SECTION VI

CONTROL STRATEGY

SECTION VI - CONTROL STRATEGY

A. Particulates (Example Region)

1. The control strategy is based upon applying Regulation I (Section XIV) to existing point sources (and area sources where applicable) by use of the Air Quality Display Model (AQDM) referenced in Paragraph 420.13 (e) (3) (i), Federal Register 36, Volume No. 158 dated August 14, 1971. This was accomplished by Radian Corporation under contract to the Texas Air Control Board. Inventory data input on a county by county basis and emissions resulting from application of Regulation I are contained in Appendix A.

2. The isopleths produced (Figure 1) by the AQDM indicate an existing particulate concentration of 92 $\mu g/M^3$ annual geometric mean (AGM). Through a contractor error the original AQDM printout was on an annual arithmetic mean (AAM) rather than the required AGM. Figures 1 and 2 have been corrected to an AGM. The controlled isopleths (Figure 2) reflect a 55 $\mu g/M^3$ air quality. All sources will be in compliance by December, 1973 (see Compliance Schedule Section VII) thus attaining the selected air quality standard. A background concentration of 25 $\mu g/M^3$ was utilized. Matagorda county air quality was selected as representative of background as it contains only minor sources of man produced particulates (see Appendix A).

3. To determine if the standard could be maintained a study was conducted to ascertain the growth of particulate sources in the Example Region (Lace Engineering study available in Austin office). The study shows an annual anticipated increase of 5.3% in particulate sources. Each of these sources will require permits to construct and operate (The Permit System, Section X). The permit system will require proven "state of the art" control or conservatively 95%. A net annual increase therefore of 0.265% will result. It is estimated that the air quality by 1977 will be 55.74 $\mu g/M^3$.

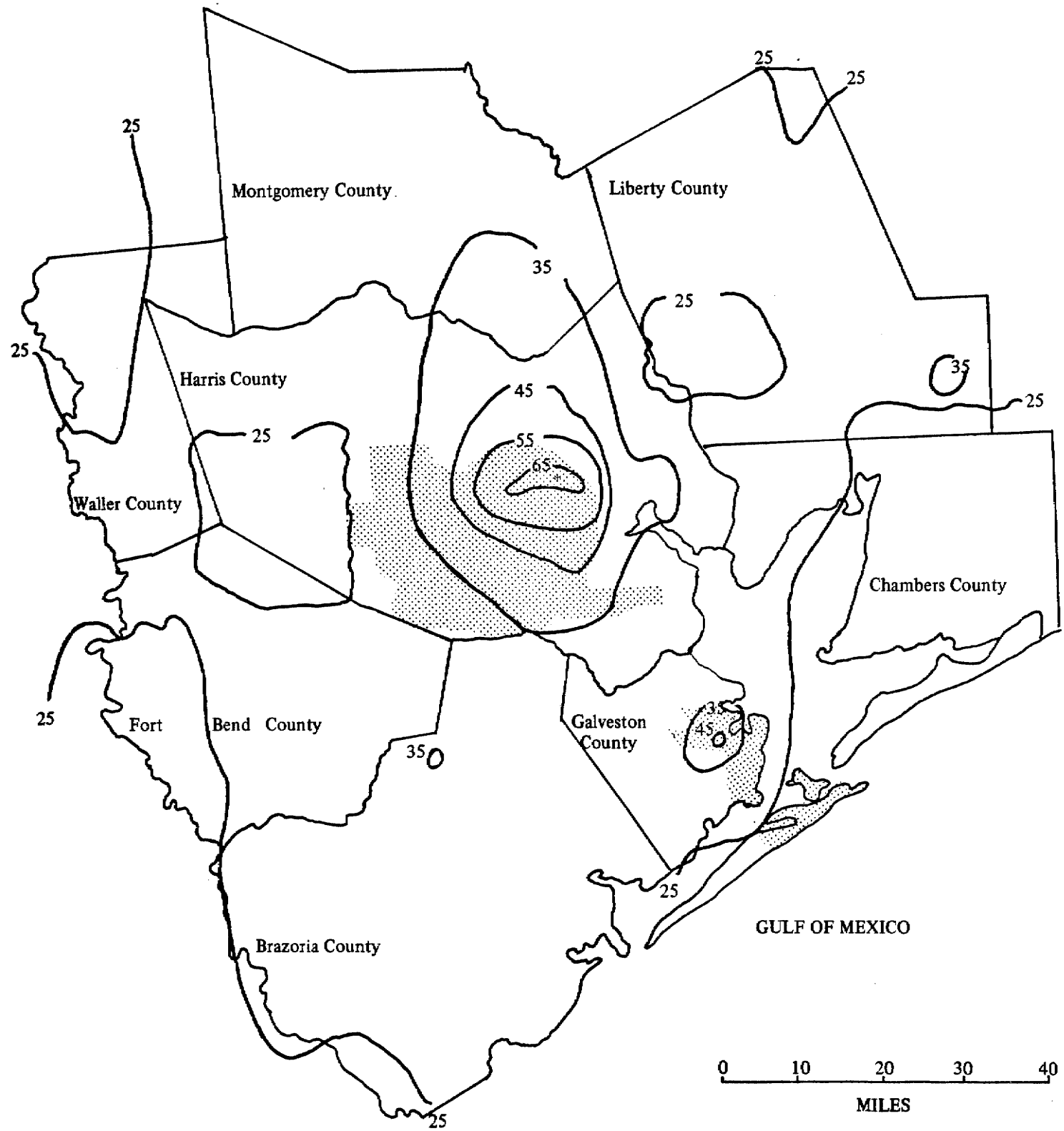
   COMPUTATIONS:

