Collector Carl Smith, and by the Houston Chamber of Commerce.

A professional engineering firm under contract to TACB, with the assistance of DPS, carried out the decentralized field study from May to August, 1980. In this program, two types of tests were performed at five privately-owned, DPS-certified safety inspection stations. These tests were (1) an idle exhaust gas analysis, and (2) a parameter check, including propane injection, check of idle speed and a visual check for existence of a catalytic converter and fuel-filler neck restrictor, if required by the vehicle make and model. The objective of this study was to provide information for examining the feasibility of combining an emissions check with the current safety inspection system. Approximately 1400 vehicles were given both tests during the course of this study. Volunteers were asked to fill out a public opinion questionnaire.

The City of Houston Department of Public Health has been conducting idle exhaust emission checks on public and privately owned

vehicles in the Harris County area under a grant from EPA for nearly two years. During this pilot program, the City assisted TACB by providing data from their testing program for approximately 10,000 vehicles. The City of Houston also conducted a public opinion survey.

A centralized, fixed-location, emissions testing field study was provided under contract to EPA. Both types of tests, idle exhaust analysis and parameter testing, were performed with the use of advanced computer technology. About 4700 vehicles were tested between March and September, 1980.

The Federal Test Procedure (FTP) field study also was performed under contract to EPA. The FTP is a long and expensive testing sequence used to certify vehicle compliance with federal emissions standards and can be used to determine actual in-use vehicle emissions. This study, as envisioned by TACB, was designed to evaluate and compare the effectiveness of the idle emissions test and parameter or functional inspection described above in correctly identifying high emitting vehicles and further to quantify emission reduction potential of various repair sequences performed by three levels of mechanics: untrained, trained and expert. This first program goal, evaluation of the short tests, is specifically required by Section 3.30(c)(1) of the Texas Clean Air Act as amended by H.B. 726. The latter is one of the additional considerations TACB determined appropriate for analysis as part of this study. EPA did not concur with the TACB program plan and redesigned the FTP portion of the program to provide data suitable only for comparison of the effectiveness of one element of the parameter check, the propane enrichment procedure, and to permit repair only by expert mechanics. Therefore, complete evaluation of the parameter or functional check as an

alternative to tailpipe idle emissions testing was not possible. Some tentative analyses of the effectiveness of programs incorporating propane enrichment and anti-tampering checks were possible by combining the limited data provided by this study and similar data from other areas, however, inadequate data preclude a definitive analysis at this time. Also, all repairs performed under the EPA FTP contract were made by expert mechanics. Exclusive use of expert mechanics for all repairs effectively prevented evaluation of local emission-related mechanic training needs. Exclusive use of expert mechanics may also have resulted in over-prediction of the emission reduction potential which may be expected from various types of maintenance.

V. Technical Results and Findings of the Study

Mechanics' Skills and Public Attitude

Generally, the major factors which determine program effectiveness are mechanics' skills and the attitudes of both mechanics and the public regarding vehicle emission controls. Programs that influence these factors will maximize the effectiveness of the Federal Motor Vehicle Control Program; those which do not influence these attitudes and skills will have little or no effect on reducing emissions of air contaminants from motor vehicles.

Because of this, and as indicated by information contained in forthcoming paragraphs, any of the administrative options available for program implementation probably can be expected to yield similar emission reduction benefits if properly designed. Each, however, carries with it a unique set of advantages and disadvantages relative to cost, consumer protection and acceptance and administrative feasibility and efficiency.

Program Effectiveness

Data show that currently operating programs are able to reduce actual vehicle fleet emissions by about five to seven percent as compared to vehicle emissions without a vehicle inspection program. Attached to this report is a graph depicting expected emission reductions due to the Federal Motor Vehicle Control Program, and additional reductions estimated to be achieved from implementation of a vehicle emissions testing and maintenance program. These reductions are calculated for the make and model mix currently comprising the typical vehicle fleet. Data further show such programs are largely ineffective in reducing emissions from pre-1975 vehicles. Emission performance of and effectiveness of testing and maintenance programs on future technology vehicles, which by 1987 will make up a majority of the fleet, cannot at

present be estimated with confidence. If the five to seven percent reduction figure is assumed for operation of some form of program in Harris County, the reduction in vehicle hydrocarbon emissions would represent about a 2.0 to 2.8 percent emission reduction in total hydrocarbons in a given year.

