SECTION VI

CONTROL STRATEGY

SECTION VI - CONTROL STRATEGY

A. Particulates (Example Region)

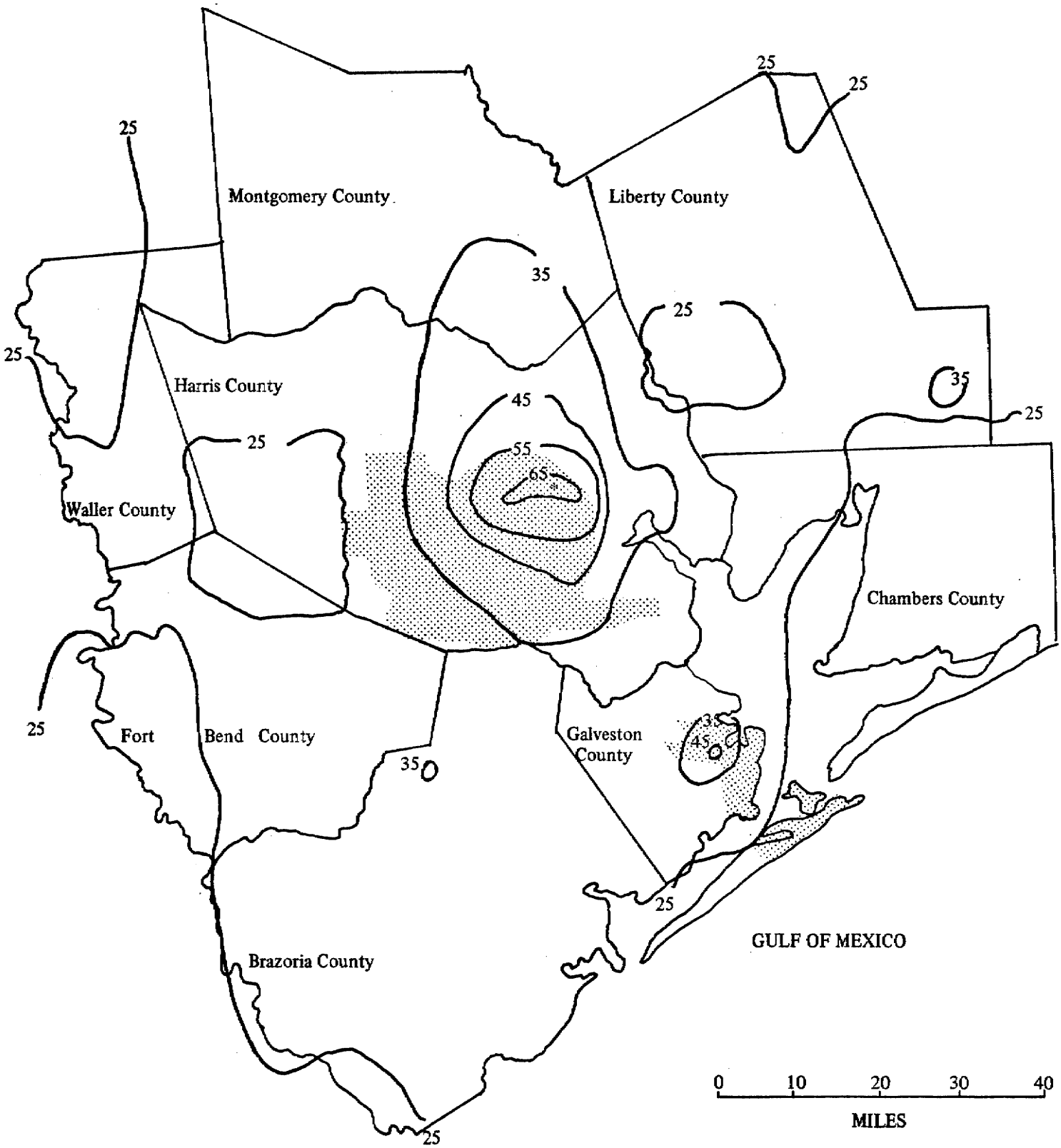
1. The control strategy is based upon applying Regulation I (Section XIV) to existing point sources (and area sources where applicable) by use of the Air Quality Display Model (AQDM) referenced in Paragraph 51.13(e)(3)(i), Federal Register 36, Volume No. 228 dated November 25, 1971. This was accomplished 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 of the Implementation Plan dated January 28, 1972.

