

TEXAS STATE IMPLEMENTATION PLAN (SIP)

OZONE CONTROL STRATEGY

HARRIS COUNTY

December 3, 1982

Section VI
Control Strategy

A. INTRODUCTION

Requirements for State Implementation Plans (SIP) specified in 40 CFR Part 51.12 provide that "...in any region where existing (measured or estimated) ambient levels of pollutant exceed the levels specified by an applicable national standard, the plan shall set forth a control strategy which shall provide for the degree of emission reduction necessary for attainment and maintenance of such national standard..." Ambient levels of sulfur dioxide and oxides of nitrogen, as measured from 1975 through 1977, did not exceed the national standards set for these pollutants anywhere in Texas. Therefore, no control strategies for these pollutants were included in revisions to the Texas SIP submitted on April 13, 1979. Control strategies were submitted and approved for inclusion in the SIP for areas in which measured concentrations of ozone, total suspended particulate, or carbon monoxide exceeded a National Ambient Air Quality Standard (NAAQS) during the period from 1975 to 1977.

The control strategies submitted in 1979 provided by December 31, 1982 the amount of emission reductions required by Environmental Protection Agency (EPA) policy to demonstrate attainment of the primary NAAQS, except for ozone in the Harris County nonattainment area. For that area, an extension to December 31, 1987 was requested, as provided for in the 1977 Federal Clean Air Act (FCAA) Amendments.

Supplemental material, including emission inventories for volatile organic compounds and total suspended particulates submitted with the 1979 SIP revisions, is included in Appendices H and O.

Proposals to revise the Texas SIP to comply with the requirements of the 1977 Amendments to the FCAA were submitted

to the EPA on April 13, 1979, November 2, 1979, and November 21, 1979. On December 18, 1979 (44 FR 74830-74832), EPA approved the proposed revision to the Texas SIP relating to vehicle inspection and maintenance and extended the deadline for attainment of the NAAQS for ozone in Harris County until December 31, 1987. (Appendix Q contains the full text of the extension request and the approval notice.) On March 25, 1980 (45 FR 19231-19245), EPA approved and incorporated into the Texas SIP many of the remaining provisions included in the proposals submitted by the State in April and November, 1979. The March 25, 1980 Federal Register notice also included conditional approval of a number of the proposed SIP revisions submitted by the State.

Additional proposed SIP revisions were submitted to EPA by the State on July 25, 1980, and July 20, 1981 to comply with the requirements of the March 25, 1980 conditional approvals. By May 31, 1982, all of the proposed revisions to the Texas SIP submitted to EPA in April, and November, 1979, July, 1980, and July, 1981, with the exception of provisions relating to the definition of major modification used in new source review and certain portions of the control strategy for total suspended particulate in Harris County, had been finally approved or addressed in a Federal Register notice proposing final approval.

The 1977 Amendments to the FCAA required state implementation plans to be revised by December 31, 1982 to provide additional emission reductions for those areas for which EPA approved extensions of the deadline for attainment of the NAAQS for ozone or carbon monoxide. Paragraph B.5. of this Section of the SIP contains the revision to the Texas SIP submitted to comply with the 1977 Amendments to the FCAA and EPA rules for 1982 SIP revisions. Supplementary emissions inventory data and supporting documentation for the revision are included in Appendices Q through Z.

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1. POLICY AND PURPOSE

a. Primary Purpose of Plan

The primary purpose of this plan is to accomplish volatile organic compound (VOC) emission reductions required by the 1977 Federal Clean Air Act (FCAA) and the Environmental Protection Agency (EPA) and necessary to avoid the sanctions and penalties prescribed by Sections 110(a)(2)(I), 176, and 316 of the FCAA.

The plan provides for the required emission reductions by the federal statutory deadline of December 31, 1982, or December 31, 1987 in the case of Harris County, through a program of reasonable controls.

b. - d. (No Change)

2. SUMMARY OF THE PRINCIPAL ELEMENTS ADDRESSED WITHIN THIS PLAN. (DETAILS ARE PROVIDED IN THE VARIOUS SUBSEQUENT SECTIONS AND APPENDICES)

a. - b. (No Change)

c. Establishing Baseline Air Quality

In order to determine the severity of the ozone problem in each nonattainment area, EPA required that data from monitoring done in 1975, 1976, and 1977 be examined for the 1979 revisions. Data from 1978 was also considered when it became available. For the 1982 revisions, EPA required that monitoring data collected in 1978, 1979, and 1980 be examined. Procedures for selecting or calculating a baseline air quality to be used in plan preparation were promulgated by EPA and are discussed and used within this plan.

d. (No Change)

e. Sources of Emission Reductions

Substantial quantities of volatile organic compounds are emitted by businesses and industry and by motor vehicles. The plan identifies the contribution from all known sources

and sets forth a program of reductions that will satisfy EPA requirements for demonstration of attainment of the standard by December 31, 1982, or by December 31, 1987, in the case of Harris County,

3. OZONE CONTROL PLAN FOR 1979 SIP REVISION

a. (No Change)

b. Ozone Nonattainment Area Designations in Texas

1) - 7) (No Change)

8) Redesignation Due to Revision of Ozone Standard

To determine the impact of the January, 1979 revision of the ozone standard to .12 ppm, the air quality data for all designated nonattainment areas were re-examined. As a result of this re-examination, it was determined that concentrations in Travis and McLennan Counties do not exceed the new standard. These redesignations were requested by the TACB on April 6, 1979 (Board Resolution 79-2) and approved by EPA in the Federal Register on April 14, 1980 and October 21, 1981.

9) Additional Redesignations

In order to petition EPA for redesignation of an ozone nonattainment area, ozone concentrations cannot exceed the standard on an average of more than once per year. The average is to be calculated on the most current three years of data. Based on review of data for ozone nonattainment counties for 1978-1980, the TACB requested redesignation to attainment for Ector County on February 6, 1980 (Board Resolution 80-1) and for Bexar County on June 5, 1981 (Board Resolution 81-9). EPA subsequently approved these redesignations in the Federal Register on June 29, 1981, and January 15, 1982, respectively.

c. - f. (No Change)

4. CONTROL STRATEGY FOR 1979 SIP REVISIONS

a. General

In all but the Harris County nonattainment area, the control strategies submitted in 1979 provided emission reductions sufficient to satisfy EPA requirements for demonstration of attainment of the ozone standard by December 31, 1982, the attainment date specified in the Federal Clean Air Act.

In the case of Harris County where emission reductions sufficient to satisfy EPA requirements for demonstration of attainment by December 31, 1982 was not possible with reasonable controls, an extension of the attainment date to December 31, 1987 was requested and approved by EPA. The FCAA requires that SIP's be revised in 1982 to provide additional VOC emission reductions for all areas for which deadlines for attainment of ozone or carbon monoxide air quality standards were extended to 1987. Paragraph VI.B.5 includes the control strategy provisions required in the 1982 SIP revision for Harris County.

Simply stated, the control strategy for securing emission reductions necessary to demonstrate attainment of the ozone standard consists of the VOC controls imposed on new vehicles by the Federal Motor Vehicle Control Program (FMVCP), reasonable controls on existing stationary sources of VOC by changes to TACB Regulation V and strict control of new stationary source VOC emissions by a permit program.

b. Estimated Emission Reductions

The emission reductions predicted from the FMVCP and the imposition of reasonable available controls on stationary sources are shown in Table 6 for each urban nonattainment county. For comparison purposes, the reduction requirements for each area are also shown.

From this Table it can be seen that the estimated emission reductions are equal to or greater than the required reductions in all nonattainment areas except Harris County.

c. (No Change)

5. 1982 Harris County SIP Revision

a. Ozone Control Plan

1) General

This section of the plan describes the actions taken by the TACB to provide the volatile organic compound (VOC) emission reductions necessary to satisfy EPA requirements for demonstrating attainment in Harris County. These federal requirements were published in the January 22, 1981 Federal Register (Appendix R).

The guidelines require states to compile extensive air quality and emissions data and specify techniques and procedures to be used by states in determining the amount of emission reduction to be required. Prior to actual preparation of 1982 SIP revisions, each affected state was required to review data from air quality monitoring, compare the air quality data with the national standard for ozone, calculate the amount of emission reduction required, identify measures available to reduce emissions, and devise legally enforceable measures to provide the required emission reductions.

A series of contractual studies were conducted in 1981 and 1982 to obtain technical information needed to satisfy EPA requirements for 1982 SIP revisions. These studies are listed below.

- o "Assessment of the Feasibility and Costs of Controlling VOC Emissions from Stationary Sources in Harris County, Texas," Radian Corporation, September 1981.
- o "Harris County Ozone Characterization Report," Arthur Young & Company, September 1981.
- o "Evaluation of the EKMA Model and Alternative Isopleth Models for Application in the Houston Area," Roy F. Weston, Incorporated, November 1981.

- o "Evaluation of Mobile II Emission Factor Model and Alternatives to Further Reduce In-Use Emissions," Roy F. Weston, Incorporated, November 1981.
- o "Exposure Risk Modeling of the Present and Future Ozone Air Quality Problem in Houston," Roy F. Weston, Incorporated, November 1981.
- o "Estimation of the Amounts and Costs of VOC Emission Reductions Attained or Potentially Attainable from the Control of Stationary Sources in Harris County," Radian Corporation, March 1982.
- o "Photochemical Dispersion Model Sensitivity Study - Houston Area," Radian Corporation, March 1981.

2) Ozone Nonattainment Area Designations in Texas

See paragraph VI.B.3.b. for a list of areas designated as nonattainment for ozone and for a discussion of the ozone nonattainment area designation process.

3) Planning Procedures and Consultation

a) Requirements Under Section 121 and 174 of the FCAA
See paragraph VI.B.3.c.1) for a description of the federal requirements as contained in Sections 121 and 174 of the FCAA.

b) Status of Requirement
See paragraph VI.B.3.c.2) and Appendix F for a discussion of the actions taken to satisfy the federal requirements of Sections 121 and 174 of the FCAA with regard to the 1979 SIP revision. Documentation of the planning procedures and consultation for the 1982 SIP revision is contained in Appendix S.

c) Response from Local Officials
In a letter to the Administrator of EPA from the Governor of Texas dated July 24, 1978, the Houston-Galveston Area Council (H-GAC) was designated, pursuant to Section 174 of the FCAA, to prepare plans for submittal to and

consideration by the TACB providing for implementation of those transportation control measures which are determined to be reasonable and which may assist in efforts to reduce VOC emissions in Harris County. (See Paragraph VI.B.3.c.3)c) and Appendix F.)

On May 8, 1981, H-GAC and TACB signed a formal agreement setting forth the specific roles and responsibilities of each agency for preparation of the 1982 SIP revisions for Harris County. Specifically H-GAC agreed to assist in preparation of emissions inventories and in the conduct of public participation activities and to develop the mobile source portion of the 1982 SIP for consideration by TACB. The May 1981 agreement included a detailed schedule and work statement for each project to be undertaken (Appendix T).

The Houston Department of Public Health also contributed significantly to the 1982 SIP development effort by assisting in preparation of needed emissions inventories and by providing air quality measurement data.

d) Responsibilities and Planning Processes of the Houston-Galveston Area Council

As a result of this designation, H-GAC has carried out extensive analyses of potential transportation controls, data collection projects and public participation activities which were required for completion of the 1982 SIP revision required for Harris County. As a result of these efforts, certain transportation measures related to air quality improvement were found to be reasonable for implementation in Harris County. H-GAC has obtained or is seeking commitments from the

elected officials of the local governments with authority to implement the air quality related transportation improvement measures found to be reasonable as described in Paragraph VI.B.5.a.6)b)(2)(c).