   5 years growth at 0.265%/year = 1.325%

   AQ at end of 1973 = 55 $\mu g/M^3$

   X = AQ 1975

   X = 55/1.0000 - 0.01325 = 55.74 $\mu g/M^3$

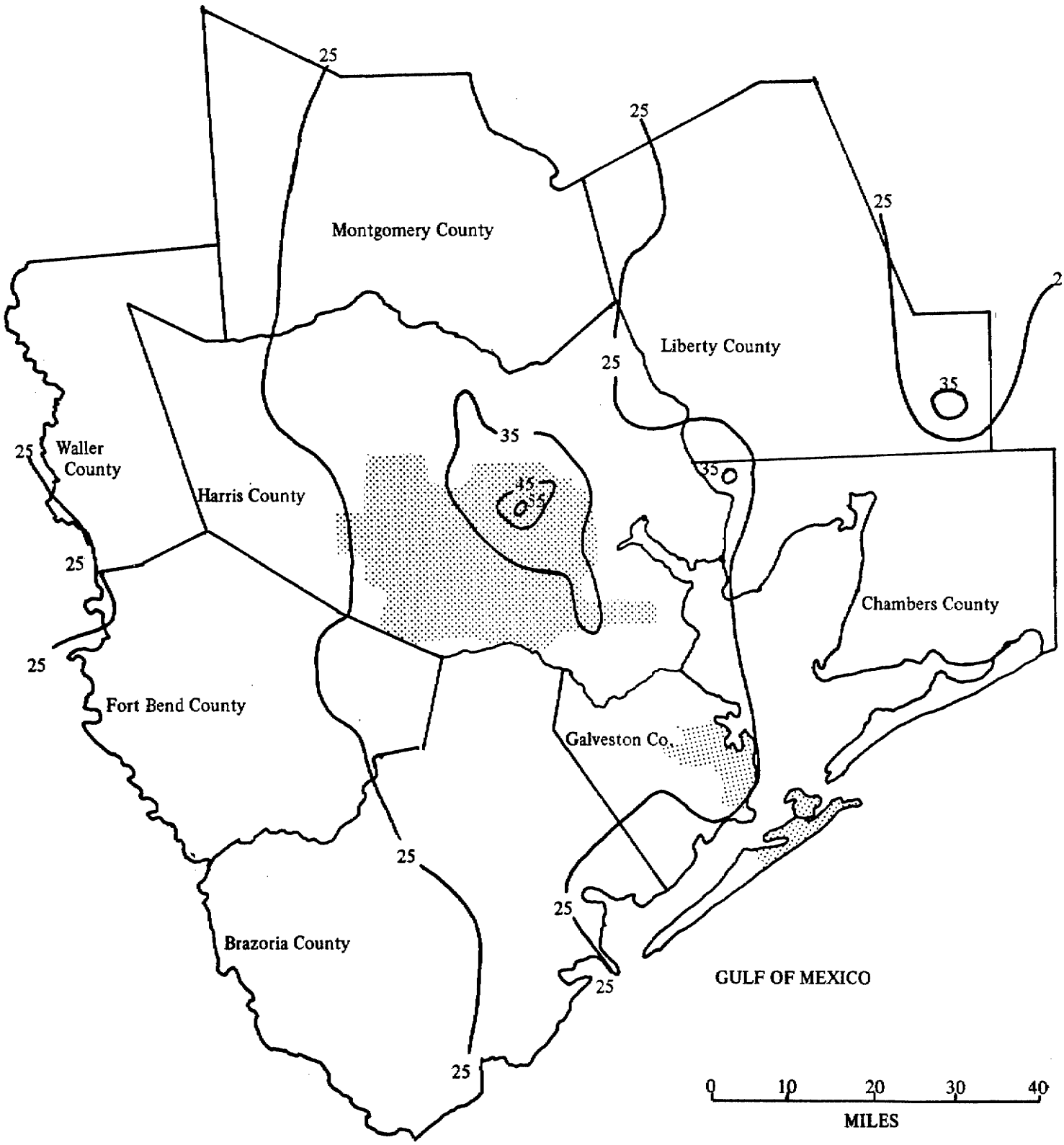


AQDM PARTICULATE CONCENTRATION – EXISTING ($\mu g/m^3$ AGM)

EXAMPLE REGION

* Because of space limitations isopleths of concentrations greater than 65 $\mu g/m^3$ were omitted in Central Houston. Maximum concentration was 92 $\mu g/m^3$.

FIGURE ONE



AQDM PARTICULATE CONCENTRATION – CONTROLLED ($\mu g/m^3$ AGM)

EXAMPLE REGION

FIGURE TWO

B. Sulfur Dioxide (SO_2) - Example Region

1. Air quality for Region 7 was estimated to be 70 $\mu g/M^3$ using the Miller-Holzworth model (Appendix A, Federal Register 158) and existing inventory data (Appendix A). Detailed computations are available for review in the Austin office. Attainment of an air quality standard of 60 $\mu g/M^3$ (National Secondary) was considered feasible. A reduction of 14.3% in inventory emissions is necessary to meet the standard $\frac{70-60}{70}$ 100 = 14.3%

2. Regulation II was applied to the major sources (62) (of these the first 20 account for 99.73% of the total emissions) with a resultant reduction of 55,700 tons per year (TPY). Table I contains inventory details. Total inventory emissions (point and area, Appendix B) show a total SO_2 emission of 176318 TPY. Therefore, the control results in 31.5% reduction indicating the adequacy of the regulation to attain the National Secondary AQS of 60 $\mu g/M^3$ AAM by 1973 (the compliance date for Regulation II for all sources). Air quality attained by 1973 will be 48 $\mu g/M^3$.