EPA policy concerning vehicle emissions control testing programs requires that they be designed and operated in such a manner as to demonstrate, by a specific EPA-approved method, a 25 percent reduction in emissions from light duty vehicles in the jurisdiction where the program is required, by 1987. MOBILE I is a computer model used to calculate emissions reductions for purposes of defining EPA approvability. The program overstates effectiveness of EPA-preferred options. Recently EPA has begun to refer to results of the model as credits rather than reductions. Nevertheless, EPA apparently is willing to grant such extremely liberal emission reduction credits to states which implement EPA-preferred programs.

Program Costs

Total program costs are estimated by considering costs to the administering agency or agencies, the inspector, the mechanic, and the consumer. Analysis of per-vehicle inspection costs for representative program options shows that an emissions inspection fee would range from just over one dollar per car to about six dollars per car. Using these figures as a basis, and including an estimated thirty dollar cost for each vehicle which needs repair work, the cost for full program implementation ranges from about eighteen to thirty million dollars. This estimate of per-vehicle inspection costs may not, however, reflect real-world costs. A typical inspection fee for programs which have been recently implemented or are planned for implementation is ten dollars. Assuming this figure, program cost would be more than forty-two million dollars.

Consumer Acceptance

Several public opinion surveys were performed in conjunction with operation of the Harris County pilot program. A majority of persons who agreed to answer questionnaires expressed support for some form of a vehicle emissions testing program. About 75 percent of those surveyed, however, expressed a preference that the inspection fee be limited to two dollars or less.

Phasing in a program assists consumer acceptance. Such an approach is recommended, should the decision be made to implement a program. Phase-in options include beginning the program with the current model and later year vehicles only, a voluntary repair period, or initially requiring inspection only on change of ownership.

Geographic Applicability

In considering the benefits and disadvantages of applying an emissions control program beyond Harris County, which is the only area to which the federal requirement for scheduling implementation of such a program applies, TACB evaluated the contribution to Harris County traffic volume from vehicles in surrounding counties. Approximately two million vehicles are registered in Harris County, and just over 500,000 registered in all seven of the contiguous counties -- Brazoria, Chambers, Galveston, Fort Bend, Liberty, Montgomery, and Waller. Calculations of the percentage of Harris County total daily traffic volume which originates outside the county show that between five and ten percent can be attributed to vehicles in these surrounding counties. Because of large costs of in-use vehicle emissions control programs and unknowns associated with emission reduction effectiveness, it appears appropriate to consider scheduling implementation only where it is required. Further, since TACB recommends consideration of a program only because of the threat of federal sanctions, it should be established, if at all, only in the area for which it is specifically required.

Program Scheduling

Time necessary for implementation of a vehicle inspection program is somewhat dependent upon the specific program design. For most program types, however, a minimum of 100 weeks from the time a decision is made to implement a program would be required prior to the beginning of testing. H.B. 726 specifies that TACB, DPS, and SDHPT shall develop and make preparations for a motor vehicle inspection and maintenance program for Harris County by designing, planning and scheduling the necessary elements of such program. It further requires the design of the program shall be adequate to allow and achieve full implementation not later than December 31, 1982. One hundred weeks prior to December 31, 1982 is January 30, 1981.

Mechanics' Skills and Training

As indicated earlier, an important determinant of program effectiveness is mechanics' attitudes and skills in properly diagnosing and repairing vehicles to optimize the effectiveness of emission control systems as well as vehicle performance with respect to drivability and fuel economy. Because of the design of the Houston FTP data collection effort, developed by EPA, it was not possible to assess the current skills of the Houston area mechanics in diagnosing and repairing emission control systems. Data from studies conducted in other areas, however, show that mechanics have a tendency to perform "late and lean" adjustments to vehicles that have been identified as high emitters. "Late and lean" is a simple adjustment to the air/fuel ratio in the carburetor, to make it more lean, and a retardation of spark timing. These are simple, quick and inexpensive adjustments which allow vehicles easily to pass idle exhaust emissions tests. Unfortunately, they also have an adverse effect on fuel economy and drivability, and little effect on actual in-use vehicle emissions.

As future technology, computer-controlled vehicles increase as a percentage of the Harris County fleet, the need to provide training for mechanics to diagnose and correct malfunctions from these complex computer-controlled vehicles may be expected to increase substantially.