4) Degree of Nonattainment-Selection of Air Quality Baseline

The January 22, 1981, EPA guideline requires the most recent three years of air quality data from the state and local air monitoring system network be summarized in the plan. Table 7 summarizes the high and second high daily maximum ozone concentrations for eight state and local air monitoring sites in Harris County from the period 1978 through 1980 and for 1981. The 1981 data were not available at the time analysis of reduction requirements needed to be made. However, the 1981 data is included because EPA guidelines require that it be examined to determine if the most recent levels recorded show a change in ozone trends that should be considered in developing the final plan. No changes were needed. EPA criteria require ambient ozone data from at least three monitoring sites be used to determine the ozone concentration value to be used to calculate the amount of VOC emission reduction to be required. These criteria include specifications for the location of monitoring sites to be considered in preparation of 1982 SIP revisions. The eight sites selected satisfy EPA criteria under various meteorological conditions typical of Harris County. The procedure specifies that for determination of SIP VOC emission reduction requirements data from at least one monitoring site located upwind of the city, one downwind at the edge of the city, and one 15-40 kilometers downwind from the city be used and considered.

Table 7

High and Second High Daily Maximum Ozone
Concentrations Per Year

<u>Monitoring Site</u>		<u>78*</u>	<u>79*</u>	<u>80</u>	<u>81</u>
4600 Aldine Mail Rd.	High	0.18	0.20	0.22	0.25
	Second	0.18	0.20	0.21	0.22
1224 Mae Dr.	High	0.20	0.20	0.34	0.27
	Second	0.18	0.18	0.27	0.19
9525 Clinton Dr.	High	0.23	0.19	0.35	0.29
	Second	0.21	0.18	0.30	0.25
1307 Crawford St.	High	0.23	0.19	0.27	0.22
	Second	0.22	0.18	0.26	0.22
8314 Parkhurst Dr.	High	0.22	0.20	0.22	0.18
	Second	0.21	0.20	0.20	0.17
7834 Fuqua St.	High	0.24	0.21	0.26	0.23
	Second	0.22	0.19	0.22	0.21
4401 Lang Rd.	High	0.24	0.22	0.29	0.18
	Second	0.19	0.19	0.22	0.16
13826 Croquet St.	High	0.29	0.24	0.26	0.25
	Second	0.23	0.20	0.24	0.20

*Due to change in calibration methods, 1978 and 1979 data (collected prior to the change) have been adjusted to be comparable to later data. The calibration change was made to conform to the revised EPA method (40CFR Part 50-Appendix D) promulgated February 8, 1979 (44FR8221).

5) Relationship Between Air Quality Baseline and Emission Reductions Required to Satisfy EPA Requirements for Demonstration of Attainment of the Ozone Standard

a) Uncertainty of Relationship

See paragraph VI.B.3.e.1) for a discussion of the uncertainty of the relationship between VOC emissions reductions and changes in ambient ozone concentrations.

b) Choice of Emission Reduction Model

Ozone is not emitted directly into the atmosphere but is formed in the atmosphere through a complex

series of chemical reactions involving certain reactive hydrocarbon compounds (volatile organic compounds or VOC) and oxides of nitrogen (NO_x). The January 22, 1981, EPA guideline specifies that states must use a computer modeling technique known as Empirical Kinetic Modeling Approach (EKMA) to relate measured ozone concentrations to emissions of VOC and NO_x to determine emission reduction requirements for 1982 SIP revisions.

EPA guidelines published in the November 14, 1979, Federal Register and in a March, 1981, Guideline Document (EPA-450/4-80-027) provide specific instructions for use of EKMA in preparation of 1982 SIP revisions. These instructions require that data from the five days with the highest ozone levels recorded during the three-year review period at each appropriately sited monitoring station be modeled to determine five day-specific emission reduction requirements. The EPA guidelines specify that the fourth highest day-specific reduction value calculated for each site be determined and the highest of this subset of site values be selected as the design reduction value (expressed as a percentage) for the nonattainment area. Combined VOC emissions from mobile and stationary sources must be reduced by that percentage.

c) Choice of Model Input Variables

The March 1981 Guidelines for Use of City-Specific EKMA in Preparing Ozone SIPs states that to insure specificity to a particular city under review, city-specific determinations of input data are strongly recommended, with default measures recommended only as a last resort. Additionally, a November 1981 report on the effects of various input parameters, prepared for

EPA by Jeffries, Sexton, and Salmi of the University of North Carolina, for EPA-OAQPS*, affirms that the EKMA model produces results which are significantly affected by 1) the choice of day modeled, 2) the chemical mechanism selected, 3) the wind trajectories, 4) the accuracy of predicted peak ozone concentrations, and 5) the mixture of VOC reactivity classes.

The model, therefore, is sensitive to both variations in the input parameters selected and changes in assumptions concerning the mixture of reactivity classes which are part of the modeling program. One of the significant factors pertaining to reactivity classes is the ratio of propylene to butane. The EPA default value is a 25/75 split for propylene/butane. This split was arrived at based on studies conducted in the 1960's, by comparing time versus ozone concentration profiles predicted by the Dodge Mechanism (a set of formula used in the EKMA model to simulate VOC/NO_x reactions in the atmosphere to produce ozone) with observations made in smog chamber irradiations of pre-emissions control automotive exhaust. If the ambient mix of precursors in an area differs from the composition of automotive exhaust, as is probably the case in Harris County, the 25/75 split may not be appropriate. Unfortunately, a basis for revising this split, acceptable to EPA, can be obtained only by conducting smog chamber irradiations of Houston air; a lengthy, expensive process which itself would be subject to great uncertainty in the selection of "Houston air."

* Effects of Chemistry and Meteorology on Ozone Control Calculations Using Simple Trajectory Models and the EKMA Procedure; Jeffries, Sexton, Salmi; School of Public Health, UNC; EPA Contract No. 68-02-3523; November, 1981.

The reactivity of the air in Houston most likely varies depending on its origin and path over emission sources. Thus multiple "Houston air" conditions may have to be tested. Review of Houston ambient air and emissions studies indicate a range of ratios is more appropriate. Thus, it is doubtful that the one surrogate 25/75 split factor used to replicate smog chamber results of 1960's model years automobile exhaust can be considered as representative of 1980 Houston air where non-automotive VOC emissions predominate. However, EPA requires use of this factor, in lieu of a more representative factor, since more current smog chamber data are not available.

An alternative method, one for considering reactivities that vary from that implied with 25/75 split, is to use a new chemical mechanism, carbon bond III, to replace the Dodge mechanism now used in the model. The CBM III provides for consideration of several hydrocarbon classes which vary in reactivity. Thus, if model inputs are available for the various hydrocarbon classes used in the model, variations in reactivity may be better simulated.

Other input variables specific to Harris County used in the analyses performed in preparation of this plan are listed below and described in Appendix U.

- o Apportionment of emissions densities to sub-county areas such as the Central Business District and Ship Channel areas to reflect the concentration of mobile and major stationary source emissions in those areas.

- o Wind trajectories and mixing height data for each modeled day.
 - o Measured morning concentrations of VOC, oxides of nitrogen, and ozone, when available, to determine VOC/NO_x ratios and transported ozone values. VOC/NO_x ratios used were median values specific to sub-county areas.
- d) Emission Reduction Requirements Resulting from Application of the Model

Following the EPA procedures for city-specific EKMA, the five days with highest maximum hourly ozone concentrations observed over the period 1978-79-80 were selected for each site as shown in Table 8. The model was run according to EPA guidelines for each day that the site was downwind of the urban/industrialized area. At least the fourth highest percent reduction estimate was selected for each site which met the following additional criteria*:

- o the model predicted observed peak hourly ozone concentrations accurately to within $\pm 30\%$.
- o for at least one day, predictions were within $\pm 10\%$ of the observed peak hourly ozone.

Table 8 shows the results of this procedure and the estimated reductions are listed for each appropriate site day. For all sites, except Fugua, predicted values are within 30 percent of observed values on all days. At Fugua the predictions are within 30 percent on four of five days. At each site at least one day's prediction is within ten percent of the observed value.

* Guidance provided from Director, Monitoring and Data Analysis Division, EPA-OAQPS; memo of December 31, 1981; "Effects of Chemistry and Meteorology on Ozone Control Calculations Using Simple Trajectory Models and the EKMA Procedure."

Table 8 Maximum Hourly Ozone Concentrations and Design Reduction Estimates

Date	Aldine			Mae Drive			Clinton			Parkhurst			Lang			Croquet			Fugua			Crawford		
	A/B	C	D	A/B	C	D	A/B	C	D	A/B	C	D	A/B	C	D	A/B	C	D	A/B	C	D	A/B	C	D
11/05/80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22/12	NC	.....	.....	.....	.....
11/02/80	21/19	20.3	SC/min*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10/08/80	.....	.....	.....	27/25	41.2	SC*	35/26	46.5	SC/min	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26/21	41.2	+
09/13/80	.....	.....	.....	34/28	36.5	SC	30/26	38.6	SC	.....	.....	.....	29/30	46.7	CBD*	.....	.....	.....	.....	.....	.....	27/30	43.0	+
08/25/80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24/17	43.7	+	.....	.....	.....	.....	.....	.....	.....
08/23/80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26/20	38.5	SC	26/20	35.7	SC	.....	.....	.....	.....
08/21/80	22/20	46.6	CBD*	26/18	44.8	CBD	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
07/02/80	.....	.....	.....	.....	.....	.....	.....	.....	.....	22/16	32.5	CBD	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
06/10/80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22/13	NC	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
05/17/80	.....	.....	.....	24/20	50.0	CBD	28/20	51.3	CBD	.....	.....	.....	22/23	39.8	CBD*	.....	.....	.....	.....	.....	.....	22/23	43.2	CBD*
08/07/79	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22/23	35.6	CBD*	.....	.....	.....	.....	.....	.....	.....	.....	.....
06/28/79	20/19	40.3	Comp*	.....	.....	.....	.....	.....	.....	20/19	40.3	Comp*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
06/14/79	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24/24	52	+	.....	.....	.....	.....	.....	.....	.....
05/31/79	18/19	42.1	CBD*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
04/24/79	.....	.....	.....	20/19	52.3	SC*	.....	.....	.....	20/19	52.3	SC*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
04/05/79	20/18	48.5	Comp*	.....	.....	.....	.....	.....	.....	20/18	46.2	Comp*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11/03/78	.....	.....	.....	.....	.....	.....	.....	.....	.....	21/19	32.6	SC*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10/01/78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22/18	36.6	SC
08/05/78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24/19	39.9	SC	.....	.....	.....	.....
08/04/78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23/19	33.3	Comp	22/20	32.1	SC*	.....	.....	.....	.....
07/18/78	.....	.....	.....	.....	.....	.....	21/22	26.2	SC/min*	22/18	49.2	Comp	24/20	32.7	+	.....	.....	.....	.....	.....	.....	23/22	31.0	SC/min*
07/17/78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21/15	44.7	SC	.....
06/30/78	.....	.....	.....	.....	.....	.....	23/18	47.5	Comp	.....	.....	.....	.....	.....	.....	.....	.....	29/19	50.3	Comp	.....	.....	.....	.....
06/28/78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18/21	35.3	+	.....	.....	.....	.....	.....	.....	.....	.....	.....

4th Highest Day 40.3% 41.2% 38.6% 32.6% 35.3% 38.5% 35.7% 36.6%

Design Reduction Estimate 41.2%

A - Observed peak ozone (pphm)
 B - Model predicted ozone (pphm) at time of observed peak ozone
 C - Estimated design reduction value (in percent)
 D - Area of precursor origin
 NC - Design value not calculated because ozone reading is believed invalid or model cannot predict observed value within ± 30%.

* - Predicted is within ± 10% of observed
 SC - Median NMHC/NO_x ratio used to compute the design value was specific to ship channel conditions
 SC/min - Median NMHC/NO_x ratio for the ship channel had no intercept with isopleth; minimum value ratio which intercepts the isopleth was used
 CBD - Median NMHC/NO_x ratio used to compute the design value was specific to central business district conditions
 + - Median NMHC/NO_x ratio used to compute the design value was specific to an area between the SC and CBD
 Comp - Median NMHC/NO_x ratio used to compute the design value was determined for all three areas combined

As seen in the table the highest of the fourth highest value is 41.2% associated with emissions from the ship channel area of Harris County. This indicates that emissions from the ship channel area of the county should be reduced by at least 41.2% from the levels estimated in 1980. The control plan proposed in VI.B.5.b.2. results in a 46.1% reduction from 1980 county average annual VOC emission levels.

