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*Air Quality Assessment Program*  
***Air Monitoring Report***  
***1992***



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TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

*Air Quality Assessment Program*  
***Air Monitoring Report***  
***1992***

AS-50  
March 1995



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**Pam Reed, *Commissioner***  
**Peggy Garner, *Commissioner***  
  
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Texas Natural Resource Conservation Commission  
Monitoring Operations Division  
Data Management & Analysis Section

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Non-Technical Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Information is Current	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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P.O. BOX 13087  
AUSTIN, TEXAS 78711-3087

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Data Management & Analysis Section  
Monitoring Operations Division, Bldg. B  
MC 165

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# Introduction

This report provides a summary of routine air quality measurements collected by the Texas Natural Resource Conservation Commission (TNRCC) and these other government organizations: City of Dallas, City of Fort Worth, City of Houston, El Paso City-County Health District, Galveston County Health District, National Park Service, and the New Mexico Air Quality Bureau. It also includes measurements from these private monitoring networks: Houston Regional Monitoring Corporation (HRM), Southeast Texas Regional Planning Commission (SETRPC), and the Texas City/La Marque Community Air Monitoring Network (TCLMCM).

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six air pollutants: ozone (O<sub>3</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), respirable particulate matter (PM<sub>10</sub>), and lead. The gaseous pollutants — ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide — are monitored on a continuous basis with one-hour averages recorded for every hour of the day every day. Particulate matter and lead are sampled on a noncontinuous basis with one 24-hour average

recorded once every sixth day at most sites, although a few sites monitor every day or every other day.

In addition, the TNRCC and the EPA collect rain samples across the state to monitor for acid rain.

Table 1 shows the pollutant concentrations

required to exceed the national standards as expressed in the units used in this report. Figure 1 shows the total number of TNRCC, other government and private monitoring sites in the State of Texas for each of the pollutants.

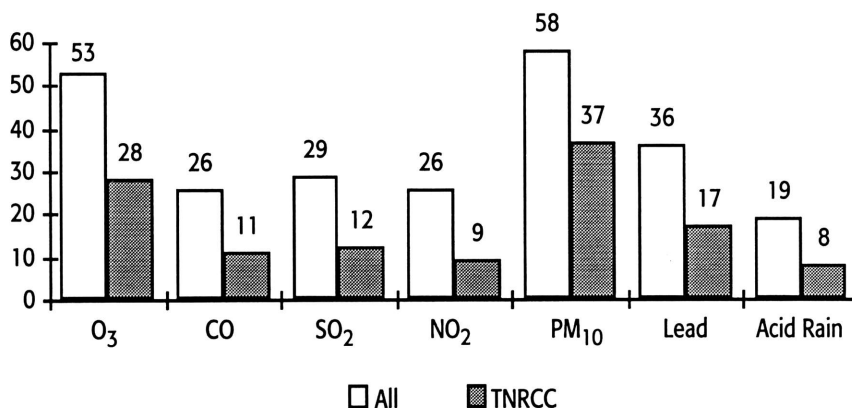
**Table 1. Air Pollution Concentrations Required to Exceed the NAAQS**

Pollutant	Averaging Period	Primary NAAQS	Secondary NAAQS
O <sub>3</sub>	1-hr ☆	125 ppb	125 ppb
CO	1-hr ☆☆	35.5 ppm	35.5 ppm
	8-hr ☆☆	9.5 ppm	9.5 ppm
SO <sub>2</sub>	3-hr ☆☆	—	550 ppb
	24-hr ☆☆	145 ppb	—
	Annual ☆☆☆	35 ppb	—
NO <sub>2</sub>	Annual ☆☆☆	54 ppb	54 ppb
PM <sub>10</sub>	24-hr ☆	155 µg/m <sup>3</sup>	155 µg/m <sup>3</sup>
	Annual ☆☆☆	51 µg/m <sup>3</sup>	51 µg/m <sup>3</sup>
Lead	Qtr ☆☆☆	1.55 µg/m <sup>3</sup>	1.55 µg/m <sup>3</sup>

- ☆ Not to be exceeded on more than three days over three years
- ☆☆ Not to be exceeded more than once per calendar year
- ☆☆☆ Not to be exceeded

Primary NAAQS — The levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health.

Secondary NAAQS — The levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.



**Figure 1. Number of Texas Air Monitoring Sites in 1992**



# Air Pollutant Summary

During 1992, the state, other government and private monitoring networks measured levels of ozone, carbon monoxide, and particulate matter above the concentration levels defined by the national standards. Measured levels of nitrogen dioxide, sulfur dioxide, and lead were below the standards.

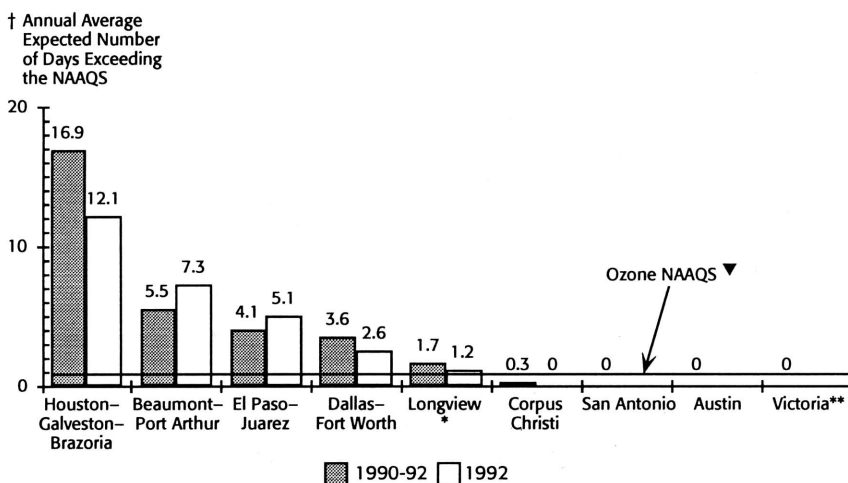
Figures 2 through 11 display comparisons of peak air pollutant measurements for metropolitan and regional areas where the pollutants are monitored. Each graph shows the highest measurement recorded at any one site in each of the areas. The graphs for carbon monoxide and sulfur dioxide also include the second

highest measurements, which are used for standard determinations.