Additional Considerations

H.B. 726 provides that TACB consider any additional factors not specifically delineated in the legislation but deemed appropriate by the Board. Following are several additional considerations which relate to statutory and administrative uncertainty associated both with Federal Clean Air Act and EPA requirements for vehicle emissions control testing programs.

Section 207(b) of the Federal Clean Air Act requires that if EPA determines that short, consumer level tests are available that correlate with the FTP, they prescribe, by regulation, procedures for administering such short tests to provide consumers access to the emission system performance warranty provided for in the Act. On May 22, 1980, EPA published regulations prescribing various short tests involving exhaust emissions measurement for use to exercise the warranty. Parameter testing is not included among the tests prescribed. Further, these regulations provide access to the FCAA emission performance warranty only for owners of 1981 and later model vehicles.

Second, increasing costs and decreasing availability of petroleum based fuels may force technology shifts in engine types and fuel use that would change or perhaps eliminate the need for in-use vehicle emissions control programs.

Third, the Federal Clean Air Act, which contains the requirement for states' to establish a schedule for a vehicle emission control

inspection and maintenance program in areas like Harris County, is scheduled for Congressional review during 1981. It is probable that requirements for in-use vehicle emissions control will be reconsidered, but it is not now clear whether the requirement to establish schedules for vehicle inspection will withstand close scrutiny.

Fourth, EPA policies which establish specific requirements for vehicle emissions testing programs are not of a statutory nature and have not been established through formal rulemaking procedures. The basic policy which specifies that vehicle inspection programs be mandatory, include emissions tests, and provide for a 25 percent reduction "credit" was established by EPA Deputy Administrator David Hawkins in a 1978 internal memorandum. Congressional action on the Federal Clean Air Act notwithstanding, any forthcoming change in EPA administration could result in substantial changes to such informal policies.

Fifth, EPA spokespersons have announced in several forums recently that major new guidance on criteria for approval and procedures for calculating emission reduction "credits" from vehicle emissions testing programs are about to be published. These documents would be used to determine whether programs adopted by states meet EPA's criteria for approval. It is not at present clear when these guidelines will be issued, nor the criteria they will contain.

VI. Discussion of Three Representative Vehicle Emissions Control Programs

As indicated previously, H.B. 726 requires twelve combinations of administrative and testing options be considered in preparation of this report: tailpipe testing operated in conjunction with the current safety inspection in existing inspection stations, state-operated inspection centers and contractor-operated inspection centers; tailpipe testing operated independent of the current safety inspection in existing inspection stations, state-operated inspection centers and contractor-operated inspection centers; parameter inspection and adjustment operated in conjunction with the current safety inspection in existing inspection stations, state-operated inspection centers, contractor-operated inspection centers; and parameter testing operated independent of the current safety inspection in existing safety inspection stations, state-operated inspection centers and contractor-operated inspection centers.

H.B. 726 further specified that these administrative and test options be compared against six criteria: consumer protection and acceptance, effectiveness including costs and benefits, social and economic impacts, geographic applicability, operation in other states of motor vehicle registration and safety inspection, and additional factors deemed appropriate. An important additional factor is approvability by EPA, since that is the basis for TACB's recommendation that program implementation be considered.

In Texas, administrative options are closely linked to another basic alternative, selection of an enforcement mechanism. Since Texas has a safety-oriented Periodic Motor Vehicle Inspection (PMVI) system currently operated by the Department of Public Safety, selection of a decentralized, privately owned garage

operation of the program could be incorporated into the PMVI program. Another enforcement option would be to require that vehicles pass an emissions test as a precondition to registration. This option also influences or is influenced by administrative alternatives. If, for example, a decentralized program independent of the safety inspection program were selected, private garages or dealerships administering the emissions tests could be redesignated as substations where vehicles could be concurrently registered. A similar variety of enforcement options exist should a centralized system be implemented. A third basic enforcement option is implementation of an entirely separate system where, for example, vehicle owners would be required to obtain a certificate of compliance on a periodic basis.

A number of additional considerations impact program design. These include phasing in the program to minimize impact to the public, waivers and/or exemptions, retest requirements, possible establishment of a referee lane, model year vehicles to be tested, quality assurance, mechanics training, and consumer access to the Federal Clean Air Act emissions systems performance warranty.

These options are represented in the following table.