3. The Lace Engineering study referred to under VI, A, 3 above predicted a 7.4% annual growth in SO_2 sources. The sources will be controlled to "state of the art" by application of the Permit System (Section X). Controls imposed are estimated to be 95% effective resulting in a net increase in emissions for new sources of 0.37% annually. The estimated air quality by 1977 will be 49.0 $\mu g/M^3$.

   COMPUTATIONS:

   5 years growth at 0.37%/year = 1.85%

   AQ at end of 1973 = 48 $\mu g/M^3$

   X = AQ 1975

   X = 48/1.000 - 0.0185 = 49.0 $\mu g/M^3$

4. Following a detailed analysis of the final compilation of the emissions inventory data it was considered appropriate to develop a separate strategy for Region 11. The atmospheric load of SO_2 is slightly greater than that of the Example Region. Further, the source category is sufficiently different from those in Region 7 that an alternate strategy could be developed to provide a more comprehensive plan.

   a. The National Secondary Standard of 1300 $\mu g/M^3$ (3 hour average) was used as the basis for strategy development as most of the available hard data was readily convertible to the three hour standard.

b. A 1900 $\mu g/M^3$ 3 hour average (0.9 ppm-1 hour converted to $\mu g/M^3$ - 3 hour) was selected as the highest representative concentration of the existing air quality. A 31.3% reduction is required to attain the selected standard ($\frac{1900-1300}{1900} = .315$).

c. The emissions inventory indicates that 98% of the SO_2 is from a single source although emitted from several stacks. A sulphuric acid plant scheduled for completion by December 1972 will reduce the affected stack emissions by 57%. Since the copper stack emissions (the stack of concern) account for 75% of the total there will be an overall reduction of 43%. This is adequated to attain the selected AQS.