Ozone measurements above 124 parts per billion (ppb) were recorded in the Beaumont-Port Arthur, Dallas-Fort Worth, El Paso, Houston-Galveston-Brazoria, and Longview-Marshall metropolitan areas. Measurements of ozone did not exceed 124 ppb during 1992 at any of the monitoring sites in the Austin, Corpus Christi, San Antonio, and Victoria areas. The highest ozone one-hour average measurement during 1992 was 243 ppb in the Houston area.

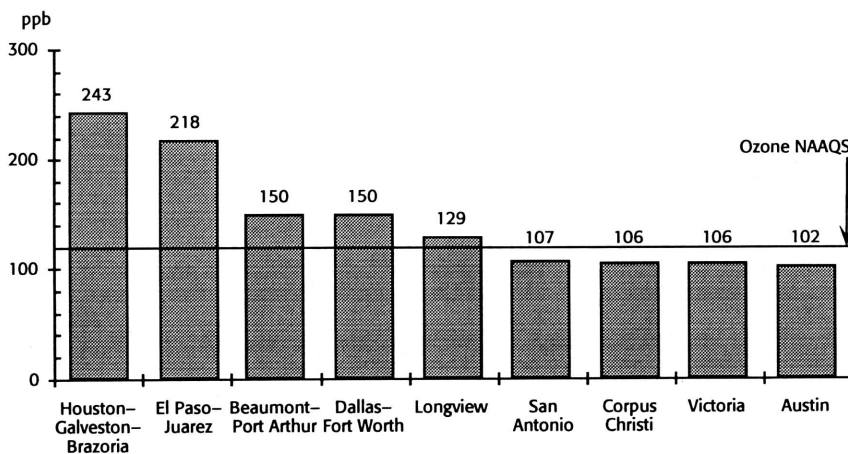
Houston-Galveston-Brazoria, Beaumont-Port Arthur, Dallas-Fort Worth, El Paso, and Longview-Marshall are ozone nonattainment areas based on the number of expected exceedance days of the ozone standard. (Calculating the expected number of exceedance days is EPA's method for compensating for missing ozone measurements. The calculation is used to determine whether or not an area is in attainment of the standard. An exceedance day is any day when the maximum one-hour ozone concentration is greater than 124 ppb.)

Monitors recorded eight-hour concentrations of carbon monoxide above 9 parts



- † Expected number of days with highest one-hour concentration over 0.12 ppm as defined by EPA for NAAQS comparisons
- ▼ Annual average not to exceed 1.0 day per year over a three-year period
- \* Each \* indicates one year not meeting EPA completeness criteria; not valid for NAAQS comparison

**Figure 2. Highest Number of Ozone Exceedances in 1992**



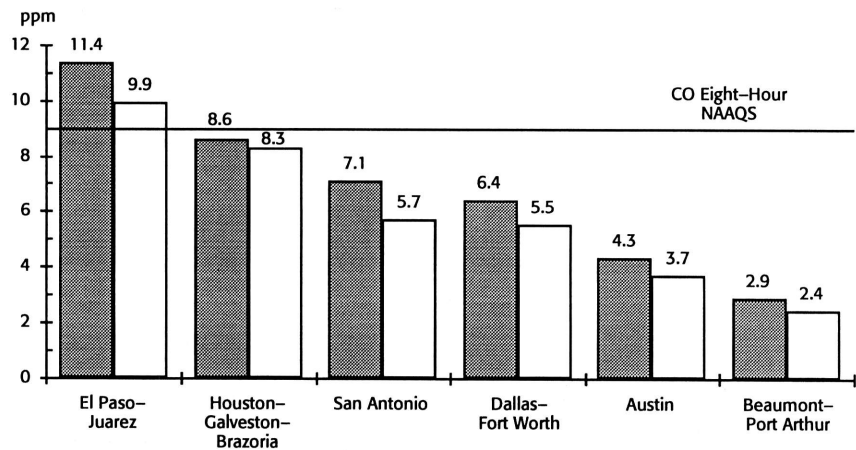
**Figure 3. Highest Ozone One-Hour Averages in 1992**

per million (ppm) only in El Paso, where a high measurement of 10.5 ppm was observed. In nearby Juarez, Mexico, the highest eight-hour running average was 11.4 ppm. Two of the six U.S. sites in El Paso recorded violations of the eight-hour carbon monoxide standard.

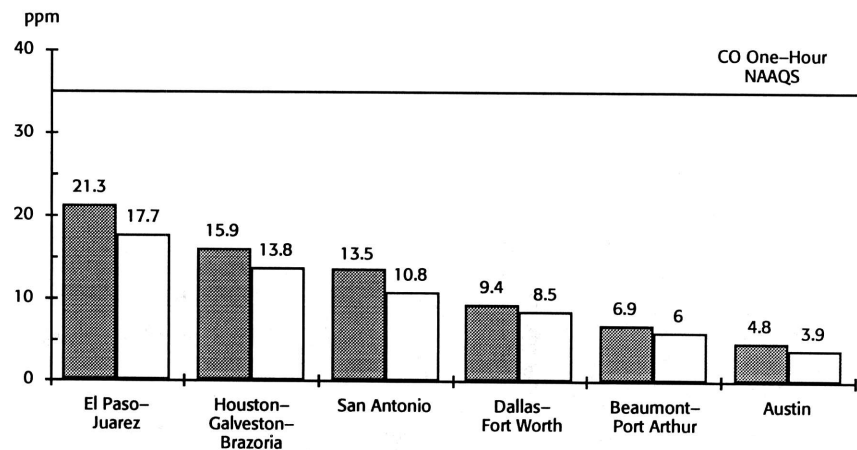
One of the eight Texas sites in the El Paso-Juarez area recorded a daily respirable particulate matter

measurement above 150 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Respirable particulate matter is made up of small, airborne particles that can be inhaled and lodge in the lungs. The high daily average was  $166 \mu\text{g}/\text{m}^3$ . In Juarez the highest 24-hour measurement was  $314 \mu\text{g}/\text{m}^3$ , and at adjacent New Mexico sites the peak was  $110 \mu\text{g}/\text{m}^3$ .