For the site days examined where the emissions considered in the modeling were predominantly from the ship channel, estimated design values ranged from 20.3% to 52.3%. For site days when emissions considered in the modeling were predominately from the Central Business District, estimated design reduction values ranged from 32.5% to 51.3%. Site days, when emissions from a sub-county area with emissions representative of a combination of ship channel emissions and CBD emissions were considered, exhibited estimated design reduction values between 32.7% and 52.0%. In general, estimated design reduction values tend to be higher for emissions from the Central Business District. The Control Strategy included in the plan, provides for a reduction in 1980 Ship Channel emissions of 46.8% and a 55.5% reduction in 1980 Central Business District emissions. For 1979 these figures are 48.3% and 56.9% respectively. More information on emission reductions is contained in Appendix U.

6) Identification of Emission Changes

a) Sources of VOC Emissions

See paragraph VI.B.3.f.1) for a discussion of the types of sources of VOC emissions.

b) Factors Affecting Magnitude of VOC Emissions

(1) New or Modified Sources

(a) New or Modified Stationary Sources
(Other than Area Sources)

The construction of new industrial facilities or modification of existing facilities affect VOC emission rates. Since 1972, all new stationary emission sources in Texas have been required to apply best available control technology (BACT) to control emissions. Since 1979, new major sources in ozone nonattainment areas have been required to control emissions to the lowest achievable emission rate (LAER) as defined in the FCAA. Construction of new plants and expansion of existing facilities generally cause emissions to increase but such increases are minimal through application of BACT and LAER. The annual changes in emissions resulting from permitted new and modified emitting facilities for 1978-1981 are shown in Table 9.

Some of the industrial equipment in use today will become obsolete in the next several years and be replaced with new, more efficient machinery. Through application of BACT and LAER, new or modified emitting facilities generally emit pollutants at a rate lower than^a older facilities of similar types. Consequently, emissions tend to decrease as industrial process

equipment turns over as a result of replacement or modification of plant process equipment.

Process or plant shutdowns and retirements result in an additional emission reduction which more than offset the emissions increases from new or modified emitting facilities. Emissions decreases of approximately 1.0% per year are estimated to result from these process or plant shutdowns and retirements. A procedure has been established to track these process or plant shutdowns and retirements through annual field investigations. Emissions offsets will be required in the event that additional controls are needed to prevent significant emissions increases from new or modified emitting facilities.

Table 9

Total VOC Emissions Increases Due to New Source
Review in Harris County

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Increase Due to Construction Permits (Tons/Yr.)	1578	4662	914	1038
Increase Due to Exemptions Granted Under Permit Procedures (Tons/Yr.)	215	295	320	0*
Total New Source Emissions Increase (Tons/Yr.)	1793	4957	1234	1038
Percentage of 1980 Emissions Inventory (231,250 tons) Represented by New Source Review.	0.8%	2.1%	0.5%	0.4%

*Exemptions are included in Construction Permits.

(b) New or Modified Area Sources

Total future VOC emissions will also be affected by changes in emissions from small stationary sources for which permits are not required, such as gasoline stations, degreasing operations, automobile paint shops, and retail dry cleaning establishments. Uncontrolled emissions from most of these minor and area type sources are calculated or estimated on the basis of population and are assumed to grow at a rate proportional to the estimated population growth. This growth rate is approximately 2.8% per year for Harris County. The estimated emission growth rate calculated on the basis of this population growth rate is expected to be approximately 0.1% per year or 2132 tons per year (0.9% of 1980 emissions) by 1987. However, increased use of water-based paint for architectural coatings is expected to result in a 0.3% decrease in emissions by 1987. In addition, VOC emissions may be expected to decrease by 0.3% because of reduced gasoline sales at service stations expected as a result of increased fuel cost and use of more fuel efficient vehicles.

(2) Changes in Motor Vehicle Emissions

In 1980 emissions from highway motor vehicles account for 60,079 tons of VOC emissions or 26% of the total 1980 VOC

emissions in Harris County. Therefore, changes in these emissions will have an impact on the total emissions inventory and on the emission reduction rate. For the next several years, the trend of emissions from motor vehicles will be downward. This reduction represents the net effect of the following factors:

(a) Federal Motor Vehicle Control Program (FMVCP)

This program, administered by the federal government, requires that vehicles meet increasingly more stringent emissions limits. Even when population growth and increased vehicle usage are taken into account, the FMVCP has resulted in significant VOC emission reductions since 1970. With the passage of time, increasing numbers of older higher emitting vehicles will be phased out of use. The FMVCP requires that all 1980 and later model year vehicles meet substantially more stringent emission limits than in prior years. The EPA Mobile 2 "Mobile Source Emission Model" calculates the effects of the FMVCP emissions standards on motor vehicle emissions for current and future years.

(b) Increases in Vehicular Use

Countering the decreases in average emissions from individual vehicles are the increases in the number and use of vehicles which have been experienced in all urban areas of Texas, and

particularly in the Houston area. For the past few years, emission reductions from FMVCP significantly exceeded the emissions increases due to increased vehicle miles travelled. This results in an overall net emissions decrease. This net reduction in vehicle emissions is expected to continue at least through 1987. The vehicle emissions as calculated by the Houston-Galveston Area Council (H-GAC) show a decrease of emissions of 11.1% of total 1980 emissions or 25,576 tons per year by 1987.

(c) Transportation Planning

As required by the 1977 FCAA, H-GAC has performed an analysis* of 26 transportation control measures (TCM) listed in Section 108 of the FCAA to assess their feasibility for implementation in Harris County and to determine the potential of such measures to reduce vehicle emissions. During the evaluation, H-GAC considered the social, economic and environmental effects that reasonably could be expected to result from implementation of each measure. As a result of the analyses, 13 measures were identified tentatively as feasible and subjected to detailed analysis. Five of the 13 measures were dropped from further

*"An Analysis of Air Quality Transportation Control Measures for Harris County," Houston-Galveston Area Council, July, 1981.

consideration as ineffective. H-GAC has estimated the emission reduction potential of the eight remaining TCM's for three levels of effort or commitment. Specific procedures have been developed by the H-GAC for determining the conformance with the SIP of all transportation plans, programs and projects implemented in Harris County on an annual basis*.

The FCAA requires that affected local governments agree to formal and specific commitments to fund and implement each transportation-related control strategy which is submitted to EPA as a SIP revision. Appendix V contains an agreement submitted by H-GAC in which the Metropolitan Transit Authority (MTA), the State Department of Highways and Public Transportation, the National Association of Vanpool Operators (NAVPO) and the Houston Chamber of Commerce have committed to joint efforts to increase by 4,400 the number of vanpools within the Harris County nonattainment area. MTA has also committed to 6,600 additional park-and-ride spaces by 1987 and an increase of 185 peak-hour buses. These transportation planning measures will result, by 1987, in 1664 tons or

*"Development of Conformity Procedures, Task 2 Interim Report, EPA Section 175, Phase 2 Work Program," Houston-Galveston Area Council, August, 1982.

0.72% emission reduction from 1980 emissions.

Conformity procedures may be used to identify projects in the annual element of the TIP which may adversely affect air quality. Measures to delay those actions will be considered should future revision to the SIP be necessary. Additional TCM commitments may also be identified by procedures established in the July 1981 initial analysis of TCMs. These contingency provisions may be initiated should the EPA Administrator determine it is necessary to compensate for unanticipated shortfalls in emission reductions.

*"Initial Transportation Commitments," Houston-Galveston Area Council, October, 1981, as updated and finalized November 16, 1982.

(d) / Vehicle Parameter Inspection and Maintenance Program

i. General

The FCAA provides that a state must "establish a specific schedule for implementation of a vehicle emission control inspection and maintenance program" for each area for which the Administrator approved an extension of the deadline for attainment of the ozone NAAQS until 1987 as part of the 1979 SIP revision approval action (Section 172(b)(11)(B)). EPA policy has expanded upon this FCAA requirement to specify that SIP revisions required in 1982 include enforceable measures to implement a mandatory vehicle inspection and maintenance program. On December 18, 1979, EPA approved the inspection and maintenance portion of the 1979 SIP revision for Harris County submitted to EPA on April 13, 1979 (FR 74830) by the Governor of Texas.

The 1979 SIP revisions included an amendment of the Texas Clean Air Act requiring the TACB, with the cooperation of Texas Department of Public Safety

(DPS) and the State Department of Highways and Public Transportation to:

- o Conduct a vehicle inspection and maintenance pilot program and study to evaluate the effectiveness and feasibility of various in-use vehicle emission control options.
- o Prepare for a vehicle inspection and maintenance program in Harris County to allow for full implementation no later than December 31, 1982, and
- o Report to the 67th Session of the Texas Legislature concerning the results of the required study and planning activities on or before December 1, 1980.

During 1980, the TACB conducted a pilot program and study of motor vehicle emissions and emissions control options to evaluate technically the cost, effectiveness, and feasibility of various vehicle emission control programs. The results of this study are contained in a report, "Program to Control Motor Vehicle Emissions in the State of Texas," prepared by the

TACB for the 67th Texas Legislature (Appendix W). The results of this project suggest that the effectiveness of vehicle emission inspection programs depends in large measure on the degree of public support and acceptance of the need for vehicle emissions control and on the ability of automobile service technicians and mechanics to maintain current technology vehicles properly. Further, the results indicate that for current technology vehicles the effectiveness of the inspection program is not particularly dependent on the type of inspection-idle emissions check or parameter check.

As a result of the work conducted during this pilot study and subsequent studies, as well as a general review of information regarding motor vehicle use in Harris County, several important factors which differentiate Harris County from other major urban areas have been identified. (See Section VI.B.5.b.1) for a general discussion of these factors.) For example, tampering and misfueling occur, 18% in Harris County, at a higher rate than is

typical of other areas, 8% according to EPA Mobile 2 model. Emissions from motor vehicles account for less than one-third of the total VOC emissions. In addition, there are more newer model year vehicles in Harris County than in most urban areas in the country. Because of this higher proportion of new vehicles in Harris County, in-use emission control measures applicable to new model (computer controlled) vehicles are especially important.

The computer-based technology which is being rapidly incorporated into new automobiles presents a major challenge to the automobile service industry. Without special training, automobile mechanics and service technicians will be unable to effectively and economically maintain new technology vehicles. The vehicle parameter inspection and maintenance program being developed for Harris County includes an aggressive mechanic training and certification program to assist the automobile repair industry to meet this new challenge. Studies have shown that most vehicles, especially new

technology automobiles which are properly maintained, not only run better but also have lower VOC emissions and operate more economically.

Vehicle inspection programs based on measurement of vehicle idle exhaust gas emissions may be somewhat effective to detect older vehicles (pre-81) with excessive carbon monoxide emissions, but are relatively ineffective to detect new computer-controlled vehicles with excessive VOC emissions.

Because of specific conditions that exist in Harris County, a special study was initiated to evaluate critical parameters to be included in a vehicle inspection and maintenance program appropriate for Harris County, that would also comply with the requirements of the FCAA (Appendix Y).

ii. Program Description

Based on this Harris County specific data, the TACB and DPS have developed a motor vehicle parameter inspection and maintenance program appropriate for Harris County. Statutory authority for the program is provided by the Texas Clean Air

Act Section 3.10 (d) and by Article XV of the Texas Vehicle Inspection Act Sections 140-142. TACB and DPS will coordinate revisions of the applicable rules and regulations or any needed statutory amendments to assure that all vehicles registered in Harris County are inspected as part of this program, in Harris County. The program will include enhanced anti-tampering requirements, voluntary mechanic training and certification, and public information program, as well as requirements for annual inspection of vehicle emission control components.