Program Type	Enforcement	Test	Additional Considerations
Centralized	Precondition to safety	Idle exhaust	Warranty
state-operated			Stringency
		Parameter/	Waivers
	Precondition	Functional	Exemptions
contractor-operated	to registration		Retests
			Referee Lanes
Decentralized			Quality Assurance
	Separate system		Mechanics Training
			Model Years to be Tested
			Public Information

In the following paragraphs, these primary program options are synthesized into three representative scenarios, and evaluated in terms of the criteria specified by H.B. 726. The technical support document includes discussion and analysis of information relative to each of the twelve options specified by H.B. 726 (see page 9 above). A discussion of the significant advantages and disadvantages of each could be produced as it is here for three representative alternatives.

Decentralized Program, Parameter Test, Combined with Safety Inspection

In this example, vehicle emissions testing requirements are applicable only to current year models and later vehicles beginning with program start-up. Parameter or functional testing is the least expensive method of evaluating emission performance, even when it includes functional performance tests such as idle speed, check for catalyst, check for presence of fuel filler restrictor and the propane enrichment procedure to check air/fuel ratio of the carburetor. The equipment necessary for this test is minimal in cost and readily available. The addition of such a testing procedure to the safety inspection would result in slightly more than one dollar added to the cost of the current safety inspection.

Costs to the public overall, as well as to the government is minimized by applying the program only to new vehicles and subsequent year models beginning with the year in which the program is initiated. For example, if a program were implemented beginning in 1983, only 1983 model year vehicles would be tested in the first year. In the second year, the program would apply to 1983 and 1984 year models and so forth. Such a program would apply to a relatively small number of vehicles in the first few years, and would permit development of an effective mechanic training program, provide for control of the program and allow

for assessment of quality assurance needs and development of an adequate quality assurance program. In addition, such a program would require a relatively small initial investment by government and station owners, since fewer stations would be needed to provide testing. Consumer acceptability in general should be enhanced as a result of the opportunity for well managed and controlled start up, good training and quality assurance. This program also would address the equitability problem for owners of vehicles that were purchased used and had tampered emission control systems the owners may not have been aware of.

During the first and second year of program operation, it is likely that only a limited number of inspection stations would need to be certified to perform the emissions testing. Eventually, a decentralized program should be more convenient to vehicle owners because of the larger number of inspection stations located throughout the area. While some have argued that decentralized programs increase the potential for consumer fraud because the inspecting station may require unnecessary repairs, such programs avoid the situation where the motorist must go back and forth between an inspection station and repair facility, the so-called ping-pong effect.

About ten percent of the typical fleet is current model year vehicles. In Houston this figure is about 200,000. Therefore, first year costs to Houston motorists for addition of the emissions test would be slightly more than $200,000, second-year slightly more than $400,000 and so on. These figures do not include costs incurred for repairs. DPS would incur additional administrative costs. Estimates are that about ten percent of existing PMVI stations, or 130 stations would have to be certified during the first year of program operation, twenty percent during the second year and so forth. Because DPS currently administers

a motor vehicle testing program, the testing facilities, administrative personnel, and an enforcement mechanism are already in place. Addition of emissions test to the current safety inspection in only one county could make enforcement difficult. Harris County motorists could avoid the emissions test by having their vehicles inspected in another county. While this problem could be somewhat mitigated by such measures as requiring owners to present their vehicle registration at the time of the safety inspection in all PMVI stations in counties contiguous to Harris County, or by using different stickers for vehicles which have had emissions tests performed and providing spot check enforcement for vehicles driven in Harris County, each such measure would add cost and administrative complexity to operation of the program. Such measures also could require statutory amendment to require vehicle owners in Harris County to carry with them their vehicle registration forms.

For post-80 technology vehicles, it appears that the parameter inspection may be as effective as the idle exhaust emissions analysis in identifying high emitters. A vehicle inspection program based on parameter or functional checks should be equivalent to or more effective than one utilizing the EPA-preferred exhaust measurement test in reducing vehicle emissions. It thus far appears, however, unlikely that EPA would approve such a program. It is also unlikely that EPA will include such a test in short tests approved for purposes of the emissions performance warranty included in the Federal Clean Air Act.

Decentralized Program, Idle Test, Combined with Safety

This program would be applicable to 1981 and later model vehicles. It would maintain the administrative advantages discussed above relative to combination with the existing PMVI system, but has other advantages and disadvantages not previously discussed.