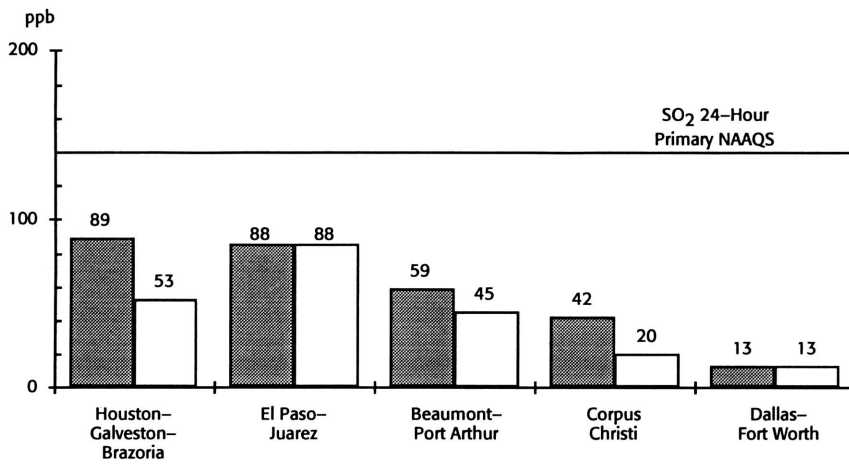
Table 2 provides a summary listing of pollutant measurements taken at each site with a comparison to the standard for all of the air pollutants. Additional summary information is provided about each pollutant in the following sections of this chapter.



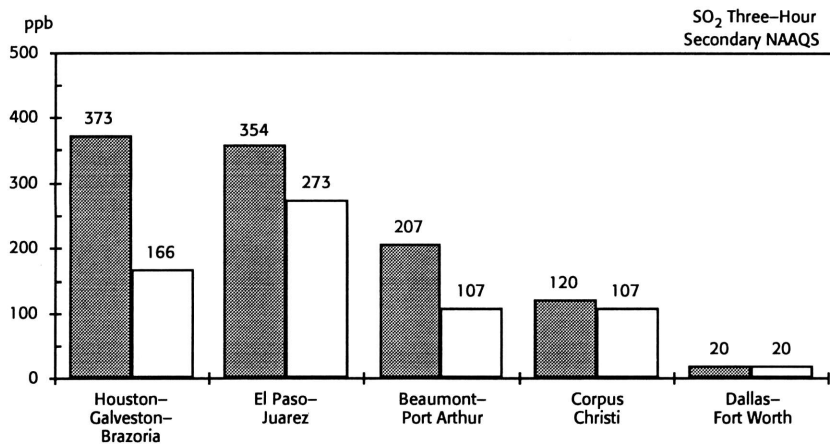
**Figure 4. Highest and Second Highest CO Eight-Hour Averages in 1992**



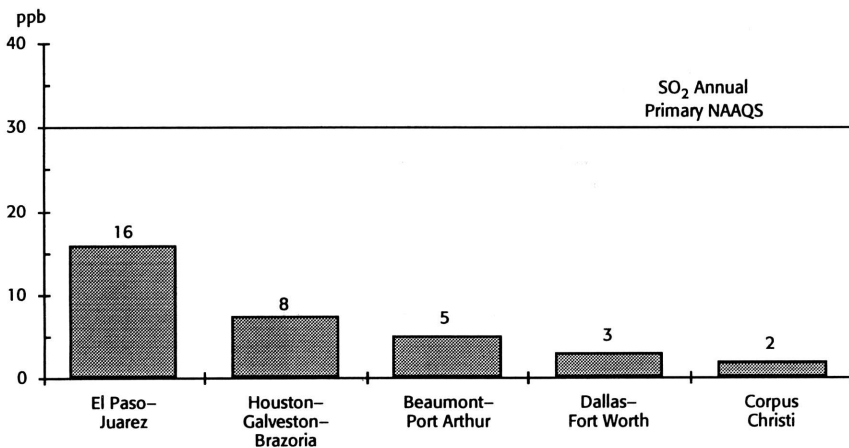
**Figure 5. Highest and Second Highest CO One-Hour Averages in 1992**



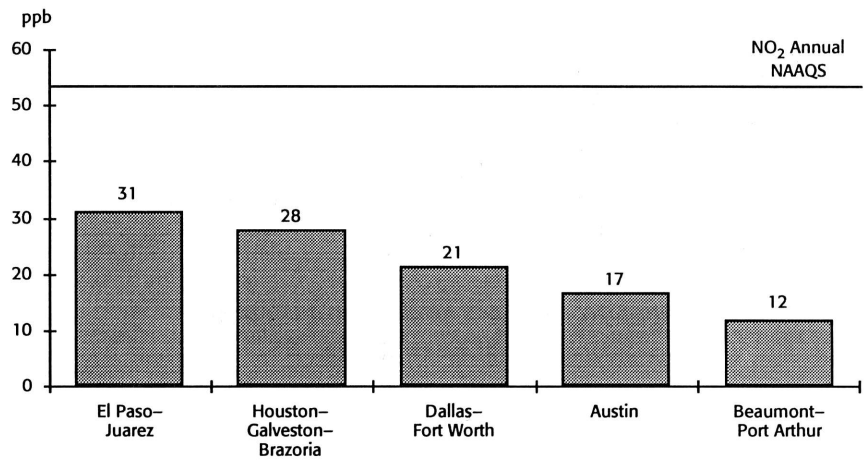
**Figure 6. Highest and Second Highest SO<sub>2</sub> 24-Hour Averages in 1992**