Each of the program elements emphasizes the importance of effective maintenance control of in-use vehicle emissions. Requirements for mandatory annual inspections are included to ensure the continued effectiveness of the program. The Harris County vehicle parameter inspection and maintenance program described in this section addresses all elements listed in EPA's 1982 SIP Vehicle Inspection and Maintenance program policy and includes additional elements

necessary to effectively address in-use vehicle emissions control in Harris County.

o Vehicle Inspection Program

- Inspection Test Procedures -

A January 19, 1981 memorandum from EPA Deputy Assistant Administrator for Mobile Source Air Pollution Control to Air and Hazardous Materials Division Directors, Regions I-X, defines the objectives of the inspection procedures included in state vehicle inspection programs to be the identification of high emitting vehicles in need of maintenance and the verification, through post-maintenance retest, that proper maintenance has been performed.

The Texas Vehicle Inspection Act, Article XV - Inspection of Vehicles V.C.S. 6701d, Uniform Act Section 140 (Appendix X) requires that all vehicles operating on the public roads of Texas be inspected annually to determine conformity with DPS Rules and Regulations Section C - Inspection Procedure (Appendix X). These regulations require inspectors to visually inspect the emission control system for

all 1968 or newer model year vehicles. This inspection includes a visual check of the exhaust emission system components. These procedures will be enhanced by additions to reference diagrams used by DPS inspectors to assist the inspectors to determine an individual vehicles requirements for emission control related components included in DPS Rules and Regulations Section E - Reference Section (Appendix X). During 1983, Harris County DPS inspectors will receive upgraded training on inspection of emissions control systems.

DPS is amending current vehicle inspection rules to include catalytic converters in the definition of exhaust emission system for 1984 and newer vehicles. This amendment was considered and approved at an October 27, 1982 Service Commander's meeting and will be presented to the Safety Commission for consideration and adoption during December, 1982. The amended rule will be submitted to EPA as a proposed SIP revision following adoption by the Safety Commission.

By September, 1983, DPS will amend current inspection procedures, as necessary, to identify, for 1984 vehicles, additional vehicle parameters critical to excess VOC emissions from light duty gasoline vehicles in Harris County. DPS inspection procedures will be reviewed and amended annually, beginning with the 1984 model year, to provide current vehicle emission parameter inspection procedures for the most recent eight vehicle model years. Amended procedures will be submitted to EPA as proposed SIP revisions following adoption by DPS. For 1984 model year vehicles, DPS inspection procedure will require that each light-duty vehicle in Harris County be inspected annually to determine the presence of and apparent function of the following listed equipment which was installed by the manufacturer to comply with the requirements of the federal motor vehicle control system: (1) PCV system; (2) air injection system; (3) evaporative emission control system; (4) choke heater and vacuum break; (5) oxygen or other appropriate closed loop

sensors; (6) catalytic converters; (7) fuel inlet restrictor. In addition, the inspection procedure will include provisions to reject vehicles which evidence obvious engine misfires and for which the owner has failed to perform maintenance required by the manufacturer to protect the emission control performance warranty or to comply with a manufacturer's recall relating to VOC emission control systems. DPS will provide the inspectors training necessary to implement appropriate inspection procedures for each of the most recent eight model years beginning in 1984.

- Emission Standards (pass/fail criteria) -

The previously referenced January 1981 EPA policy memorandum requires that emissions standards, or pass/fail criteria, must be included in a state's vehicle emission inspection and maintenance program. These standards or criteria determine, in part, the emission reductions to be credited for program implementation.

The pass/fail criteria used by inspectors to inspect vehicle in Texas are defined in DPS Rules and Regulations Section C - Inspection Procedures (Appendix X). These rules require that inspectors must inspect for and reject all 1968 and newer model year vehicles if the exhaust emission system has been removed, disconnected, or altered in any manner to make it ineffective; the plumbing is loose, broken, leaking or improperly routed; or the air pump belt is loose or removed. The Texas Vehicle Inspection Act Article XV Inspection of Vehicles V.C.S. 6701d, Uniform Act Section 140(d) Compulsory Inspection (Appendix X) provides that if an inspection indicates any of these deficiencies exist the vehicle shall be adjusted or repaired before a certificate is issued. Reinspection within 15 days at the same inspection station shall be available free of charge after adequate repairs have been made.

To enhance the existing vehicle parameter inspection and maintenance program for 1984 or newer model year vehicles in Harris County, DPS will, by

September, 1984, amend these rules to include any additional pass/fail inspection criteria that may be necessary. These pass/fail criteria will be reviewed annually and amended, as necessary, to provide current pass/fail criteria for the most recent eight model year vehicles. These rule amendments will be submitted to EPA as proposed SIP revisions following adoption by DPS. For 1984 model year vehicles, DPS pass/fail criteria will provide for rejection of a vehicle on which the following equipment which was installed by the manufacturer to comply with the requirements of FMVCP has been disconnected or removed: (1) PCV system; (2) air injection system; (3) evaporative emission control system; (4) choke heater and vacuum break; (5) oxygen or other appropriate closed loop sensors; (6) catalytic converter; and (7) fuel inlet restrictor. In addition, the pass/fail criteria will include provisions to reject vehicles which evidence obvious engine misfires and for which the owner has failed to perform maintenance required by the manufacturer to protect the

emission control performance warranty or to comply with a manufacturer's recall relating to VOC emission control systems.

DPS pass/fail criteria were used in determining the emission reduction to be credited for program implementation (see Table 10) as documented in Appendix Y.

- Inspection Station and Inspector Licensing Requirements

-

EPA policy (July 17, 1978 EPA memorandum from David Hawkins to Regional Administrators) requires all inspection facilities to be licensed. A representative of the facility must have received instructions in the proper use of the instruments and in vehicle testing methods and must have demonstrated proficiency in these methods. The facility must agree to maintain records and to submit to inspection of the facility. The appropriate government agency must have provisions for penalties for facilities which fail to follow prescribed procedures and for misconduct.

All licensing procedures required by EPA for vehicle inspection and maintenance programs are satisfied through the provision of the Texas Vehicle Inspection Act Article XV Inspection of Vehicle V.C.S. 6701d, Section 141 State Appointed Inspection Stations (Appendix X). DPS Rules and Regulations Section A - Station Licensing and Operation (Appendix X) define the criteria for approval of inspection stations. Under these rules and the provisions of the statute, DPS trains and certifies all inspectors and licenses all inspection stations. All inspectors and each of the approximately 1100 inspection stations must be recertified every two years. DPS can require additional inspector training at any time. The DPS has committed to developing and providing training to the inspectors. DPS requires each inspection station to keep records of all inspections performed, to maintain a copy of such records at the inspection station, and to submit to DPS periodic reports on inspections performed (see Record Keeping and Record Submittal

Requirements). DPS takes corrective action against non-complying inspectors and inspection stations, including assessment of misdemeanor penalties and revoking inspector or inspection station licenses.

- Equipment Specifications -
EPA vehicle inspection and maintenance program policy (July, 1978 and January, 1981) requires specifications to be established for testing instruments to ensure that accurate inspections are conducted.

The DPS has authority under Texas Vehicle Inspection Act Article XV (Appendix X) to define equipment specifications and maintenance requirements for instruments and/or equipment used in vehicle inspections. DPS Rules and Regulations Section C - Inspection Procedures, require visual examination of exhaust emission systems. No equipment is required for those inspection of emission control components on 1968 or newer model year vehicles under current rules. Such additional equipment specifications and maintenance

requirements as may be necessary to inspect 1984 or newer model year vehicle emission control systems in Harris County will be added to DPS Rules as required.

- Record Keeping and Record Submittal Requirements -

Although EPA has not established specific data collection and reporting requirements for vehicle inspection and maintenance programs, annual reports on program implementation and enforcement are required to document the effectiveness of the program and to demonstrate reasonable further progress (RFP) in emission reductions.

The TACB will monitor the results of the vehicle parameter inspection and maintenance program in Harris County to determine the effectiveness of the program pass/fail criteria. This annual report will be based on data collected by DPS certified inspection stations, compiled by DPS and forwarded to the TACB. The report forms proposed to be used by DPS inspectors to record and report data resulting from annual inspection of vehicle emission

control systems are included in Appendix X (DPS Rules Section D - Reporting Requirements). Data reported will include the date of inspection, the inspection station, the make, model and year of the vehicle, and the repairs required for each of the emission control system components.

Program effectiveness will be determined through analysis of vehicle inspection reports including: (1) the number of inspections conducted; (2) the number of emission control system related failures; and (3) the types of repair required and the maintenance performed. Analysis of Regulation IV compliance records will be included to determine the number of corrective action taken including the number of notices of violations issued for vehicle misfueling and tampering. The number of certifications and licenses issued and the number of non-compliance citations issued to vehicle inspectors and inspection station licenses revoked will be carefully monitored by DPS.

- Quality Control, Audit, and
Surveillance Procedures -

EPA policy (July, 1978) states that vehicle inspection and maintenance programs must include a quality assurance program consisting of periodic audits to assure that the inspection facilities are observing the proper test procedures, record keeping practices, and equipment calibration requirements.

DPS Rules and Regulations
Section A - Station Licensing and Operation, and Section B - General Inspection Requirements (Appendix X), specify quality control procedures to be followed by licensed inspection facilities and individual inspectors. Official Vehicle Inspection Stations and qualified inspectors in Texas are licensed and certified by the DPS on alternate years. Stations must meet specific requirements for proper facilities, adequate equipment, and qualified personnel before a license can be granted or renewed. Certified inspectors are required to attend specified training courses, pass qualifying examinations, and demonstrate their ability to

conduct an acceptable inspection. Up-to-date inspection records must be available for examination by DPS troopers during normal business hours. DPS troopers will visit, announced and unannounced, each inspection station at least on a quarterly basis. In addition, the DPS investigates complaints in accordance with procedures specified in the Rules and Regulations for Official Vehicle Inspection Stations and Certified Inspectors, Section B, to determine whether there has been a violation of the Vehicle Inspection Act or regulations. Violations may be punishable by fines not to exceed \$200. Under authority of Texas Vehicle Inspection Act, Article XV - Inspection of Vehicles V.C.S. 6701d Uniform Act Section 141, (Appendix X), DPS can and does revoke the license of any facility or certificate of any individual inspector found to be out of compliance with the agency's rules and regulations.

- Procedures to Assure that Noncomplying Vehicles are Not Operated on the Public Road -

EPA policy (January 1981) states that an effective program must include provisions which ensure that noncomplying vehicles are not operated on public roads. Such provisions must be equally effective as prohibiting registration. The enforcement program must include identification of noncomplying vehicles, penalties and enforcement procedures.

The Texas Vehicle Inspection Act Article XV - Inspection of Vehicles Section 140 (Appendix X) requires that before a vehicle may be initially registered and titled in the county of residence, the owner must have the vehicle inspected at a state certified inspection station and receive a verification from the permanent identification number of the vehicle. Inspection is required once annually. All vehicles are required to display a valid inspection certificate.

Any person operating a vehicle on the highways of Texas, other than a vehicle licensed in another state and being temporarily and legally operated under a valid reciprocity

agreement, in violation of the provision of the Act including operation of a vehicle which does not display a valid inspection certificate, is guilty of a misdemeanor and on conviction shall be punished as provided in Article XVI - Penalties and Disposition of Fines and Forfeitures Section 143 - Penalties for Misdemeanors (Appendix X), with up to \$200 fine. The Act provides for enforcement of these provisions by any peace office in the state.

In January 1983 the DPS will begin issuing to vehicles inspected in Harris County an inspection sticker with a red numeral insert instead of the black insert that will continue to be used for the rest of the State. This Harris County specific inspection sticker will reflect the increased emphasis being placed by DPS inspectors on the examination of vehicle exhaust emission systems. This emphasis will be provided by DPS through additional reference diagrams (Appendix X) and training to improve the ability of inspectors to determine if originally installed emission control systems are in place and

operating. During 1983, Harris County inspectors will receive this additional training.

- Any Other Official Program Rules Regulations, and Procedures -

The Texas Air Control Board Regulation IV (31 TAC Chapter 114), Control of Air Pollution from Motor Vehicles, revised March 20, 1981 (Appendix X) requires the proper maintenance and operation of air pollution control systems or devices used to control emissions from motor vehicles. A more detailed description of these control requirements is provided in the Anti-tampering section of this program description.