NOTE: The Following is provided as additional information to the above strategy:

American Smelting and Refining Company at El Paso, Texas utilizes a method of curtailment of emissions involving a prediction of possible violation supplemented by hard data acquisition from 18 SO_2 monitoring sites at various points and at varying distances from the smelter. The entire system is computerized. Curtailment actions are initiated when the integrated system predicts a probable excursion in excess of the 0.5 parts per million SO_2 hourly emission limit established in the variance granted to the company by the Texas Air Control Board.

The prediction technique is based upon meteorological information from various sources. Wind and temperature sensors are located throughout the plant area. By utilizing information furnished by the National Weather Service, facsimile maps, weather maps and other data from Albuquerque and El Paso International Airport, ASARCO meteorologists can determine inversion breakup temperature and time, along with wind and other meteorological conditions. Once the temperature, wind speed, and wind direction is forecast, clearing time (which is the time it takes for a reference release of a specific amount of SO_2 at the stack to clear the area) can be calculated. Converters, normally the major source of emissions at the plant, are curtailed first. Breakup time minus clearing time equals curtailment time. Full curtailment does not normally occur everyday. Since the forecasting technique is not 100% reliable, it is supplemented by the hard data telemetered to a central console. The central console is manned full time (24 hours a day) by a meteorologist. When the meteorologist on duty determines that a potential for violation exists and that curtailment action must be taken, he activates an alarm to the converter department. The supervisor in charge of that department takes immediate action to shut down the converters. There is no lag time between the initiation of the abatement program and the shutdown of the converters. All supervisory personnel have been directed to react immediately

to decisions of the console operator. Once curtailment action has been effected, the plant can return to normal operation only after the person who determined that the units must curtail decides that they come back on line.

C. Set II Parameters

1. Carbon Monoxide (CO)
   a. The final results of the summer study (Jul-Sep) for CO revealed that Region 11 (El Paso) must be classified Priority I as the 8 hour maximum was 17.4 mg/M^3 (Priority I cut off is 14 mg/M^3 8 hour maximum).

   b. A reduction of 42% in total emissions is necessary to meet the national standard of 10 mg/M^3 $(\frac{17.4 - 10}{17.4} 100 = 42)$. Federal controls on motor vehicles will reduce the overall atmospheric burden by 16.3% by 1975. Application of the CO provision of Regulation V will control the remaining emission to an 85% level. An overall reduction by 1975 of 43.8% is anticipated. The calculated air quality in 1975 is 9.8 m/M^3. These data are summarized in Table 2.

   c. The vehicle inspection system discussed elsewhere in this Plan and the Permit System (Section X) will enable the State to maintain the air quality once attained, although the precise quantative contribution of each system to such maintenance can not be calculated at this time.

2. Photochemical Oxidants and Hydrocarbons (OX/HC)
   a. General: The Regions listed in Column 1 of Table 3 are classified Priority I as a result of the July/September 1971 sampling study conducted jointly by EPA/APCO and the State. While the data is meager and spans a relatively short period of time, it is the only data available to the State obtained by the measurement method imposed by the Federal Register 158, paragraph 420.14 (e) (1). It must, therefore, be used to develop control strategy. Paragraph 420.14 (b) forces the State to adopt "other measures" to reduce emissions as Federal controls on vehicles are inadequate to attain the national standard. "Other measures" will be inspection and/or testing depending upon the legislation obtained (see Section V).

   b. Control strategy
      (1) Table 3 summarizes the reduction in emissions expected from motor vehicle controls, Regulation V, and the proposed vehicle inspection program (see Section V for timetable).

(2) Regions 7 and 9 (Houston and San Antonio respectively) require a two year extension to take maximum advantage of Federal controls on motor vehicles. This request is contained in the cover letter to the Plan. Corpus Christi (Region 5) is a special case. Footnote 5 of Table 3 comments briefly on the controls necessary to attain the nation standard for OX/HC.

(3) Column 7 of the summary is based upon a consultant's study of growth of HC sources in the appropriate Regions. Figures contained in the column reflect the net increase in stationary source emissions through 1977. New sources will be controlled through application of the Permit System. Existing sources will be in compliance by 1973. Since the increases were based upon expect population and industrial growth, the provision of paragraph 420.12 (a) Federal Register 158 should be satisfied. It has been assumed that the normalized controls for vehicles used to determine reduction from Federally imposed controls contains a growth factor; consequently an additional factor has not been included in the calculations.

(4) The strategy outlined will definitely attain the national standard in the time frame listed. The Permit System will assist in maintenance so far as stationary sources are concerned. However, in the case of mobile sources (all transportation emissions listed in Part III of the emissions inventory summary - Appendix A) the State recognizes that alteration of traffic patterns may be necessary in those urban areas where such sources are the major contributor of HC. The Air Pollution Control Services is taking the initiative to confer with State and local planners to determine long range feasible courses of action. Details of progress will be reported in the first semi-annual report.