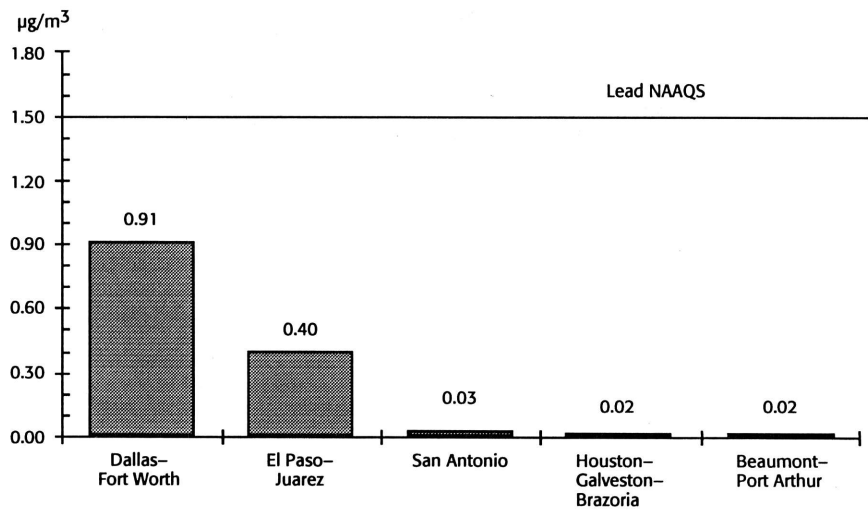
**Figure 7. Highest and Second Highest SO<sub>2</sub> Three-Hour Averages in 1992**



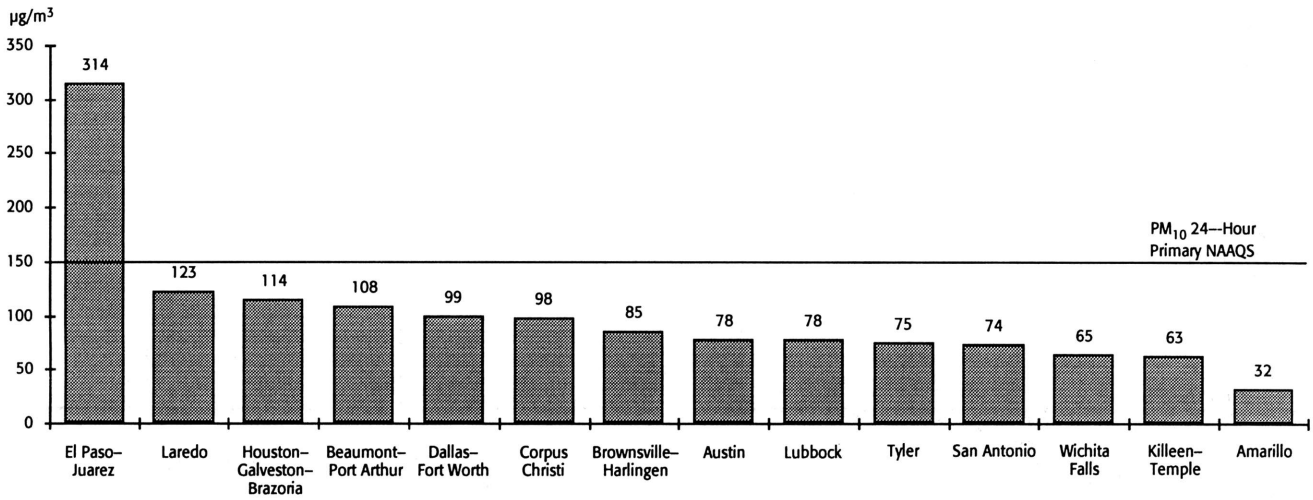
**Figure 8. Highest SO<sub>2</sub> Annual Averages in 1992**



**Figure 9. Highest NO<sub>2</sub> Annual Averages in 1992**

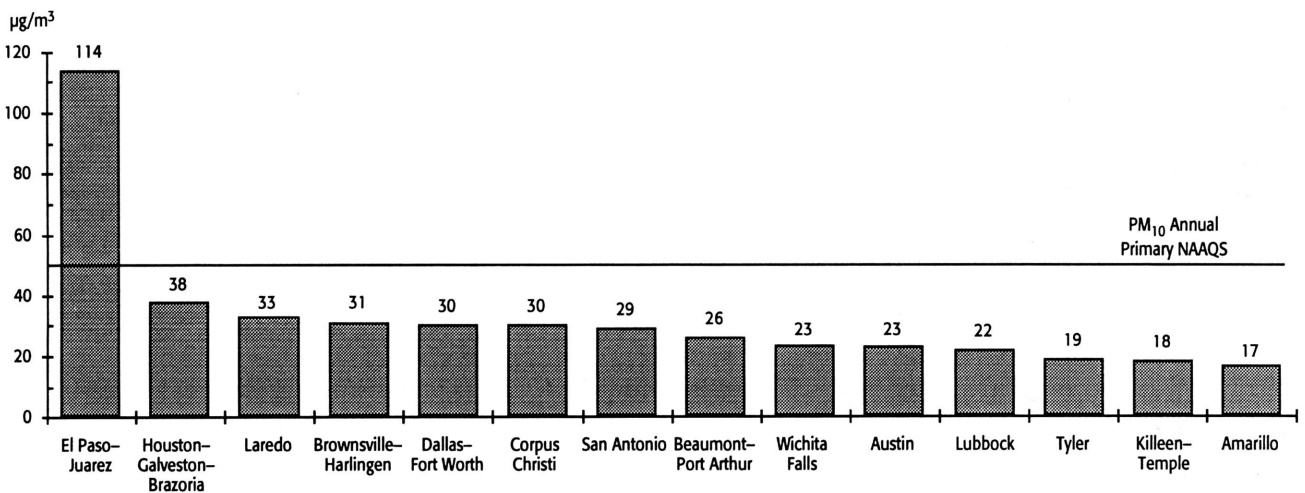


**Figure 10. Highest Lead Quarterly Averages in 1992**



**Figure 11. Highest PM<sub>10</sub> Daily Averages in 1992 (Including Exceptional Event Days)\***

\* Days when unusual, uncontrollable events occurred (primarily dust storms)