- Mechanic Training Program -

In the January 19, 1981 EPA policy statement, EPA strongly encourages establishment of mechanic training programs in conjunction with inspection and maintenance programs. Current EPA policy does not, however, include emission reduction credit for mechanic training programs. EPA's failure to include such emission reduction credit in current policy apparently was based on the

expectation that EPA would approve only state inspection and maintenance programs which unconditionally required that vehicles with excessive emissions be repaired to eliminate the excessive emissions without regard for cost. If cost is not considered, mechanic skill would not, therefore, be a factor. Recently, EPA has begun to approve state inspection and maintenance programs with specific limits on the maximum repair cost a vehicle owner may be required to bear. Consequently, the effectiveness of vehicle inspection programs is highly dependent on mechanic skills.

TACB will ensure establishment of a technical information center with responsibility for collecting, updating and maintaining data and information on new model vehicles and emission control systems. The center will be responsible for providing technical support to DPS to maintain up-to-date inspection procedures, developing curricula and materials necessary to conduct short courses on procedures

necessary to effectively diagnose and repair engine malfunctions of new technology vehicles.

Performance standards will be developed to measure the effectiveness of the mechanic training program. TACB will coordinate efforts to present effective mechanic training throughout the community and will issue certificates for successful completion of appropriate short courses relating to diagnosis and repair of engine malfunction of new technology vehicles.

TACB will assure development of the mechanic training program. Information on the responsibilities of agencies, educational institutions or other entities assisting in the program will be provided, along with letters of commitment, by January 15, 1983. From January through August 1983, the TACB will develop a program to support in-service upgrade mechanic training in Harris County. When implemented in September 1983, this program will provide training to service technicians and mechanics on how to repair and service computer-controlled vehicles.

Emphasis will be given to proper maintenance and repair of the emission control components of the system. Certification of completion of this training will be provided.

The TACB will coordinate development of this mechanic training program with representatives of automobile manufacturers, mechanics and garage owner associations, local government, and local training institutions. The initial training curriculum will concentrate on 1984 model year vehicles. Yearly updates to the curriculum will provide new information relative to the new model year vehicles.

The mechanic training program will include a performance test. If the mechanic satisfactorily completes the performance test, he will be issued a certificate. This certificate will be suitable for display. Through the public information program citizens will be informed of the meaning of the mechanic certification.

Currently EPA requires vehicle manufacturers to place under the

hood of each new vehicle a label with general instructions on emission control systems and critical engine settings. The current requirement is very general and different manufacturers provide the required information in a variety of formats and at many different levels of detail. If EPA labeling requirements were revised to require that manufacturers include on the label affixed to each new vehicle in a consistent and easily understood format specific information on the type and location of emission control systems and components required on the vehicle as a condition of the vehicle certification and to provide a list of the maintenance and/or parts replacement necessary to protect the 50,000 mile vehicle emission control system warranty, cost of technical support needed to support the Harris County vehicle inspection program would be substantially reduced. Such labeling would enable every motorist and mechanic to know the specific requirements necessary to maintain a vehicle at its designed emission control performance level.

- A Public Awareness Plan -

EPA policy (July 1978) requires implementation of a public information program to publicize the inspection and maintenance program in the media. The TACB will assure implementation of the public information program, with the cooperation of those local agencies interested in participating in the public awareness program. Information on the appropriate local and state agencies activities will be provided along with letters of commitment by January 15, 1983. The DPS will post bulletins at all inspection stations in Harris County in January 1983 to explain the new inspection stickers and to inform the inspectors of the need to examine carefully vehicle exhaust emission systems. Notices to inform the public of the emphasis being placed on inspection of the vehicle emission exhaust system will also be posted. Also in January 1983, the TACB will prepare and, in coordination with local governments, distribute brochures explaining the Harris County Vehicle Parameter Inspection and

Maintenance Program. News releases and public service announcements will be prepared as a cooperative effort of the TACB, DPS and appropriate local agencies.

Public information materials will include information on the need for proper maintenance of vehicle emission control systems, the emphasis being placed on the annual inspection of these components by the DPS inspectors, the anti-tampering requirements of TACB Regulation IV, and the mechanic training and certification program. The media to be used to distribute this information will include brochures, posters, and T.V., radio and newspaper announcements.

The main thrust of this public information program will be to inform motor vehicle owners and operators of the need for and advantages of maintaining their vehicle's emission control system in good operating condition. Information regarding the penalties that could result from non-compliance with the TACB Regulation IV anti-tampering requirements as

well as the annual inspection requirements that will detect such non-compliance will be included. Information about the mechanic training and certification program will be distributed to mechanics in the Harris County area and to the general public. This aspect of the public information program will provide citizens who are concerned about the need for and who recognize the advantage of proper emission control system maintenance information to aid them in selecting trained mechanics to service their vehicle. The certificate provided to mechanics upon completion of the training program will serve as a recognizable sign of ability to perform proper maintenance on new technology vehicles including repair of emission control systems.

o Vehicle Maintenance Program

- Anti-tampering -

TACB Regulation IV, Control of Air Pollution from Motor Vehicles, as adopted October 30, 1973 and amended March 20, 1981 (Appendix X), requires that all motor vehicle owners or operators must use and maintain

the vehicle's emission control system in good operating condition. The regulation further prohibits removal, replacement or deactivation of a vehicle emission control system except to install a system equally effective in reducing emissions from the vehicle. Sale of a vehicle without the original or equivalent emission control system in good operating condition is prohibited. To enhance the effectiveness of these rules, the TACB will initiate rulemaking procedures in January, 1983 to add additional requirements and specificity to certain existing requirements. This rule-making action will be completed by July 1983. These rule revisions will prohibit misfueling of motor vehicles by individuals at any service station where unleaded gasoline is available, limit or prohibit misuse of parts and components designed to defeat or deactivate originally installed emission control systems, and, for 1984 and newer model year vehicles, require that prior to the transfer of ownership subsequent to initial sale as a new vehicle the seller of the vehicle must provide to the

buyer certification that the vehicle complies with DPS emission control system inspection criteria at time of sale. Enforcement of the new Regulation IV requirements as well as the current requirements will be accomplished by appropriate state and local agencies. Proposed changes to TACB Regulation IV will include provisions to require owners or operators of service stations to report to TACB or appropriate local enforcement agencies any observed misfueling of motor vehicles. The TACB will implement this regulation through a surveillance program in Harris County. TACB and appropriate local agencies plan to investigate approximately 40% (not to exceed 200 annual investigations) of the largest service stations, automotive repair facilities, fleet repair and fueling facilities, etc. in Harris County and conduct necessary investigations of other operations to assess compliance with the provisions of Regulation IV. Appropriate enforcement actions (such as notices, fines, administrative enforcement conferences, or injunctive relief which might

include replacement of tampered components) will be taken when violations of the provisions of the regulation are detected. Appropriate enforcement action will be taken by the agency with jurisdiction over that area. Other tampering actions will be detected at the annual vehicle inspection.

iii. Estimated VOC Emissions Reduction Credits

EPA January 22, 1981 guidelines for developing 1982 SIP revisions require that, to be approvable, states must demonstrate that vehicle inspection and maintenance programs will provide hydrocarbon emission reduction credits equivalent to the reduction credits EPA would assign to implementation of an inspection program based on measurement of idle tail pipe exhaust emissions. According to current EPA policy, this would require states to demonstrate emission reduction credit equal to 35% of the 1987 light-duty highway vehicle emissions or 12,176 tons per year by 1987 for Harris County. Emissions reduction credit estimates for the Harris County vehicle

parameter inspection and maintenance program show that the program provides the amount of hydrocarbon emission reduction credit required by EPA policy.

EPA requires that a mathematical computer simulation model referred to as Mobile 2 be used to calculate 1987 mobile source emissions and that supplemental calculation procedures, inspection and maintenance credit model, be used to determine the amount of emission reduction credit which should be assigned to implementation of an idle exhaust test based vehicle inspection program. The current EPA inspection and maintenance credit model contains a programming error which results in calculation which overestimate the hydrocarbon emission reduction credits which should be assigned to vehicle inspection and maintenance programs by about 40 percent in 1987. Because of this error, EPA is in the process of changing its policy for assigning emission reduction credit for implementation of vehicle inspection and maintenance programs as a result

of 1982 SIP revision requirements. Essentially, EPA will allow states which have developed 1982 SIP revisions for ozone nonattainment areas using the model which has been found to be in error, the model used to establish the requirement for a 35 percent reduction of light-duty vehicle hydrocarbon emissions, use the 35% hydrocarbon emission reduction in proposed 1982 SIP revisions to continue even though the program is now considered by EPA to reduce overall light-duty fleet emissions by 25 percent. TACB has taken this policy change into account for preparation of 1982 Harris County SIP revisions.

Several additional factors were also considered by the TACB when calculating emission reduction credits for the Harris County vehicle parameter inspection and maintenance program. One such factor is that automobile standards are based on total hydrocarbon emissions and the EPA policy for evaluating the effectiveness of inspection and maintenance programs allows an area to demonstrate reductions based on total hydrocarbon

emissions or on nonmethane hydrocarbon emissions. Methane is a nonreactive component of exhaust emissions which does not contribute to the formation of ozone. The methane fraction of a vehicle's emissions, according to EPA's Mobile 2 model, is 7 percent for pre-1975, 13 percent for 1975-1980, and 32 percent for post-1980 model years.

Another factor is that in Harris County, a recent EPA survey indicates that approximately 18 percent of in-use vehicles have experienced emission system tampering or misfueling. EPA has estimated that nationally only 8 or 9 percent of in-use vehicles have experienced emission system tampering or misfueling. Because EPA data on vehicle tampering and misfueling in Harris County have only recently become available and because EPA policy concerning proper treatment of the methane portion of the vehicle exhaust remains under review neither of these factors were taken into account in calculations used to develop mobile source emission estimates in the 1982 Harris County SIP revisions. Preliminary estimates suggest,

however, that had these factors been taken into account estimated 1987 Harris County mobile source nonmethane hydrocarbon emissions would be approximately equal to the emissions estimates included in the plan. All factors considered are more fully discussed in Appendix Y.

The original EPA model developed for use to estimate motor vehicle emissions (Mobile I) assigned emission reduction credits to mechanic training programs included in State Implementation Plan vehicle inspection and maintenance programs. EPA changed this policy, however, and refused to approved mechanic training emission reduction credits when Mobile I was revised and reissued as Mobile 2. Apparently EPA based this policy change on the assumption that all vehicles identified through state vehicle inspection and maintenance programs as excessive emitters (including computer controlled technology vehicles) would be repaired to eliminate the excessive emissions without regard for cost. Using this assumption,

emission reduction estimates would not be dependent on mechanic skills. Since that time, many state inspection and maintenance program which EPA has approved establish the maximum repair cost which any individual vehicle owner may be required to bear as 100 dollars or less. The effectiveness of programs with such cost waivers to reduce emissions is highly dependent on mechanic skills. TACB has considered the need for mechanic training for computer technology vehicles and used procedures consistent with those provided by EPA with the Mobile I model to estimate the impact of mechanic training on emission reduction in Harris County (see Appendix Y).