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 are programmed to be in compliance by December, 1973 (see Compliance Schedule, Section VII) thus giving some lead time to reach the selected air quality standard by 1975. 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.

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 by 1975
X = 55/1.0000 - 0.01325	=	55.74 $\mu g/m^3$



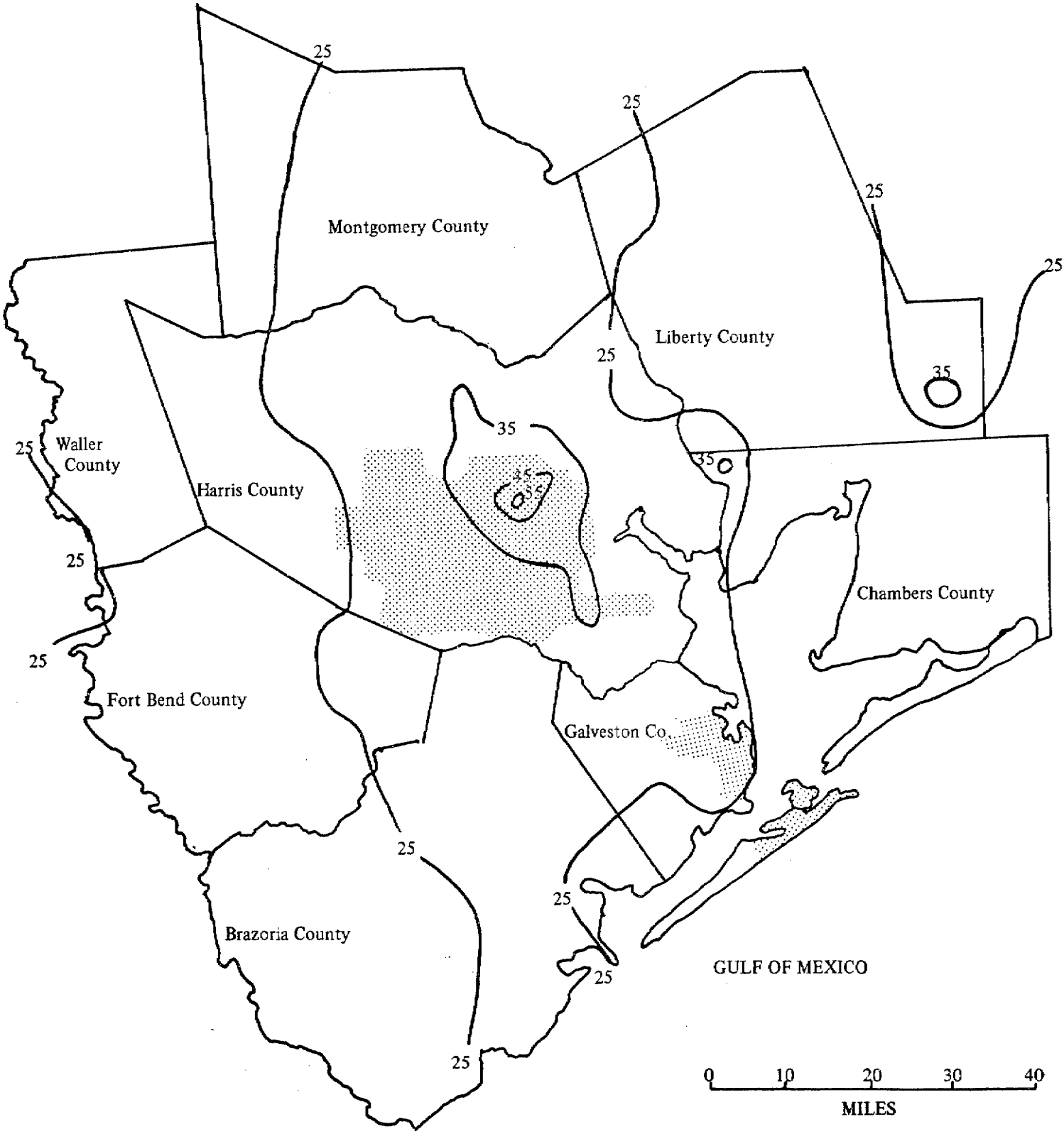
AQDM PARTICULATE CONCENTRATION – EXISTING ($\mu g/m^3$ AGM)