**Figure 12. Highest PM<sub>10</sub> Annual Averages in 1992 (Including Exceptional Event Days)\***

\* Days when unusual, uncontrollable events occurred (primarily dust storms)

**Table 2. 1992 Pollutant Summary by Monitoring Site**

Location	O <sub>3</sub>		CO <sup>+</sup>		SO <sub>2</sub> <sup>+</sup>			NO <sub>2</sub>	PM <sub>10</sub>			Lead	
	High Hr (ppb)	Exp Exc (days)	2nd Hr (ppm)	2nd 8-Hr (ppm)	2nd 24-Hr (ppb)	2nd 3-Hr (ppb)	Ann (ppb)	Ann (ppb)	High Day (µg/m <sup>3</sup> )	Exp Exc (days)	Exp Ann (µg/m <sup>3</sup> )	High Qtr (µg/m <sup>3</sup> )	Exc Qtr
<b>NAAQS ■</b>	125	1.1	35.5	9.5	145	550	35	54	155	1.1	51	1.55	0
<b>Amarillo MSA (TNRCC Region 1)</b>													
Amarillo									32	✱0.0	✱17		
<b>Austin-San Marcos MSA (TNRCC Region 11)</b>													
Downtown 32			6.0	3.7				✱17					
East									78	0.0	23		
North 25	101	0.0											
Northwest 3	102	0.0											
Ridgetop									78	0.0	22		
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>													
Beaumont 2	138	2.1	3.9	2.4	45	107	5	8	108	0.0	26	0.02	0
Kountze 85	111	0.0										0.02	0
Marina													
Port Arthur 28	132	3.2			43	103	4						
SETRPC 40	150	3.0						5					
SETRPC 42	151	5.0						8					
SETRPC 43	148	7.1						10					
West Orange 9	137	1.1						12					
<b>Big Bend National Park (TNRCC Region 6)</b>													
Brewster County	65	0.0											
<b>Brazoria PMSA (TNRCC Region 12)</b>													
Clute 11	134	3.7											
<b>Brownsville-Harlingen-San Benito MSA (TNRCC Region 15)</b>													
Brownsville									85	0.0	31		
San Benito									73	0.0	24		
<b>Corpus Christi MSA (TNRCC Region 14)</b>													
Leopard									97	✱0.0	✱28		
Navigation									98	✱0.0	✱30		
Tuloso 21	92	0.0			14	57	1						
West 4	106	0.0			20	107	2						
<b>Dallas PMSA (TNRCC Region 4)</b>													
Bonnieview	100	0.0						12					
Boys Club									75	0.0	27	0.19	0
Cedar Hill									37	✱0.0	✱19		
Chalk Hill									82	0.0	23	0.02	0
Coit									84	0.0	26		
Colony	120	0.0											
Convention									51	✱0.0	✱26	0.04	0
Denton Airport	150	✱											
Dallas N 5	123	0.0						14				0.09	0
Douglas												0.04	0
Earhart												0.05	0
Ervey			8.5	5.5									
Farmers Branch												0.03	0
Frisco Acker												0.13	0
Frisco Gould 2*												0.25	0
Frisco Gould 4*												0.58	0
Frisco 31	144	✱											
Frisco 5th St.												0.91	0
Garland												0.08	0
Hinton	140	1.0	7.5	5.4	10	20	2	21					
Lancaster									78	0.0	22		
M.L. King												0.05	0
Midlothian 4									47	0.0	17		
Midlothian 5									30	✱0.0	✱19		
Midlothian 6									99	✱0.0	28		
Midlothian 7									50	✱0.0	17		
Midlothian 8									52	✱0.0	16		
Midlothian 9									21	✱0.0	✱19		
Midlothian 11									34	✱0.0	✱16		
Midlothian 84									52	0.0	19		
Morrell									91	0.0	30	0.06	0
Nolen												0.04	0
Palmer Paper												0.05	0
Rector												0.06	0
Sargent												0.05	0
Sunnyvale												0.03	0
Terrell Virginia												0.06	0