Considering these factors and following procedures consistent with EPA methods and procedures, an estimated 12,863 tons per year of emissions reductions could be credited for the Harris County vehicle emissions inspection and maintenance program in the control strategy. Table 10 lists the individual program elements and the credit associated with each. A full description of each element is

TABLE 10

1987 REDUCTIONS IN HARRIS COUNTY VEHICLE
HYDROCARBON EMISSIONS RESULTING FROM THE
HARRIS COUNTY VEHICLE PARAMETER INSPECTION
MAINTENANCE PROGRAM

	1987 Reduction in NMHC (in tons) ²	% Reduction in 1987 vehicle Emissions ³
<u>Reductions From Existing Inspection Elements¹</u>		
PCV System	388	1.36%
Air Injection System	228	0.80%
Evaporative Emissions Control System	419	1.47%
Choke Heater, Vacuum Break System, and Other Electrical Disconnects	<u>303</u>	<u>1.07%</u>
TOTALS	1,338	4.7%
<u>Reductions From the Enhanced Inspection Program for 1984 and Newer Vehicles</u>		
PCV System	171	0.60%
Air Injection System	50	0.18%
Evaporative Emission Control System	430	1.51%
Choke Heater and Vacuum Break	288	1.01%
O ₂ and Other Closed-Loop Sensors	542	1.91%
Fuel Inlet restrictor	525	1.85%
Catalytic Converter	923	3.24%
Road Test Misfire	500	1.76%
Documentation Checks for Compliance with Recalls and manufacturer emission related maintenance requirements	<u>382</u>	<u>1.34%</u>
TOTALS	3,811	13.40%
<u>Deterrence of Misfueling (Public Information, Regulations on Private Misfueling)</u>	1,355	4.76%
<u>Deterrence of Tampering (Public Information, Certificate of Conformance)</u>	669	2.35%
<u>Mechanics Training</u>	1,860	6.35%
<u>Public Information (Including increased Adherence to manufacturer Recommended Maintenance)</u>	379	1.33%
Total Light-Duty Vehicle Emissions Reduction	9,413	33%
1987 Reduction of Total Mobile Source Emissions		27.3%
Adjustment to Represent Equivalence to EPA Previously Approved I/M Programs Based on 10% I/M Credit Model Error	3,450	10%
TOTALS	12,863	37.3%

¹ Based only on the effect of inspection program reducing future incidence of occurrence in 1987 for 1975 and newer model year cars. Due to low percentage of VMT and high accumulated mileage, effect on pre-75 cars is negligible.

² Tons calculated by multiplying vehicle emission factor by vehicles mileage traveled (VMT).

³ % Reduction is ratio of grams per mile improvement by NMHC fleet factor, 1.48 gpm, for 1987.

included in the program description section of this section of the plan. Appendix Y contains the documentation of procedures used to calculate emission reduction credits.

iv. Implementation Schedule

In accordance with the 1979 SIP, the TACB has added milestones to the approved 1979 schedule for development and implementation of a vehicle inspection and maintenance program the milestones which will be following during implementation of the program in Harris County. This schedule incorporates mechanic and other personnel training, a public information program and an anti-tampering program, in addition to the actual vehicle testing.

Harris County Vehicle Parameter
Inspection and Maintenance Program

Implementation Schedule

- Nov 82 DPS and TACB identify rule changes needed to implement Harris County program. Needed rule changes might include requirements for certification of conformance with emission-related inspection criteria at time of resale, additional antitampering, and mis-fueling rules.
- Dec 82 TACB adopts SIP.
- Dec 82 DPS posts notices in Harris County inspection stations describing need for and effect of new emphasis on emission-related requirements (1 for inspectors; 1 for public).
- Jan 83 DPS initiates revisions to training for Harris County inspectors to emphasize emissions related portion of training.
- Jan 83 TACB and DPS initiate rule making as necessary.
- Jan 83 Harris County DPS inspection stations begin emphasize inspection of vehicle emission control components during annual inspections and to issue special stickers.
- Jan -
 May 83 DPS revises training program to include new vehicle inspection procedure for 1984 model year.
- Jan 83 DPS revises definition of catalyst to be emission control device for Harris County beginning with 1984 year model.
- Jan 83 Public information program to explain the vehicle parameter inspection program, to discourage tampering and misfueling, and to encourage good maintenance initiated.
- Jan -
 Aug 83 TACB develops and initiates program to maintain currency of inspection procedures for new model years and to provide in-service upgrade mechanic training and certification.

May - DPS trains Harris County inspectors to implement
 Aug 83 new emission parameter inspection procedures for
 1984 model year.

July 83 TACB adopts rule to prohibit misfueling by any
 individual and to discourage improper use of parts
 and components designed to defeat emission control
 systems.

Sep 83 Harris County DPS inspection stations initiate
 new inspection procedures for 1984 year model,
 repair not mandatory until Sep 1984.

Jan 84 Mechanic training and certification program initiated.

Jan - TACB technical support/mechanic training center
 May 84 develops inspection handbook and vehicle emission
 component of inspection procedures for 1985 year
 model.

Sep 84 DPS adopts rule changes to require repair of 1984
 and 1985 year model vehicles which fail to conform
 to emission-related inspection requirements.

Sep 84 DPS inspection stations initiate new inspection
 procedures for 1985 year model; 1984 and 1985 year
 models which fail to satisfy emissions inspection
 requirement must be repaired before a sticker may
 be issued.

Sep 84 TACB adopts rule requiring certification of conformance
 with DPS emission-related inspection criteria at
 time of resale for 1984 and later year models.

(3) Reductions in Stationary Source Emissions
Due to Additional Controls

As required by the FCAA and EPA guidance, reasonable available control measures have been applied to all stationary sources in Harris County with a potential to emit 100 or more tons per year as well as to certain smaller sources. Control measures to be applied are prescribed in revisions to Regulation V adopted on March 30, 1979, July 11, 1980, and proposed with this plan revision. Estimated emission reductions anticipated from previously adopted VOC control measures with compliance dates later than December 31, 1980 are included since these reductions must be subtracted from the base year 1980 emissions inventory to document accurately emissions changes occurring between 1980 and 1987.

(a) VOC Control Requirements Adopted

March 30, 1979

See Table 4 and paragraph VI.B.3.f.2)c)(1) for a listing of these control measures as contained in 1979 SIP revisions. Table 11 lists each of these controls by TACB rule number and the emission reductions estimated to result from implementation of each. These emissions reduction estimates have been updated as compared to those presented in the 1979 SIP revision. This update reflects reduction estimates based on actual emissions reported in 1980.

(b) VOC Control Requirements Adopted
July 11, 1980

In the 1979 SIP revisions, the TACB committed to consider for adoption additional VOC control measures based on control technique guidelines published after January 1, 1978. The TACB considered these controls at public hearings held in April of 1980 and subsequently adopted controls for the following categories of VOC emission sources:

- o Petroleum Refinery Fugitive Emissions
- o Surface Coating of Miscellaneous Metal Parts
- o Pharmaceutical Manufacturing
- o Graphic Arts (Printing)
- o Flatwood Products
- o Petroleum Liquid Storage (External Floating Roof)
- o Perchloroethylene Dry Cleaning Systems

Table 11 lists each of these controls by TACB rule number and the emissions reductions estimated to result from implementation of each. Specific exemptions provided for and approved under the provisions of the miscellaneous metal parts surface coating requirements will not interfere with reasonable further progress.

(c) VOC Control Requirements Adopted with
this Plan Revision

The January 22, 1981, EPA guideline requires states to develop strategies to reduce further emissions from stationary sources through implementation of reasonably available control technology on additional source categories or process types. In 1981, a study* to evaluate the feasibility and costs of implementing additional VOC emission controls on stationary sources in Harris County was conducted. Nine types of categories of industrial VOC emission sources were identified as accounting for approximately 90,000 tons or 80 percent of the total stationary source emissions projected for 1982. The nine types of categories of industrial emissions that account for a majority of remaining VOC emissions are: 1) fugitive leaks from organic chemical plants; 2) uncontrolled or partially controlled process streams from organic chemical plants; 3) emissions from plastics manufacturing; 4) uncontrolled or partially controlled process streams from petroleum refineries; 5) emissions from ship and barge loading and transfer; 6) emissions from motor vehicle fueling; 7) emissions from degreasing

*"Assessment of the Feasibility and Costs of Controlling VOC Emissions from Stationary Sources in Harris County, Texas," Radian Corporation, September, 1981.

operations; 8) emissions from carbon black manufacturing; 9) emissions from loading and unloading of bulk gasoline terminals. Of these types or categories of emissions, only three--organic chemical fugitive leaks and emissions from ship and barge loading and from motor vehicle fueling--were not already subject to TACB regulations.

The principal sources of each of the nine types or categories of emissions listed above were evaluated to determine VOC emissions reductions that could be achieved by implementing additional control requirements. The cost of controlling the emissions and the potential economic impact on affected emitting facilities were estimated. Table 11 lists each of the control measures, by TACB rule number, for which results of the study indicated that implementation of control would have an insignificant to moderate economic impact on the affected industry. The emissions reductions estimated to result from implementation is also listed for each.

A separate study* was conducted to determine the emissions levels which would result if each significant existing emitting facility in Harris

*"Estimation of the Amount and Costs of VOC Emission Reductions Attained or Potentially Attainable from the Control of Stationary Sources in Harris County," Radian Corporation, March, 1982.

Table 11

VOC Emission Reduction for Harris County from
Application of Controls in Revised
Regulation V

Adoption	Control	TACB Regulation V Section # 115	Reduction (tons/year)	
March 30, 1979	Large Appliance Manufacture	.191, .191(1), .192, .193, .194	0	
	Gasoline Bulk Plants	.121, .122, .123	984	
	Metal Furniture	.191, .191(2), .192, .193, .194	0	
	Petroleum Liquid Storage (Fixed Roof Only)	.101, .102, .103, .104, .105, .106	4,511	
	Degreasing	.172, .173, .174, .175, .176	2,084	
	Bulk Gasoline Terminals	.111(2), .111(3), .112, .113	0	
	Petroleum Refining; Turnaround Vacuum Systems, & Waste Water Separators	.151, .152, .153, .141, .142, .143, .144	15,753	
	Cutback Asphalt	.171, .176(a)	209	
	Surface Coating, Auto Can, etc.	.191, .191(3)-(8), .192, .193, .194	2,427	
	Stage I, Vapor Recovery	.131, .132, .134, .135	0	
	Subtotal (March 30, 1979 Adoption)			25,968
	July 11, 1980	Petroleum Refinery Fugitive Emissions	.251, .252, .253, .254, .255	6,446
		Surface Coating of Miscel- laneous Metal Parts	.191, .191(9), .192, .193, .194	0
Pharmaceutical Manufacturing		.231, .232, .233	220	
Graphic Arts (Printing)		.201, .202, .203	0	
Flatwood Products		.191, .191(10), .192, .193, .194	0	
Petroleum Liquid Storage (External Floating Roof)		.101, .102, .103, .104, .105, .106	2,259	
Perchloroethylene Dry Cleaning Systems		.221, .222, .223	711	
Subtotal (July 11, 1980 Adoption)			9,636	
December 3, 1982	Process Vents	.161, .162, .163, .164	15,717	
	Synthetic Organic Chemical and Plastics Manufacturing Fugitive Emissions	.271, .272, .273, .274, .275	15,850	
	Bulk Gasoline Terminals	.111, .112, .113	1,666	
Subtotal (December 3, 1982 Adoption)			33,233	
TOTAL			68,837	

County could be controlled to the extent generally required for a new facility of a similar type. Results of this study indicate that control requirements recommended in the previous study would result in emission levels at existing facilities approximately equivalent to those at new facilities.

(d) Additional Control Technique

Guidelines

The TACB has committed to consideration for adoption reasonable control technique guidelines (CTG's) for each source category for which EPA issues future CTG's.

c) Emissions Inventory

(1) 1980 VOC Emissions Inventory

An EPA guideline document (EPA 450/4-80-016) specifies the methods for states to use in preparation of VOC emissions inventories to be used in 1982 SIP revisions. The January 22, 1981, EPA guideline requires a 1980 emissions inventory data base be prepared for use in 1982 SIP revisions. A copy of the 1980 Emissions Inventory for Harris County is included in Appendix Z. Emissions are listed as tons of VOC per year. Seasonally adjusted emissions in kilograms per hours of day used in calculating control requirement estimates for Harris County are listed in Appendix U.

The following sections more completely describe the various components of the inventory and the methodology used in their determination.