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

2-15-73



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

EXAMPLE REGION

FIGURE TWO

2-15-73

B. Sulfur Dioxide (SO_2)

1. Example Region

a. Air quality for Region 7 was estimated to be 70 ug/m^3 using the Miller-Holzworth model (Appendix A, Federal Register 228) and existing inventory data (Appendix A, 1969 Data). Detailed computations are available for review in the Austin office. Attainment of an air quality standard of 60 ug/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%

b. Regulation II was applied to the major sources (62) (of these the first 20 account for 99.7% of the total emissions, 1969 data) with a resultant reduction of 55,700 tons per year (TPY). Table One contains inventory details. Total inventory emissions (point and area, Appendix A of 1969 data) 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 ug/m^3 AAM. (The compliance date for Regulation II for all sources is December, 1973. This will provide some lead time for an attainment date of 1975.) Air quality attained is estimated to be 48 ug/m^3.

c. The Lace Engineering study referred to under paragraph 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 ug/m^3.

COMPUTATIONS:

5 years growth at 0.37%/year	=	1.85%
AQ at end of 1973	=	48 ug/m^3
X	=	AQ 1975
X - 48/1.000 - 0.0185	=	49.0 ug/m^3

2. Region 11 - El Paso

A separate SO_2 control strategy for Region 11 is required because of the special combination of a large SO_2 source and the unique terrain factors which do not exist in other industrialized areas of Texas. The principal SO_2 emission source in Region 11 is from the American Smelting and Refining Company (ASARCO) in El Paso which operates a large nonferrous smelter producing primary

lead, copper, and zinc. The emission of SO_2 from this plant is about 94 percent of the Region 11 total. Nearby sources in Mexico and New Mexico, although not in the boundaries of Region 11, were included in the emission inventory listing. The following control strategy affects a major reduction of ASARCO emissions and accomplishes attainment and maintenance of the Federal Primary and Secondary SO_2 Ambient Air Quality Standards in Region 11.

a. The achievement of SO_2 National ambient air quality standards in Region 11 results with the implementation of Texas Air Control Regulation II, Control of Air Pollution from Sulfur Compounds, effective March 5, 1975. Ambient air data for 1973 and the estimate of ambient air levels for 1979 are given in Table Four. Table Five shows the reported emissions expected when ASARCO complies with the March 5, 1975 Regulation II. The overall Region 11 emission reduction is approximately 73 percent, as the result of a 79 percent reduction in the ASARCO plant emissions. It was assumed that the air quality improvement is in linear proportion to the emission reduction. Thus, a 73 percent reduction of the 1973 highest ambient 24 hour reading of 0.14 and of the 3 hour reading of 0.47 gives the 1979 estimates of 0.04 and 0.13 respectively as reflected in Table Four.

b. In order to provide additional ambient air data, Table Six is included to show data obtained from ASARCO. The Texas Air Control Board cannot verify the ASARCO data; however, it is useful to confirm the TACB data. It may be observed that the order of magnitude of the two sets of data are similar in that there are very few data points that are in excess of the primary and secondary SO_2 ambient air standards. It should be noted that both the emission data and the ambient data for 1973 reflect the effects of the Intermittent Control System that has been applied by ASARCO for several years. Since all available ambient air quality data reveals only a small variance from the Federal Standards, the substantial emission reduction obtained by Regulation II will be adequate to attain and maintain the SO_2 national ambient air quality standard.

c. The restrictions on emissions in paragraph 201.16 of Regulation II are in terms of concentration limits rather than rate-of-flow limits. With the ASARCO facility operating under the design conditions outlined in permits issued for construction in accordance with Regulation VI, the rate-of-flow in lbs/hr in 1979 has been calculated and is as shown in Table Five. These calculations are based on ASARCO operating at maximum design capacity. The rate-of-flow is the maximum that would be allowed at the ASARCO plant under Regulation II. Any change due to a new source, modification of an existing process, or change in method of operation would require ASARCO to submit in accordance with Regulation VI an application for permit to construct and/or operate. As outlined in other control strategies, the Permit System (Regulation VI) described in Section X, in conjunction with the other Regulations will enable the State to attain and maintain the national

ambient air quality standards in Region 11. Other Texas Air Control Board functions which will support evaluation of SO_2 ambient standards are (1) the Air Quality Surveillance Network as described in Section IX, (2) emission reporting and source surveillance as outlined in Section XI, and (3) dispersion modeling studies supported by adequate meteorological data.