■ Air pollution concentration required to exceed the NAAQS

† Number of actual exceedances; expected exceedances may be slightly higher

✱ Measurements for 1992 do not meet EPA completeness criteria

♣ Block averages, rounded to hundredths

✱ Relocated during 1992

♣ Running averages, truncated to tenths



**Table 2. 1992 Pollutant Summary by Monitoring Site (continued)**

Location	O <sub>3</sub>		CO†		SO <sub>2</sub> ‡			NO <sub>2</sub>	PM <sub>10</sub>			Lead	
	High Hr (ppb)	Exp Exc (days)	2nd Hr (ppm)	2nd 8-Hr (ppm)	2nd 24-Hr (ppb)	2nd 3-Hr (ppb)	Ann (ppb)	Ann (ppb)	High Day (µg/m <sup>3</sup> )	Exp Exc (days)	Exp Ann (µg/m <sup>3</sup> )	High Qtr (µg/m <sup>3</sup> )	Exc Qtr
<b>NAAQS ■</b>	125	1.1	35.5	9.5	145	550	35	54	155	1.1	51	1.55	0
<b>El Paso-Juarez Area TX NM MX (TNRCC Region 6)</b>													
Advance MX	218	☆	14.8	7.7					314	10.0	114		
Anthony NM									110	0.0	39		
Chamizal	124	0.0	17.7	9.9					113	☆0.0	☆26		
Downtown 6	112	0.0	16.0	9.3	48	240	10	31				0.22	0
East 30	123	0.0	12.3	7.0									
EPNG Building	157	☆											
Ivanhoe			8.2	4.5					49	0.0	22		
Kern					56	227	11					0.17	0
La Union NM	117	0.0			16	81	3						
Lindbergh									41	0.0	22		
NE Clinic									47	0.0	21	0.10	0
Pestalozzi MX									189	☆2.0	☆58		
Race Track NM												0.40	0
Riverside									116	0.0	32		
Socorro									88	0.0	41		
Sunland NM	126	☆			88	267	16		109	0.0	32	0.38	0
Techno MX	124	☆	16.0	8.8					135	0.0	40		
Tillman			14.4	7.7					166	2.1	40	0.26	0
UTEP 12	142	5.1	10.9	6.4	54	273	12	21					
Vilas									146	0.0	44		
Zenco MX									212	2.0	58		
<b>Fort Worth-Arlington PMSA (TNRCC Region 4)</b>													
Downtown 16			5.6	4.0								0.03	0
FAA									51	0.0	20		
Geddes									47	☆0.0	☆20		
Keller 17	147	1.0											
NW 13	149	2.1	6.5	3.8	13	20	3	14					
Worth Heights									70	0.0	25	0.03	0
<b>Galveston-Texas City PMSA (TNRCC Region 12)</b>													
Fire Station									50	☆0.0	☆23		
Galveston Airport	198	☆											
Nessler Pool									103	☆0.0	☆24		
TCLMCM 34th St.	180	☆			20	53	☆2	8					
TCLMCM Ave. A					18	47	☆2						
TCLMCM Seawall					19	50	☆4	☆8					
Texas City 10	126	1.1			39	103	4		111	☆0.0	☆25	0.02	0
<b>Guadalupe Mountains National Park (TNRCC Region 6)</b>													
Culberson County	80	☆											
<b>Houston PMSA (TNRCC Region 12)</b>													
Aldine 8	200	9.4	10.1	8.1				☆15	62	☆0.0	☆30		
Baytown 24					23	50	8					0.01	0
Bingle									100	0.0	26		
Clinton	220	8.2	6.8	4.7	31	110	6	23	103	0.0	38	0.02	0
Crawford	208	4.6	8.3	5.1	32	60	7	28	103	0.0	30		
Croquet	178	6.7			13	27	3						
Deer Park 18	198	2.3			10	33	1						
East 1	225	6.8	12.1	6.6	19	80	4	17	99	☆0.0	☆34	0.02	0
Fulton												0.01	0
Harris NW 26	176	10.2											
HRM 1	229	10.3	7.9	5.2	24	89	5	27	97	NA	30		
HRM 3	209	10.4	7.0	5.2	53	166	6	22	102	NA	34		
HRM 4	208	10.1	3.0	2.3	10	48	1	17					
HRM 7	243	12.2	5.3	3.0	21	62	2	19	48	NA	22		
HRM 8	202	7.2	3.7	2.5	10	26	1	13					
HRM 10	159	3.1	1.2	0.8	4	16	<1	8					
HRM 11	173	6.1	1.8	0.9	5	23	<1	12					
Kress									108	0.0	34	0.02	0
Lang	183	6.7	13.8	8.3				☆22					
Manchester 22	218	8.7			40	117	6						
Monroe	220	6.2			18	43	4		103	☆0.0	☆28		
N Wayside	183	6.3			17	53	5						
Pasadena									114	☆0.0	☆32		
Texas Commerce	160	☆											

■ Air pollution concentration required to exceed the NAAQS  
 † Number of actual exceedances; expected exceedances may be slightly higher  
 ☆ Measurements for 1992 do not meet EPA completeness criteria  
 ‡ Block averages, rounded to hundredths  
 ✖ Relocated during 1992  
 † Running averages, truncated to tenths

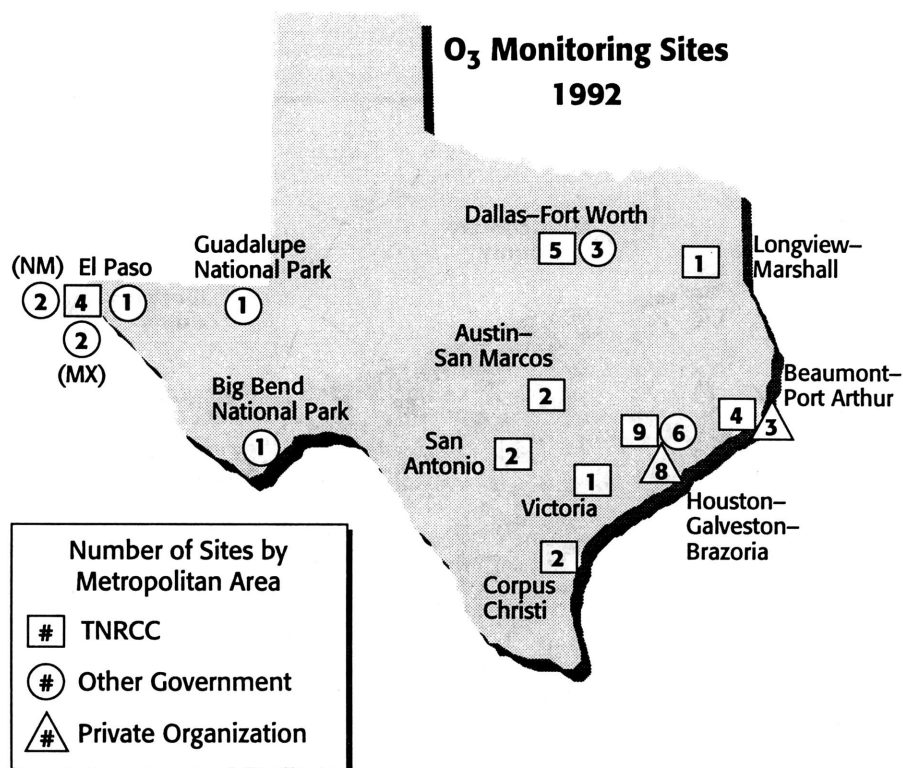
**Table 2. 1992 Pollutant Summary by Monitoring Site (continued)**