(a) Major Stationary Sources

The operator of each large industrial facility in Harris County (facilities emitting more than 100 tons per year of VOC) was required to complete an extensive questionnaire describing and estimating the type and amount of VOC emissions from each process. A total of 135 questionnaires were completed for Harris County. Information from these questionnaires was audited for accuracy and completeness and verified by comparison with data from field investigations and EPA process emission factors*. Total emissions from this category of emissions sources were estimated to be 138,526 tons per year in 1980 or 59.9% of the total VOC emissions.

i) Oil & Gas Production & Processing

Emissions were based on reported 1980 Emission Inventory Questionnaire (EIQ).

ii) Gasoline & Crude Oil Storage & Transfer

Emissions were based on reported 1980 EIQ. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.101-.106 and 115.111-.113) which have a final compliance date of December 31, 1982.

iii) Synthetic Organic Chemical Storage & Transfer

Emissions were based on reported 1980 EIQ. Emission reductions in

*"A Practical Approach to Developing and Maintaining a Point Source Emissions Inventory Data Base," Carl Snow & Joe Panketh, April, 1982.

1982-1987 are the result of TACB Regulation V controls (Rules 115.101-.106 and 115.111-.113) which have a final compliance date of December 31, 1982.

iv) Bulk Gasoline Terminals

Emissions were based on reported 1980 EIQ. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.111-.113) which have a final compliance date of December 31, 1982.

v) Other (Storage & Transfer)

Emissions were based on reported 1980 EIQ.

vi) Petroleum Refineries

Emissions were based on reported 1980 EIQ. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.141-.144 and 115.151-.153) which have a final compliance date of December 31, 1982.

vii) Lube Oil Manufacture

Emissions were based on reported 1980 EIQ.

viii) Organic Chemical Manufacture

Emissions were based on reported 1980 EIQ.

ix) Inorganic Chemical Manufacture

Emissions were based on reported 1980 EIQ.

x) Pharmaceutical Manufacture

The national emissions from this industry as tabulated by EPA were used as the basis. State emission

levels were estimated by multiplying the national level by the ratio of the number of state pharmaceutical employees over the number of national pharmaceutical employees. County levels were determined by proportioning the state emission level to the number of pharmaceutical operations in the county. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 116.231-.233) which have a final compliance date of December 31, 1982.

- xi) Plastics Products Manufacture
Emissions were based on reported 1980 EIQ.
- xii) SBR Tire Manufacture
Emissions were based on reported 1980 EIQ.
- xiii) Iron & Steel Manufacture
Emissions were based on reported 1980 EIQ.
- xiv) Other Industrial Processes
(Unspecified SIC)
Emissions were based on reported 1980 EIQ.
- xv) Industrial Surface Coating - Cans
Emissions were based on reported 1980 EIQ. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.191-.194) which have a final compliance date of December 31, 1982.

- xvi) Industrial Surface Coating - Metal Coils
Emissions were based on reported 1980 EIQ. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.191-.194) which have a final compliance date of December 31, 1982.
- xvii) Industrial Coating - Paper
Emissions were based on reported 1980 EIQ.
- xviii) Barge & Tanker Cleaning
No significant repair or cleaning facilities were identified in 1980 data collection effort.
- xix) Fermenting Processes
Major sources of emissions were not identified in 1980 data collection effort.
- xx) Vegetable Oil Processing
Sources of emissions were not identified in 1980 data collection effort.
- xxi) Rubber Tire Manufacture
Sources of emissions were not identified in 1980 data collection effort.
- xxii) Textile Polymers & Resin Manufacture
Sources of emissions were not identified in 1980 data collection effort.
- xxiii) Synthetic Fiber Manufacture
Sources of emissions were not identified in 1980 data collection effort.

- xxiv) Industrial Surface Coating - Large Appliances
Sources of emissions were not identified in 1980 data collection effort.
- xxv) Industrial Surface Coating - Magnet Wire
Sources of emissions were not identified in 1980 data collection effort.
- xxvi) Industrial Surface Coating - Automobiles
Sources of emissions were not identified in 1980 data collection effort.
- xxvii) Industrial Surface Coating - Fabric
Sources of emissions were not identified in 1980 data collection effort.
- xxviii) Industrial Surface Coating - Metal/Wood Products
Sources of emissions were not identified in 1980 data collection effort.
- xxix) Industrial Surface Coating - Miscellaneous Metal Products
Sources of emissions were not identified in 1980 data collection effort.
- xxx) Industrial Surface Coating - Plastic Parts Painting
Sources of emissions were not identified in 1980 data collection effort.
- xxxi) Industrial Surface Coating - Large

Ships

Sources of emissions were not identified in 1980 data collection effort.

xxxii) Industrial Surface Coating - Large Aircraft

Sources of emissions were not identified in 1980 data collection effort.

(b) Minor and Area Source Emissions Inventory

Emissions from small industrial sources and area sources were estimated by using EPA emission factors for each type of source. The emission factors are based on population and are derived from national average estimates of emissions from various activities and industrial processes. Information from the 1980 census was used to determine the population of Harris County. Total emissions from small industrial and area sources were estimated to be 25,626 tons per year in 1980 or 11.1% of the total VOC emissions. Population estimates used to predict 1987 emissions were obtained from the Texas Department of Water Resources 208 Planning Section* and reflect a growth in population from 2,409,544 in 1980 to 2,900,703 in 1987. Emission estimates based on this population increase indicate that minor and area source emissions may be expected to increase 0.9% or 2132 tons from 1980 to 1987. Decreases in area source emissions are expected to be approximately 0.6% or

*"Population Projections for Texas - State, County, State Planning Region and 208 Water Quality Designated Areas," Texas Department of Water Resources, January, 1980

1474 tons because of increased use of water-base paints for architectural coatings and decreased gasoline sales.

i) Service Station Loading (Stage I)

Emissions for this category were calculated from AP-42 factors.

Factors applicable to existing Stage I controls for service station loading were used.

Gasoline throughput was obtained from the State Department of Highways and Public Transportation as derived from the gasoline tax for quantity of gasoline sold. Total Texas gasoline usage was allocated to counties based on population.

ii) Service Station Unloading

The AP-42 factors for uncontrolled vehicle loading, evaporation, and spillage were used to calculate emissions for this category. The same gasoline throughput as calculated for category i) was used.

iii) Ship & Barge Transfer of All VOC

Emissions were estimated using ship traffic data from Houston Ship Channel Port Authority. The information contained the quantity of petroleum and associated liquid petroleum products that were shipped in and out of the Houston Ship Channel.

iv) Gasoline Bulk Plants

National emissions as determined by EPA were used as the basis for

estimating these emissions. The national emissions were multiplied by the ratio of motor fuel in Texas over the national use. The county emission levels were estimated by apportioning the State emissions among the counties, according to population. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.121-.123) which have a final compliance date of December 31, 1982.

v) Architectural Coatings

This category includes evaporative losses due to normal residential or commercial usage of volatile organic solvents in paint and varnish. An emissions factor of .9 tons of VOC per 1000 population was used, as derived in the TACB "Reactive Carbon Compound Control Reexamination for the State of Texas," SP-1 Report, dated March 13, 1975.

vi) Degreasing

This category includes cold cleaning degreasing. Open top vapor and conveyORIZED degreasing emissions are a part of the industrial source emissions. An EPA emission factor of 3 lbs/capita/year was used to estimate emissions. Emissions reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.172-.176)

which have a final compliance date of December 31, 1982.

vii) Dry Cleaning

This category includes evaporated dry cleaning establishments. An emissions factor of .5 tons of VOC per 1000 population was used based upon the TACB report, "Reactive Carbon Compound Control Reexamination for the State of Texas," SP-1. Emission reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.221-.223) which have a final compliance date of December 31, 1982.

viii) Cutback Asphalt

Cutback asphalt paving emissions were derived from data for the State provided by the State Department of Highways and Public Transportation (SDHPT). It was estimated by the SDHPT that they used 45% of all cutback asphalt in the State. The SDHPT furnished data on tons of cutback asphalt they used. The usage by the private sector, including cities, etc., was calculated by factoring the State's use of cutback asphalt by the 45:55% proportion. The solvent content of cutback asphalt is an average of 21% by weight. County emissions were determined by apportioning the State emissions among the counties according to relative populations.

Using population as an indicator for the cutback asphalt used by the private sector, emissions by county were calculated. Emissions reductions in 1982-1987 are the result of TACB Regulation V controls (Rules 115.171&.176) which have a final compliance date of December 31, 1982.

ix) Fuel Combustion

This category includes emissions resulting from residential and commercial institutional fuel use. Residential fuel consists of fuel oil and wood used in home heating, cooking, fireplaces, etc. The fuel oil consumed is assumed to be kerosene. Emission estimates from wood burning are based on the assumption that 30% of the single family units have fireplaces and each burns 0.5 cords of wood per year. These emissions are proportional to the population of the area. Commercial-institutional fuel is that consumed in commercial establishments such as shops and public and private institutions such as schools, libraries, etc. The emissions are dependent upon the amount of kerosene, distillate and fuel oil used. Again, the emissions are proportioned to the population.

x) Solid Waste Disposal

This category represents the emissions from disposal by open

burning and incineration of solid waste produced by commercial establishments and institutions. It is assumed that 75 tons of municipal-type wastes per 1000 population are burned openly.

xi) Forest, and Structural Fires

Structural fires emissions are estimated and distributed by four structural fires per 1000 population and 10% of the structure is assumed to be consumed in the fire. Emissions from forest fires are based on the 10-year (1962-1971) average of 0.28% of the forested land burned each year. The emissions are proportioned to the acres of forest in the county.

Agricultural fires are not reported because of the complete lack of data available on this activity.

xii) Auto Refinishing

This category includes auto body shops and paint shops. An EPA emission factor of 2.6 tons/employee/year was used to estimate emissions.

xiii) Graphic Arts

This category includes printing operations whose annual emissions of solvent are less than 100 tons/year. An EPA emissions factor of 0.8 lb/capita/year was used to estimate emissions.

xiv) Adhesives

There are no reported emissions from adhesives manufacture in Harris County. There is no information available at this time for quantifying adhesives use. Therefore no emissions are reported in TACB emission summary.

xv) Solvent Extraction Process

Solvent extraction process emissions have not been separated from the industrial process emissions. All emissions of this type that were reported are a part of stationary industrial sources.

xvi) Consumer/Commercial Solvent Use

This category includes household products, toiletries, aerosol products, rubbing compounds, windshield washing, polishes and waxes, nonindustrial adhesives, space deodorant, moth control, and laundry treatment. An EPA emission factor of 6.3% lb/capita/year was used to estimate emissions.

xvii) Pesticide Application

No information was available at the time of this report for quantifying VOC emissions from pesticide use in Harris County. The main agent for diluting pesticides for commercial and farm use is water. Because Harris County is heavily urbanized, any emissions related to agricultural activities would be minimal. The

total VOC would be a very small number in relation to total VOC in Harris County.

xviii) Waste Solvent Recovery Processes

There was no waste solvent recovery processes inventoried as a separate category. Waste solvent recovery emissions for industry would be included as a part of total emissions for major stationary sources.

xix) Stationary Internal Combustion

Engines

Emissions from stationary internal combustion engines are included in industrial process emissions.

Other significant applications of stationary engines were not identified in Harris County.

(c) Mobile Sources

Emissions from motor vehicles, ships, trains, and aircraft were calculated by Houston-Galveston Area Council (H-GAC). Joint traffic surveys and sampling were performed by H-GAC and State Department of Highways and Public Transportation (SDHPT). The H-GAC estimated 1980 Harris County mobile source emissions as 63,846 tons*. TACB estimated off-highway emissions, such as construction and farm equipment, to be 3,252 tons. Total 1980 Harris County mobile source emissions were approximately 67,098 tons or 29.0% of the total VOC emissions.

i) Highway Vehicles

*"Methodology and Procedures for Inventory and Projections of Mobile Source Emissions in Harris County," Houston-Galveston Area Council, December, 1981.