d. Of necessity, several assumptions were made in the development of the SO_2 control strategy for Region 11. These assumptions are detailed in Table Seven. Each assumption is annotated with a brief statement of the rationale for support of the assumption. It is important to recognize that these assumptions reflect conditions to support the achievement and maintenance of air quality standards. As additional information concerning ambient air readings and emission inventories becomes available accompanied by the availability of weather data in the ASARCO area, a validated dispersion model may be developed to further support the validity of the control strategy. With a validated model further study will enable refinement of assumptions and requirements for maintaining ambient air quality standards. Supporting data, studies, and detailed calculations are available from the Texas Air Control Board's central office, 8520 Shoal Creek Blvd., Austin, Texas 78758.

C. Set II Parameters

1. Carbon Monoxide (CO)

In accordance with the revision of the priority classification (see Section II) from I to III in Region 11, there is no control strategy required for carbon monoxide since all regions meet the national ambient air secondary standards for carbon monoxide.

2. Photochemical Oxidants and Reactive Carbon Compounds

The results of a revision of the Texas Control Strategy for Oxidant/Hydrocarbon reductions are summarized in Table Three. The study evaluated the reductions in hydrocarbon (carbon compound) emissions that will be realized (as a result of compliance with Regulation IV, V and VI) in the seven Texas Air Control Regions now classified Priority I.

The data tabulated in Table Three indicates that the required reductions are achieved in the ten counties of concern within the seven Priority I Regions and, as a result, the reductions required to achieve ambient air quality standards are obtained by 1975 in all seven Regions. The data tabulated in Appendix C indicate that the standards will not be maintained in Region 7 and Region 10 after 1985. Therefore, additional industrial growth after 1985 will not be permitted if the projected trends in growth are realized. This will be facilitated through the implementation of Regulation VI.

The required reduction was determined from the second high measured ozone value in each case. A reactive carbon compound control strategy is employed and an oxidant non-methane hydrocarbon relationship was formulated using the publication Air Quality Criteria for Nitrogen Oxides (AP-84) as the basis. Although the set of data in the report AP-84 is used, it is most likely too severe because of the different meterological conditions existing along the Gulf Coast as compared with the cities studied in the Report.

Compliance with Regulation IV, V and VI which apply to motor vehicles, volatile carbon compound emissions from point sources, and emissions from permit units, respectively, result in the high reductions required to achieve the standard. Regulation VI results in an emission of 0.43 gms/mile of hydrocarbons for the 1975 model as compared with 12.6 gms/mile for the pre-controlled 1967 model, a reduction of 97%. Most of the point sources along the Gulf Coast are within refineries and chemical plants. Compliance with Regulation V results in a reduction of 91% for the years 1975 through 1977 for the refineries, while chemical plant reductions are 79% and 86% for these years because of the different compliance dates in revised Regulation V. New and modified sources require construction permits and must employ the latest control technology; therefore, emissions associated with industrial growth will be at least 90% less than emissions that would result from uncontrolled industrial expansion.

Growth factors for automobiles were taken from the Texas Highway Department's projections for vehicle miles traveled. Growth rates for all other sources were taken from the Standard Metropolitan Statistical Areas report.

A county by county model was employed rather than a Regional Model. The carbon compound emission inventory in the base year and projections for the counties and the Regions are reflected in Appendix C.

Other supporting data and details of the calculations procedures employed are documented and available in a report available from the Texas Air Control Board, entitled Hydrocarbon Control Strategies.

3. Oxides of Nitrogen

The Federal Register Volume 39, Number 90, dated May 8, 1974 revised the priority classification from I to III for Regions 5, 7 and 8. In accordance with this revision there is no control strategy required for oxides of nitrogen since all regions meet the national secondary standards for nitrogen dioxide.