Location	O <sub>3</sub>		CO♦		SO <sub>2</sub> ⊕			NO <sub>2</sub>	PM <sub>10</sub>			Lead	
	High Hr (ppm)	Exp Exc (days)	2nd Hr (ppm)	2nd 8-Hr (ppm)	2nd 24-Hr (ppb)	2nd 3-Hr (ppb)	Ann (ppb)	Ann (ppb)	High Day (µg/m <sup>3</sup> )	Exp Exc (days)	Exp Ann (µg/m <sup>3</sup> )	High Qtr (µg/m <sup>3</sup> )	Exc Qtr
<b>NAAQS ■</b>	125	1.1	35.5	9.5	145	550	35	54	155	1.1	51	1.55	0
<b>Killeen-Temple MSA (TNRCC Region 9)</b>													
Temple									63	0.0	18		
<b>Laredo MSA (TNRCC Region 15)</b>													
Laredo									123	⊕0.0	⊕33		
<b>Longview-Marshall MSA (TNRCC Region 5)</b>													
Longview 19	129	1.1											
<b>Lubbock MSA (TNRCC Region 2)</b>													
Lubbock									78	0.0	22		
<b>San Antonio MSA (TNRCC Region 13)</b>													
Airport												0.02	0
Downtown 27			10.8	5.7									
East Kelly									58	0.0	25		
ITC									72	0.0	29	0.03	0
New Braunfels 3									20	⊕0.0	⊕13		
New Braunfels 4									22	⊕0.0	⊕11		
North 7	107	0.0	9.1	4.1					74	0.0	21		
Northwest 23	98	0.0											
<b>Tyler MSA (TNRCC Region 5)</b>													
Tyler									75	0.0	19		
<b>Wichita Falls MSA (TNRCC Region 3)</b>													
Wichita Falls									65	⊕0.0	⊕23		
<b>Victoria MSA (TNRCC Region 14)</b>													
Victoria 87	106	0.0											

- Air pollution concentration required to exceed the NAAQS
- ⊕ Block averages, rounded to hundredths
- † Number of actual exceedances; expected exceedances may be slightly higher
- ⊗ Relocated during 1992
- ☆ Measurements for 1992 do not meet EPA completeness criteria
- ◆ Running averages, truncated to tenths