This category includes emissions from the operation of vehicles over all the roads in the county. EPA Mobile Source Emission Model, Mobile 2, was used to generate emission factors for various types of vehicles. These types are motorcycles, passenger automobiles, pickup trucks both light and heavy, heavy duty gasoline trucks and all diesel vehicles (light duty passenger, light duty trucks and heavy duty trucks). Traffic data used for input to the Mobile 2 model was gathered by H-GAC from automated counters and by manned check points at representative locations. Highway mobile sources were estimated to be 60,079 tons in 1980.

ii) Off-Highway Vehicles

This category includes such miscellaneous gasoline or diesel-fueled equipment such as tractors, road graders, bulldozers, etc. The estimate of emissions, 3,252 tons in 1980, was calculated by TACB using SDHPT data on this type of equipment registered in the county. AP-42 emission factors for this type of equipment was used.

iii) Rail

Locomotive emissions of 621 tons were calculated by H-GAC by

calculating activities of the 19 rail lines and eight local rail companies in the county.

iv) Aircraft

H-GAC estimated aircraft emissions at 1,981 tons from recorded aircraft movements at Houston International, Hobby, Ellington and other local/regional general aviation facilities.

v) Vessels

Emissions for this category were calculated by H-GAC at 1,165 tons. Data for the calculations were obtained by aerial photos of the Houston Ship Channel and by using U.S. Coast Guard records to determine ship types and emissions.

(d) Inventory Summaries

A summary of VOC emissions in Harris County for 1980 is contained in Appendix Z.

(2) Emission Reductions and Growth

Also included in the inventories in Appendix Z are estimates of the amount of emission reductions resulting from application of controls or other causes and of the amount of growth in non-permitted minor and area source emissions. Changes in area source emissions were based upon estimated population increases. Motor vehicle emissions include growth estimated from the projected increase in population and in per capita vehicle miles traveled (VMT). Changes in emissions from permitted new or

modified emitting facilities are not included in the 1987 emissions inventory estimates because increases resulting from new or modified emitting facilities are expected to be more than offset by reductions resulting from process or plant shutdowns and retirements.

(3) Required Emission Reductions

From the inventory emissions and growth data summarized in Appendix Z, and the percentage reduction requirement in Table 8, the emission reductions required to demonstrate attainment can be calculated. The estimated emission reductions requirement is 41.2% or 95,275 tons.

(4) Emissions Tracking

In order to demonstrate that reasonable further progress is being made toward attainment of the standard, the Clean Air Act requires that a comprehensive and accurate current inventory "be revised and resubmitted as frequently as may be necessary." A current inventory is also required to enable a determination to be made of the impact of any proposed new or modified major source.

The TACB will satisfy these requirements by a continuous update of the emissions inventory using source surveillance and permit data, as well as updated estimates of vehicle emission factors, VMT, and population. These emissions inventory updates will account for emission reductions resulting from process or plant shutdowns and retirements and emissions increases from new or modified emitting facilities.

The overall Harris County mobile emissions inventory will be monitored by H-GAC and reported annually to the TACB. H-GAC annual updates will involve use of data from SDHPT permanent traffic counters, traffic-count programs performed by the various municipalities with Harris County, the Harris County program and additional sampling as required. H-GAC will monitor Vanpool commitments by accessing the Metropolitan Transit Authority (MTA) data base and inventories maintained by H-GAC. The number of formally committed park-and-ride spaces will be inventoried annually by MTA, as will the number of committed peak-hour local bus assignments. Part of the H-GAC program is to evaluate the degree of success or failure of each implemented TCM. The procedures for monitoring are described in more detail in Section 175, Phase 2 Program, revised June, 1982. This information will be submitted to the TACB annually by H-GAC with the mobile emissions inventory.

b. Control Strategy

1) General

Volatile organic compound emissions reductions are required by EPA for areas which exceed the ozone standard. EPA has specified that states must use EKMA to determine how much VOC emissions must be reduced for 1982 SIP revisions.

By necessity, the EPA requirements and guidelines for use of models, development of appropriate control strategies, and implementation of programs and regulations designed to reduce VOC emissions are

designed to apply to an average or "typical" situation likely to be encountered in major U.S. urban areas. Harris County, however, is differentiated by several significant atypical features which were considered in the development of this plan. Specifically:

- Less than one-third of the total VOC emissions are generated by mobile sources.
- Unlike other urban areas, the ozone "problem" is a singular one in that the carbon monoxide standard has not been exceeded.
- Newer model year cars make up an unusually large percentage of the total vehicle fleet.
- There is a distinct distribution and concentration of mobile and major stationary source emissions within the adjacent CBD and ship channel areas.
- Because of the number and concentration of refining, petrochemical, and related industries, the composition of reactive VOC classes in the CBD and the ship channel are different. The relative importance of industrial VOC emissions make source emissions and the distribution of specific VOC compounds present in Harris County somewhat different than in typical cities where vehicle emissions clearly dominate.
- Texas has regulated existing industrial sources since 1972 with the result that by 1987 VOC emissions in Harris County will have been reduced by 306,000 tons per year or by 71% when compared to estimated 1972 emissions.
- Texas has regulated and conducted comprehensive new source review of such

sources since 1972 with the result that new VOC emissions have averages less than 1% over the last four years.

Application of EKMA following EPA guidelines while using specific data appropriate for the Houston area results in a VOC emission reduction requirement of 41.2%. This plan demonstrates how VOC emissions can be reduced in Harris County by 46.1% from the base year of 1980 to 1987.

2) Estimated Emission Reduction

Table 12 lists VOC emission reduction estimates for each of the control requirements discussed in Subsection VI.B.5.a: FMVCP, transportation control measures, inspection and maintenance programs and stationary source controls as adopted on March 30, 1979 and July 11, 1980 and as proposed with this plan. Growth estimates for both stationary and mobile sources have been included.

(3) New Source Review

In addition to the emission reductions to be effected by stationary source type controls and the FMVCP, the TACB strategy calls for the review of new emitting facilities in accordance with Section 173 of the FCAA, as reflected in TACB Regulation VI.

TACB Regulation VI requires that a demonstration be made that the expected increased emissions from any major new or modified emitting facility in a nonattainment area when combined with the emissions from other sources, be sufficiently less at the time of beginning of operation than at the time of the permit application so as to represent Reasonable Further Progress (RFP). Emissions reductions anticipated to result from process or plant shutdowns and retirements are estimated to more than offset

emissions increases from new or modified emitting facilities. Emissions offsets will be required in the event that additional controls are needed to prevent significant emissions increases from new or modified emitting facilities.

(4) Projection of Reasonable Further Progress

Table 13 lists the annual estimated VOC emissions for mobile and stationary sources in Harris County for the period 1980 through 1987. The total estimated VOC emissions and amount of VOC emissions that would represent a linear VOC emission reduction from 1980 to 1987 are also listed. The mobile emissions estimates include linear reductions resulting from transportation control measures and the vehicle parameter inspection and maintenance program beginning in 1981 and 1983, respectively. FMVCP reductions were calculated using MOBILE 2. Stationary source reductions were calculated by applying control efficiency factors to source emissions data contained in the inventory and assuming the compliance date to be the final compliance date for the applicable rule. Because the addition of required controls is a phased operation and RFP is calculated annually, it may be appropriate to reduce the estimated annual emissions by a percent of the required reductions prior to the final compliance date. Area source growth and reductions were calculated as described in paragraph VI.B.5.a.6)(1)(b). The reduction in tons accounted for by the difference between the estimated reductions from shutdowns and permitted increases is apportioned over the seven year period. Process modifications resulting in 2761 tons emission reduction have been taken into account in the 1982 and subsequent annual projections. Future emissions changes will be reported annually.

For each year except 1981, total VOC emissions in Harris County are estimated to be less than the amount of emissions that would be allowed if the required

Table 12

VOC Emissions Changes for Harris County Between 1980 and 1987

	VOC Reduction		VOC Increase		Net Emissions Change	
	Tons	%*	Tons	%*	Tons	%*
TACB Regulation V Controls Adopted 3/30/79	25,968	11.2				
TACB Regulation V Controls Adopted 7/11/80	9,636	4.2				
TACB Regulation V Controls Adopted 12/3/82	33,233	14.4				
Increased Use of Water-based Paints in Architectural Coatings	725	0.3				
Reduced Gasoline Sales	749	0.3				
+Process or Plant Shutdowns or Retirements	2,313	1.0				
Area and Minor Source Growth			2,132	0.9		
+Permits (Average 1978-1981)			2,255	1.0		
SUBTOTAL (STATIONARY)	72,624	31.4	4,387	1.9	68,237	29.5
Federal Motor Vehicle Control Program (& highway growth)	25,576	11.1				
Transportation Control Measures (Level 1 Commitment)	1,664	0.7				
Vehicle Inspection and Maintenance	12,863	5.5				
Non-highway Mobile Growth			1,705	0.7		
SUBTOTAL (MOBILE)	40,103	17.3	1,705	0.7	38,398	16.6
TOTAL	112,727	48.7	6,092	2.6	106,635	46.1

* Percent of 1980 Emissions Inventory (231,250 tons)

+ Not Itemized in Appendix Z

emissions reductions of 95,275 tons were accomplished as a linear decrease from the 1980 baseline emissions to 1987. No additional controls can be implemented at this time to accomplish additional emission reductions in 1981.

Table 13

1980-1987 Annual Harris County VOC
Emissions Estimates

<u>Date</u>	<u>Estimated VOC Emission in Tons</u>			<u>Amount of VOC Emissions Representing Linear Decrease</u>
	<u>Mobile Sources</u>	<u>Stationary Sources</u>	<u>Total</u>	
1980	67,098	164,152	231,250	231,250
1981	62,968	164,270	227,230	217,639
1982	58,840	126,004	184,844	204,029
1983	53,688	126,043	179,731	190,418
1984	46,729	125,625	172,354	176,807
1985	40,107	121,349	161,456	163,196
1986	34,161	108,942	143,103	149,586
1987	28,700	93,154	121,854	135,975

6. SOCIAL AND ECONOMIC CONSIDERATIONS OF THE PLAN

a. - d. (No Change)

e. Evaluation of the 1982 SIP for Harris County

Extensive analysis of impacts, especially economic and social, were performed during the development of the ozone control strategy for the 1982 SIP revisions for Harris County. All previous comments in this section remain applicable. The following four study reports, however, include additional characterization and quantification of the specific impacts of the alternatives considered for and of the final area, point, and mobile source control measures incorporated into the 1982 SIP plan.

- o "Assessment of the Feasibility and Costs of Controlling VOC Emissions from Stationary Sources in Harris County, Texas," Radian Corporation, September 1981.
- o "Estimation of the Amounts and Costs of VOC Emission Reductions Attained or Potentially Attainable from the

Control of Stationary Sources in Harris County,"
Radian Corporation, March 1982.

- o "An Analysis of Air Quality Transportation Control Measures for Harris County," Houston-Galveston Area Council, July 1981.
- o "Program to Control Motor Vehicle Emissions in the State of Texas," TACB, November 1980, with technical support documentation in "Technical Support Document on the Harris County Pilot Vehicle Emission Testing Program and Study," Radian Corporation, November 1980.

7. FISCAL AND MANPOWER RESOURCES

In compliance with the Clean Air Act [Section 110(a)(2)(F)(i)], the financial and manpower resources available to the state and local air pollution control agencies are described in another section of the plan. The necessary resources needed to carry out the provisions of this plan are available for the current (1983) fiscal year. The availability of the resources necessary for later fiscal years is dependent upon the appropriation actions of the Texas Legislature and local governments.

8. HEARING REQUIREMENTS

a. - c. (No Change)

d. Public Hearings for 1982 SIP Revisions

1) Location, Date, Time (work hour and evening session held)

Austin	July 12	7:00 PM
Houston	July 13	3:00 PM & 7:00 PM

2) Attendance & Participation

		Oral	Written
<u>City</u>	<u>Attendance</u>	<u>Presentations</u>	<u>Presentations</u>
Austin	14	2	2
Houston	108	13	14
TOTAL	122	15	15

Additional written statements mailed to Austin...23

Total written statements.....39

All written and oral testimony are on file at the Texas Air Control Board in Austin.