TABLE ONE

LISTING OF REGION 7 POINT SOURCES DECENDING ORDER WITHIN COUNTY

SULPHUR 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.
Harris 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
Liberty Co.	35	LIB 010	3	
	38	WIL 096	3	

	Rank	I. D. Number	(Tons/Yr.) Sulphur Dioxide	Allowable SO_2 Emissions From Regulations Tons/Yr.
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

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

TABLE TWO
CONTROL STRATEGY
CARBON MONOXIDE
(DELETED)

TABLE THREE

PRESENT HYDROCARBON AND PROJECTED REDUCTIONS BY PRIORITY I REGIONS

COUNTY	MEASURED AMBIENT OZONE LEVEL $\mu g/m^3$ (PPM)	% HC RE-*** DUCTION TO ATTAIN NATIONAL STANDARD OF 160 $\mu g/m^3$	CONTRIBUTION TO TOTAL HC FROM GASOLINE VEHICLES			REDUCTIONS BY 1975/1977			
			1971	1975	1977	FROM FEDERAL CONTROLS ON GASOLINE VEHICLES	FROM STATIONARY SOURCE CONTROLS	OTHER TRANSPORTATION	TOTAL REDUCTION
TRAVIS	218 (.109)	18	71.0	65.9	59.9	27.0 / 39.0	3.7 / 4.8	2.5 / 3.6	33 / 46
NUECES	368(.184)	62	7.8	18.7	16.3	3.4 / 4.7	71.5 / 74.4	1.6 / 2.1	77 / 81
HARRIS	630(.315)	75 *	13.1	34.8	32.3	3.9 / 6.4	70.0 / 72.6	-0.1 / 0.2	74 # / 79
GALVESTON	440(.220)	64 *	5.0	17.9	16.7	1.4 / 2.3	78.8 / 82.0	0.0 / 0.0	80 / 84
BRAZORIA	530(.265)	70 *	16.1	37.2	35.6	5.3 / 8.1	65.8 / 69.8	-0.1 / -0.3	71 / 78
DALLAS	250(.125)	24	69.5	65.9	63.0	23.0 / 34.3	7.1 / 7.5	-0.8 / 2.3	29 / 44
BEXAR	290(.145)	40	64.4	62.4	55.7	25.4 / 36.3	8.9 / 9.1	3.2 / 4.2	40** / 50
JEFFERSON	682(.341)	77 *	3.0	10.5	9.2	1.1 / 1.7	80.8 / 84.0	0.0 / 0.0	82 / 86
ORANGE	430(.215)	63 *	12.0	25.7	24.2	4.4 / 6.7	66.1 / 71.5	0.0 / 0.0	71 / 78
EL PASO	240(.120)	25	52.8	63.5	56.9	18.3 / 27.1	25.8 / 25.5	1.7 / 2.2	46 / 55

* Straight percentage rollback

**Includes 2% reduction from traffic flow improvements

***This calculated reduction results from single measurement values of oxidant level

\# 74% reduction obtained is equivalent to 75% reduction required within the accuracy of the data

TABLE FOUR

REGION 11 SO_2 DATA

TEXAS AIR CONTROL BOARD STATIONS

Station	Type	Sample Period For 1973	SO_2 PPM Averages			
			24 Hr. High		3 Hr. High	
			1973	1979*	1973	1979*
Campbell	Connie Trailer	4/73	0.06	0.01	0.35	0.09
Zach White	Bubbler	12 Mo.	0.09	0.02	----	----
VTEP	Bubbler	12 Mo.	0.07	0.02	----	----
TIGUA	Bubbler	12 Mo.	0.03	0.008	----	----
Pershing	Bubbler	12 Mo.	0.01	0.003	----	----
H.D.	Bubbler	12 Mo.	0.01	0.003	----	----
Trans M.T.	Bubbler	12 Mo.	0.01	0.003	----	----
Kern	Bubbler	2/73	----	----	0.47	0.13
Kern	Bubbler	3/73	0.14+	0.04	----	----
PRIMARY			0.14	0.14	----	----
SECONDARY			----	----	0.5	0.5

*Projected Effect of Regulation II.