Equipment necessary to perform the idle exhaust gas analysis is expensive, a minimum of $3000 per analyzer. A DPS survey of currently certified inspection station owners indicates about 20 percent would drop out of the safety inspection program if an idle emission test were added to it. Respondents noted high cost and low reliability of exhaust emissions analyzers are the principal reasons. Combination of this test with the current safety inspection would add about six dollars to the cost of the test. First year costs to Houston motorists for the test would total about $3,000,000; second year, about $4,200,000. These figures do not include repair cost or the cost of a safety inspection.

This program option is designed to take advantage of EPA's regulations prescribing exhaust tests as acceptable to allow consumers access to the Federal Clean Air Act emissions system warranty provisions. Also, as discussed previously, these regulations apply to 1981 and later model vehicles. Use of the idle exhaust test is an advantage further, with respect to EPA approvability. However, according to MOBILE I, EPA's computer model, in order to achieve the EPA-required 25 percent emission reduction credit, with an effective mechanic training program, it would be necessary to require that half of all vehicles tested (50 percent stringency) receive maintenance in order to qualify for EPA's 25 percent reduction credit. It is possible to achieve additional reductions by using additional tests, such as checks for tampering and maladjustments of emission control systems. For example, it is estimated from operating programs and the Houston FTP study, that a three percent actual reduction can be achieved by an inspection and repair for tampering. However, as indicated earlier actual reductions and credits are not equivalent, and there is no certainty that EPA would provide credits for this tampering check. In order to show the 25 percent credit, and require corrective maintenance on a reasonable number of vehicles, this program would have to pick up earlier model vehicles.

Centralized, Contractor-Operated, Idle Test, Prerequisite for Registration

This program would be administered through centralized facilities operated by a private contractor. Idle exhaust tests would be administered to all 1975 and later model vehicles. Passing the idle test would be a prerequisite to vehicle registration. The only common feature this program shares with either of the first two is the use of the EPA-preferred idle exhaust test. The required 25 percent emission reduction credit by 1987 is easily demonstrated using a 25 percent stringency factor. Actual emission reduction benefits for including 1975-1980 model vehicles are marginal. That this type of program would be operated at a small number of centralized locations by a contractor is an advantage in terms of initial capital and administrative costs to the state. Only about 100 to 150 inspection lanes would be required for full program implementation. Costs to the motorist for an idle exhaust test at such a facility would be approximately $3.50. This amount is less than the same test at decentralized facilities, but more than the cost of the parameter test. Total cost to Houston motorists for the inspection during the first year of program implementation, however, would be almost $6,000,000. This high cost is due to including 1975-1980 model vehicles. Profit to the contractor is not included in this estimation, nor are repair costs. Although total implementation costs for a centralized system are somewhat less than for decentralized, additional costs would be incurred by the motorist in driving time and testing time, offsetting the cost advantage to some extent.