3. Oxides of Nitrogen

a. Regions 5 and 8 (Corpus Christi and Dallas/Fort Worth) are classified Priority I based on the summer study. Region 7 (Houston) exceeded the national standard of $100\mu g/M^3$ AAM.

b. Table four summarizes the information available. Control strategy will be developed when Regulation VII is quantified.

TABLE ONE

LISTING OF REGION 7 POINT SOURCES DECENDING ORDER WITHIN COUNTY

SLUPHUR DIOXIDE

	Rank	I. D. Number	(Tons/Yr.) Sulphur Dioxide	Allowable SO_2 Emissions From Regulations Tons/Yr.
Brazoria Co.	10	PHI 086	4421	1853
	12	DOW 004	1654	1654
	16	MON 056	404	375
	20	DOW 002	236	76
	24	STA 238	40	
	51	HUM 030	0.5	
	52	PAN 036	0.4	
		TOTAL	6755.9	3958
Chambers Co.	43	WAR 042	1	
		TOTAL	1	
Ft. Bend Co.	28	PP 004	20	
	42	JEF 012	1	
		TOTAL	21	
Galveston Co.	1	AME 130	37967	21649
	6	UNI 028	12384	5843
	13	AMO 002	1140	770
	15	MAR 002	492	492

	Rank	I. D. Number	(Tons/Yr.) Sulphur Dioxide	Allowable SO_2 Emissions From Regulations Tons/Yr
Galveston Co. Con't.	17	GUL 010	380	380
	19	TEX 176	336	336
	21	BOR 004	122	
	23	MON 052	50	
	26	PP 005	26	
	34	MIN 008	3	
		TOTAL	52900	29470
Harris Co.	2	HUM 032	36007	22324
	3	STA 230	16520	14827
	4	DU 002	15141	7665
	5	SHE 032	14598	11580
	7	STA 232	10783	8936
	8	PEN 020	6530	4613
	9	SHE 020	6460	6460
	11	ATL 018	2523	3001
	18	HUB 038	376	376
	22	HNG 022	75	
	25	MER 034	28	
	27	ANH 002	20	
	29	PP 006	13	
	32	WAN 006	7	

	Rank	I. D. Number	(Tons/Yr.) Sulphur Dioxide	Allowable SO_2 Emissions From Regulations Tons/Yr.
rris Co. Con't.	33	ROH 002	7	
	37	PP 002	3	
	39	USI 008	2	
	41	CRO 066	2	
	45	ELE 034	1	
	46	HOU 116	1	
	47	GUL 078	1	
	49	TEN 012	0.6	
	50	GUL 040	0.6	
	53	PP 001	0.4	
	54	UNC 002	0.3	
	55	UNI 180	0.2	
	57	UNI 012	0.2	
	58	HOU 124	0.1	
	59	RIV 020	0.1	
	60	PP 003	0.04	
	62	PEP 002	0.02	
		TOTAL	109100.56	79782
berty Co.	35	LIB 010	3	
	38	WIL 096	3	

	Rank	I. D. Number	(Tons/Yr.) Sulphur Dioxide	Allowable SO_2 Emissions From Regulations Tons/Y
Liberty Co. Con't.	44	TEX 290	1	
	48	WIL 072	0.7	
		TOTAL	7.7	
Montgomery Co.	14	COL 112	604	503
	30	GRO 008	10	
	31	BRA 002	8	
	36	GRI 016	3	
	40	SUP 034	2	
	56	WIL 150	0.2	
	61	CUR 006	0.03	
		TOTAL	627.23	503

Of the sixty-two companies listed above, the companies ranked 1 - 20 account for 99.73% of the total emissions in Region 7.