Revised 4-15-75

TABLE FIVE

REGION 11 EMISSIONS INVENTORY

Company	Source	SO_2 - lbs/hr 1973	1979*	
ASARCO	16	8400.0	2149.0	
	17	205.0	0.0	Drafted to #16
	18	36440.0	6020.0	
	19	171.0	1042.0	
	FUG	807.0	0.0	Drafted to #18
	21	82.0	387.0	
	22	6.0	8.6	
	Sub-Total	46111.0	9606.6	
SWPC	101	212.0	372.0	
	102	212.0	372.0	
MEXCEM (e) Mexico	201	200.0	400.0	
EL PASO ELEC (e) New Mexico (9 stk cluster)	301	512.0	618.0	
	Sub-Total	1136.0	1762.0	
TEXACO	31	105.0	105.0	
	32	29.6	29.6	
	33	88.8	88.8	
	34	9.0	9.0	
	35	238.0	238.0	
	36	73.6	73.6	
	37	73.6	73.6	
	38	73.6	73.6	
	39	212.0	212.0	
	30	206.3	206.3	
CHEVRON	52	1.0	1.0	
	53	3.0	3.0	
	57	1.0	1.0	
	58	8.0	8.0	
	59	5.0	5.0	
	60	112.0	112.0	
	62	6.0	6.0	
	63	6.0	6.0	
	67	30.0	30.0	
	68	40.0	40.0	
	71	2.0	2.0	
	72	432.0	432.0	
ELPACID	85	214.0	214.0	
P/D	92	12.8	12.8	
	93	12.8	12.8	
	Sub-Total	1995.1	1995.1	
TOTAL		49242.1	13363.7	

*Calculated Emissions

(e) Estimated

Revised 4-15-75

TABLE SIX

REGION 11 SO_2 DATA

ASARCO MONITORS

Station	Date[1]	Time	SO_2 PPM Averages			
			24 Hr.		3 Hr.	
			1973[1]	1979[2]	1973[1]	1979[2]
Rudolph	2/09/73	1330-1630	----	----	0.52	0.15
Rudolph	4/01/73	24 hours	0.143	0.04	----	----
Rudolph	4/29/73	1030-1330	----	----	0.51	0.15
Rudolph	5/18/73	1000-1300	----	----	0.63	0.16
Missouri	9/02/73	1000-1300	----	----	0.535	0.15
Farrell	9/08/73	0700-1000	----	----	0.57	0.16
Farrell	9/08/73	24 hours	0.163	0.04	----	----
Missouri	9/12/73	0930-1230	----	----	0.568	0.16
McKelligon	10/25/73	1130-1400	----	----	0.57	0.16
Robinson	10/25/73	1030-1330	----	----	0.65	0.17
Rudolph	10/25/73	1030-1330	----	----	0.69	0.17
Robinson	11/20/73	24 hours	0.152	0.04	----	----
Parkhill	11/21/73	1630-1930	----	----	0.54	0.15
Parkhill	12/10/73	1300-1600	----	----	0.768	0.20
PRIMARY STANDARD			0.14	0.14	----	----
SECONDARY STANDARD			----	----	0.5	0.5

1. The data for 1973 reflects violations only.
2. Projected effect of Regulation II.

TABLE SEVEN

Assumptions Used In

Region 11 SO_2 Control Strategy

No.	Assumption	Rationale
1	No major industrial growth in Region 11.	Present sources project no significant growth.
2	No conversions by sources to use high sulfur fuel (except SWPC).	Sources project no appreciable increased SO_2 above 1973 values.
3	ASARCO facilities operating at maximum capacity as shown below:	ASARCO projects maximum capacity operation by 1979.

TONS/DAY

Process	Ore and Concentrates	Converter Flux	Slag	Other	Total
Copper	1000	350	----	300	1650
Lead	1550	---	----	---	1550
Zinc	----	---	800	---	800

4	Fugitive losses will not cause violations of regulations or standards.	Losses cannot be measured accurately. Major fugitive loss from converters will be drafted to copper stack.
5	Revisions will be made to copper stack to permit vertical discharge of annulus gases.	ASARCO has agreed to make this revision.
6	ASARCO abatement program completed by 1979.	As proposed by ASARCO.

Revised 4-15-75