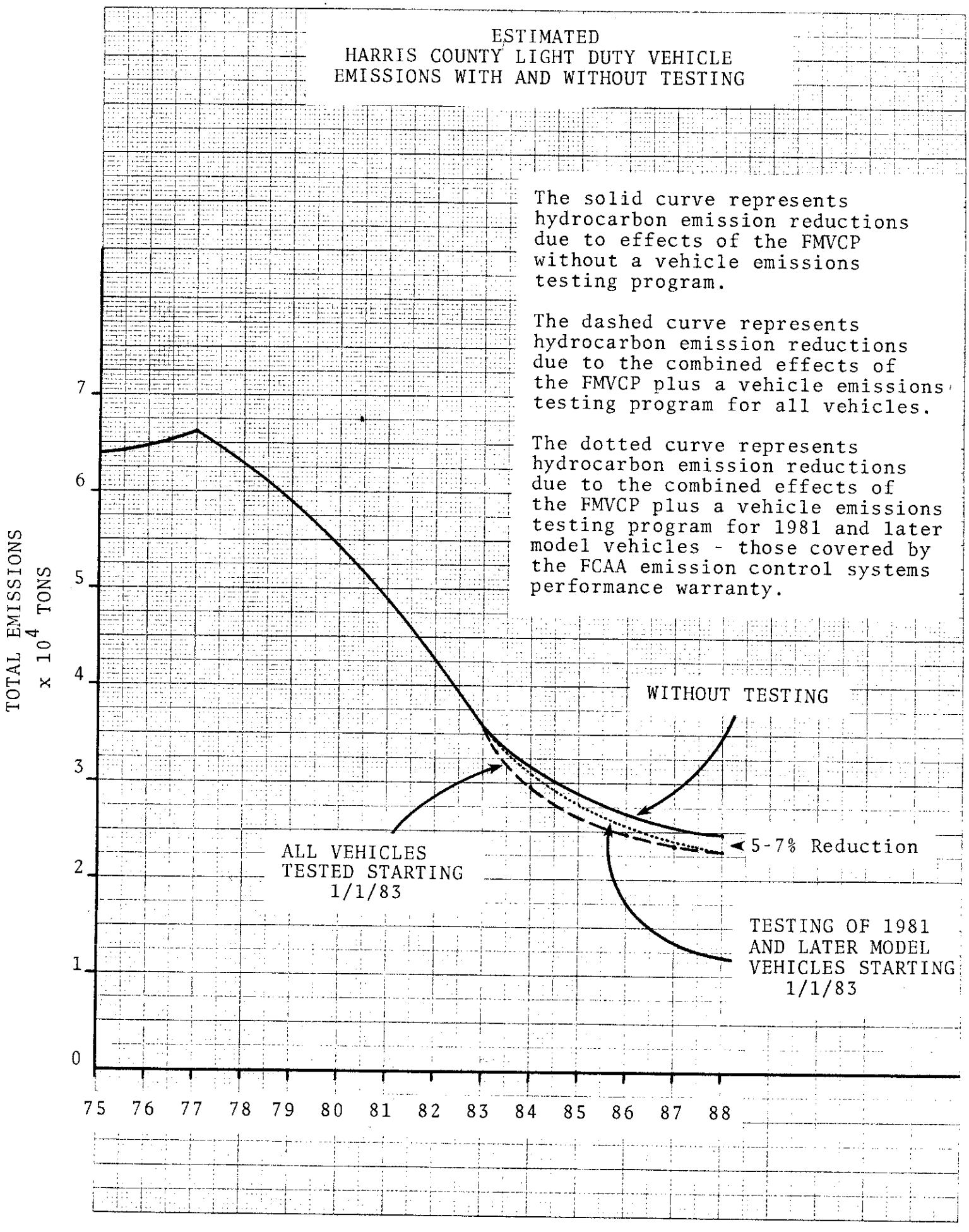
Using the vehicle registration system as an enforcement mechanism could work, as it has in many areas which have previously established programs. The existing system could be revised so that evidence of passing the emissions test is required before registration can be accomplished. The administrative burden that this

would place on the Harris County Tax Assessor-Collector would be significant. One means of offsetting this burden could be to reimburse that office from inspection receipts. This would increase cost of the inspection fee.

This program also offers the opportunity for developing a system that would benefit consumers by allowing for vehicle registration, safety inspection, and emissions testing at one centralized location. At minimal expense, a centralized emissions test station could acquire the equipment in order to be certified as a PMVI safety inspection station, and be designated as a substation for vehicle registration. Both tests could be performed, and all three requirements could be fulfilled in one visit. The cost to the motorist would be approximately the same as would be incurred for an emissions test in this facility and safety inspection in a separate private garage.

To optimize this benefit, however, the SDHPT, DPS and Harris County Tax Assessor-Collector's office would incur a substantial administrative burden to, for example, synchronize annual vehicle registrations with safety and emissions testing requirements.

ATTACHMENT


ESTIMATED
HARRIS COUNTY LIGHT DUTY VEHICLE
EMISSIONS WITH AND WITHOUT TESTING
The solid curve represents hydrocarbon emission reductions due to effects of the FMVCP without a vehicle emissions testing program.
The dashed curve represents hydrocarbon emission reductions due to the combined effects of the FMVCP plus a vehicle emissions testing program for all vehicles.
The dotted curve represents hydrocarbon emission reductions due to the combined effects of the FMVCP plus a vehicle emissions testing program for 1981 and later model vehicles - those covered by the FCAA emission control systems performance warranty.
TOTAL EMISSIONS x 10^4 TONS
0
1
2
3
4
5
6
7
75
76
77
78
79
80
81
82
83
84
85
86
87
88
WITHOUT TESTING
5-7% Reduction
ALL VEHICLES TESTED STARTING 1/1/83
TESTING OF 1981 AND LATER MODEL VEHICLES STARTING 1/1/83