EMISSIONS: Point = 169413.39 Area = 6905

TOTAL 176318 TPY

Allowable Point Source (Regulation II) = 113713

$$\text{Overall Control (\%)} = \frac{176318 - (113713 + 6905)}{176318}(100) = 31.5$$

CONTROL STRATEGY
CARBON MONOXIDE

REGION	8 hr. max. July-Sept. Study mg/M^3	Reduction to attain 10 mg/M^3 %	F*	Overall reduction Federal Controls % 1971-75 **	Reg. V Control Reduction % 1971-75	Total reduction %	Estimated Air Quality 1975 mg/M^3
El Paso Region 11	17.4	42.0	.675	16.3	27.5	43.8	9.8

* Ratio of vehicle emissions total

** Calculated in accordance with Appendix I FR 158

TABLE THREE

SUMMARY OF OX/HC CONTROL STRATEGY

PRIORITY I REGIONS

REGION	(1) PHOTOCHEMICAL OXIDANT HOURLY AV. $\mu g/M^3$ (PPM)	HC REDUCTION TO ATTAIN 160 $\mu g/M^3$ AQS %	(2) F 1971-75 / 1975-77	OVERALL REDUCTION DUE TO FED. CONTROLS ON VEHICLES %	REG. V REDUCTION %	INCREASE IN HC NOT AFFECTED BY REG. V (3) %	NET REDUCTION %	VEHICLE INSPECTION REDUCTION(4) OVERALL %	TOTAL REDUCTION %	COMMENTS
Austin-Waco 3	218 (0.109)	25	.788	24.8	0.114	1.54	23.5	15.8	39.3	Will meet national standard by 1975 with vehicle inspection.
			.706	16.7	0	1.34	15.6		54.9	
Corpus Christi 5	368 (0.184)	62	.284	9	21.8	1.36	29.4	5.7	35.1	Footnote (5)
			.276	6.3	0	3.02	3.3		38.4	
Houston 7	300 (0.15)	50	.512	16	15.3	.85	30.5	10.2	40.7	Will meet national standard by 1977.
			.505	11	0	2.03	9.0		49.7	
Dallas Fort Worth 8	250 (0.125)	35	.794	25.1	1.4	1.66	24.8	15.9	40.7	Will meet national standard by 1975.
			.732	17.0	0	1.15	16.0		56.7	
San Antonio 9	290 (0.145)	46.6	.767	24	.701	1.6	23.1	15.3	38.4	Will meet national standard by 1977.
			.686	16.3	0	1.4	14.9		53.3	
El Paso 11	240 (0.12)	33.0	.826	26.0	2.35	1.33	27.0	16.5	43.5	Will meet national standard by 1975.
			.776	17.5	0	1.02	16.5		60.0	

(1) Figure used is the second highest valid value recorded during the Jul-Sep study. The standard can be exceeded once annually. The highest value recorded was taken as the annual excursion and strategy based upon the second highest.

(2) Ratio of motor vehicle emissions to total.

(3) "Growth Factor" as defined in Appendix I, Federal Register 158.

(4) The reduction calculated is based upon an anticipated 20% reduction in current HC emissions from vehicles by imposing the 5 point inspection program listed below. These data are based upon tests conducted by the Atlantic Richfield Clean Air Caravan on 75,000 vehicles in a nationwide survey. The technical paper was presented at the October 1971 meeting of the Society of Automotive Engineers and is available in the Austin office. Supplementary information was obtained from Mr. Bob Gower, The Harvey Technical Center, 400 East Sibley Blvd., Harvey, Illinois 60426. It has been assumed that the inspection program will be fully operational in the urban areas listed by June 1975. The inspection program consists of the following five points:

a.	Check plugs	Clean and gap according to manufacturers specifications
b.	Check distributor	Replace points, condensor. Gap according to manufacturers specifications
c.	Check timing	Adjust according to manufacturers specifications
d.	Check PCV	Correct if plugged or restricted
e.	Check air filter	Correct if plugged or restricted

(5) To meet the 160 $\mu g/M^3$ standard by 1975, HC emissions will have to be reduced an additional 26.9%. This can be achieved by reducing all HC sources included in the Process Loss (Section II, Appendix A, Draft Plan) by 82%.

TABLE FOUR

OXIDES OF NITROGEN

REGION	AAM JULY-SEP. STUDY $\mu g/M^3$	REDUCTION REQUIRED TO ATTAIN 100 $\mu g/M^3$ %	CONTRIBUTION BY SOURCE CATEGORY - %				OVERALL REDUCTION FEDERAL CONTROLS ON VEHICLES - %
			MOTOR VEHICLES	POWER PLANTS	PROCESS LOSS	OTHER	
5 CORPUS CHRISTI	117	14.5	14	4.7	71	10.3	1971-75 -1.1 1975-77 4
7 HOUSTON	103	3	46	13.5	34.5	6	1971-75 2 1975-77 9
8 DALLAS/ FT. WORTH	126	20.6	72	11.7	5.6	10.7	1971-75 6 1975-77 14