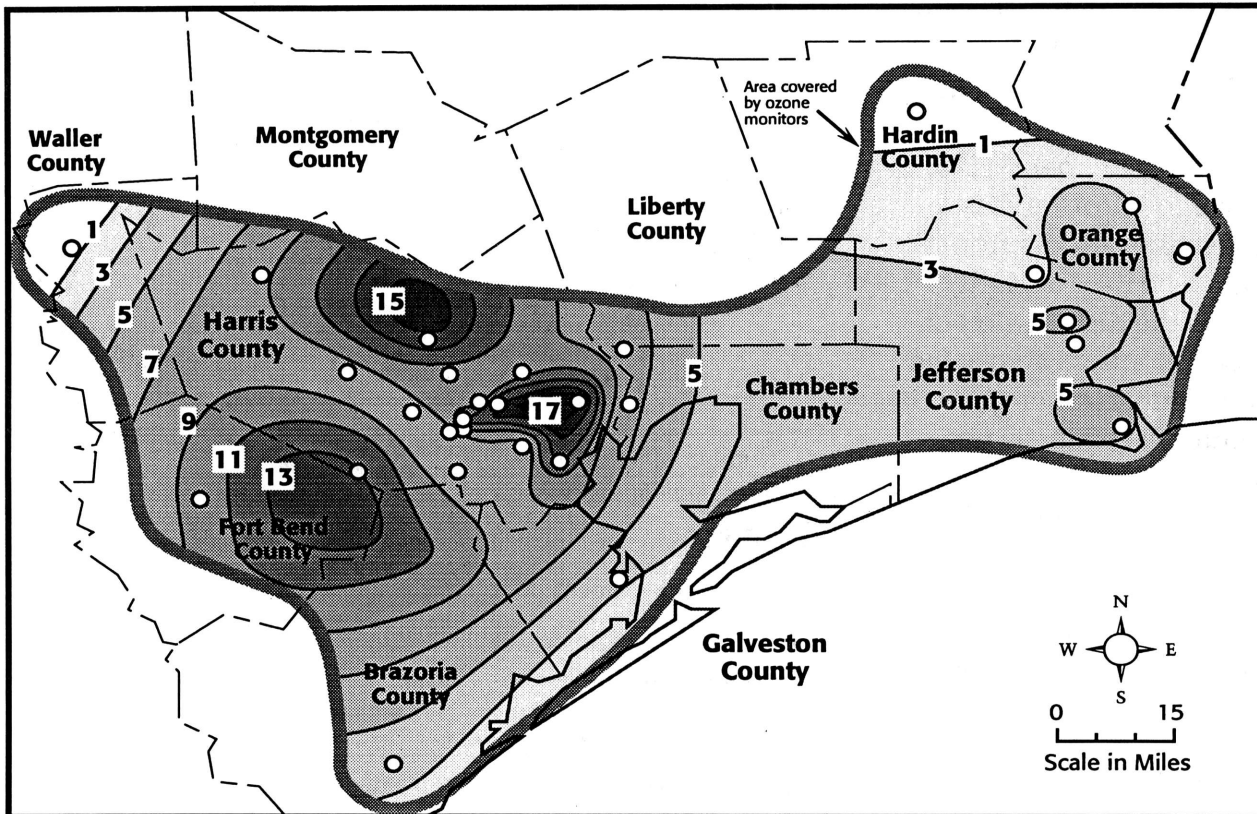
## Ozone

During 1992, the TNRCC, other government and private networks continuously monitored ozone at 53 sites in Texas. In addition, New Mexico and Mexico each operated two ozone monitors across their respective borders from El Paso. The map at right shows the distribution of ozone monitors across the state. Unlike other gaseous pollutants, ozone is not emitted directly into the atmosphere. Instead, it is created in the atmosphere by the action of sunlight on volatile organic compounds and nitrogen oxides. In Texas, higher levels of ozone usually occur on sunny days with light winds, primarily from March through October. An ozone exceedance day is counted if the peak one-hour average ozone concentration measured exceeds the standard. Then, the expected exceedance days are determined from the actual number of measured exceedances with adjustments to account for missing data according to EPA guidelines. In order to demonstrate attainment of the standard, the average annual number of expected exceedances must not exceed 1.1 day per year over a three-year period.

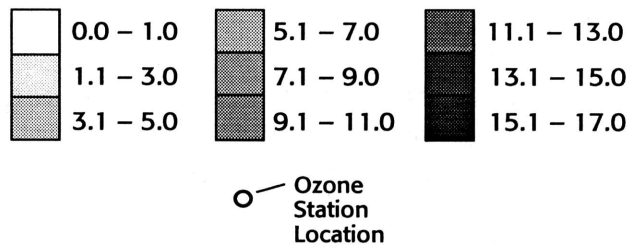


Figures 13, 14, and 15 show the distribution of the number of expected ozone exceedances for 1990-1992 for the Houston, Dallas-Fort Worth, and El Paso areas. Table 3 provides a summary of ozone measurements for 1992 and expected exceedances for 1990-1992. The listings include all of the TNRCC, other government and private monitoring sites. The table listings are grouped alphabetically by metropolitan area. The monitoring sites for each area are arranged in descending order from the highest measured one-hour concentration. The Aerometric Information

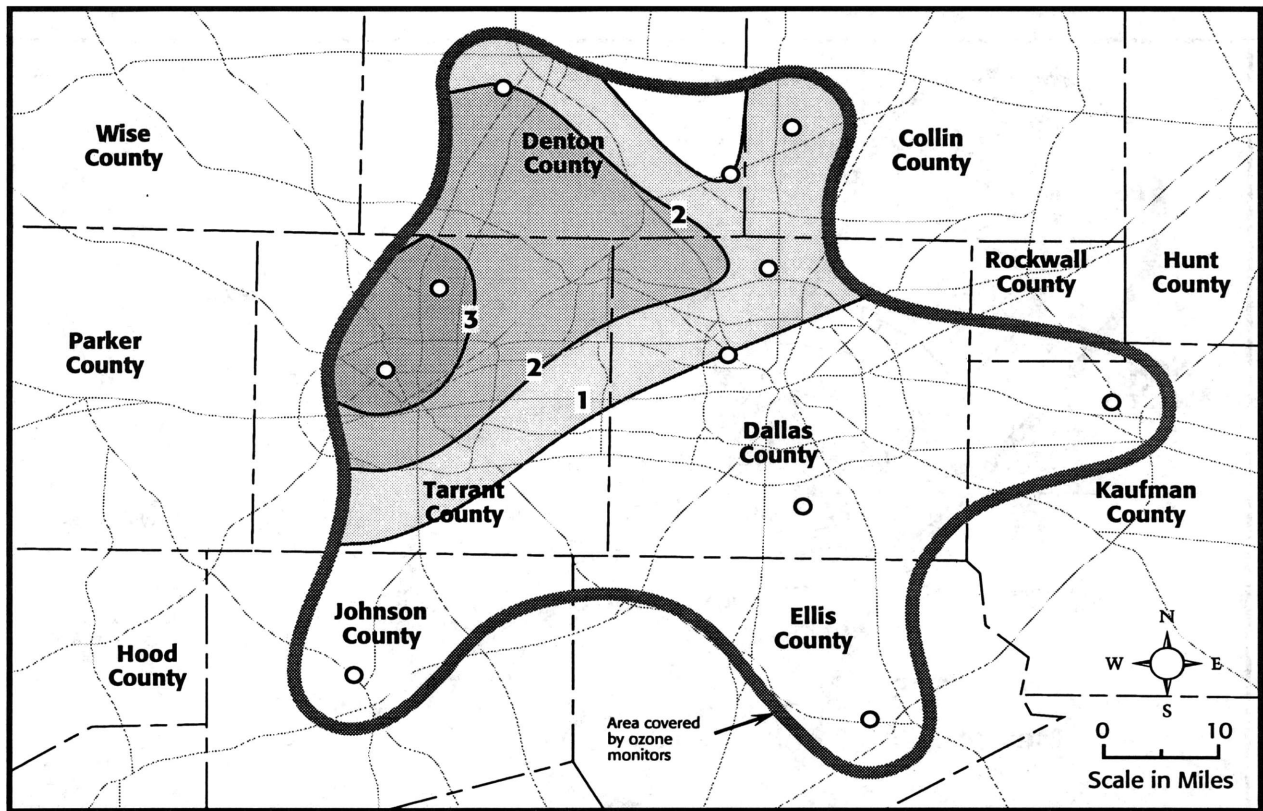
Retrieval System (AIRS) number for each site is listed along with the site name. The AIRS number is part of the EPA's system for keeping track of air monitoring sites nationwide. The percent completeness shown in this table is based on the ozone season and indicates the percentage of the ozone season for which valid data were obtained according to EPA guidelines.



**Key**



**Figure 13. Southeast Texas Expected Annual Ozone Exceedances 1990-92**

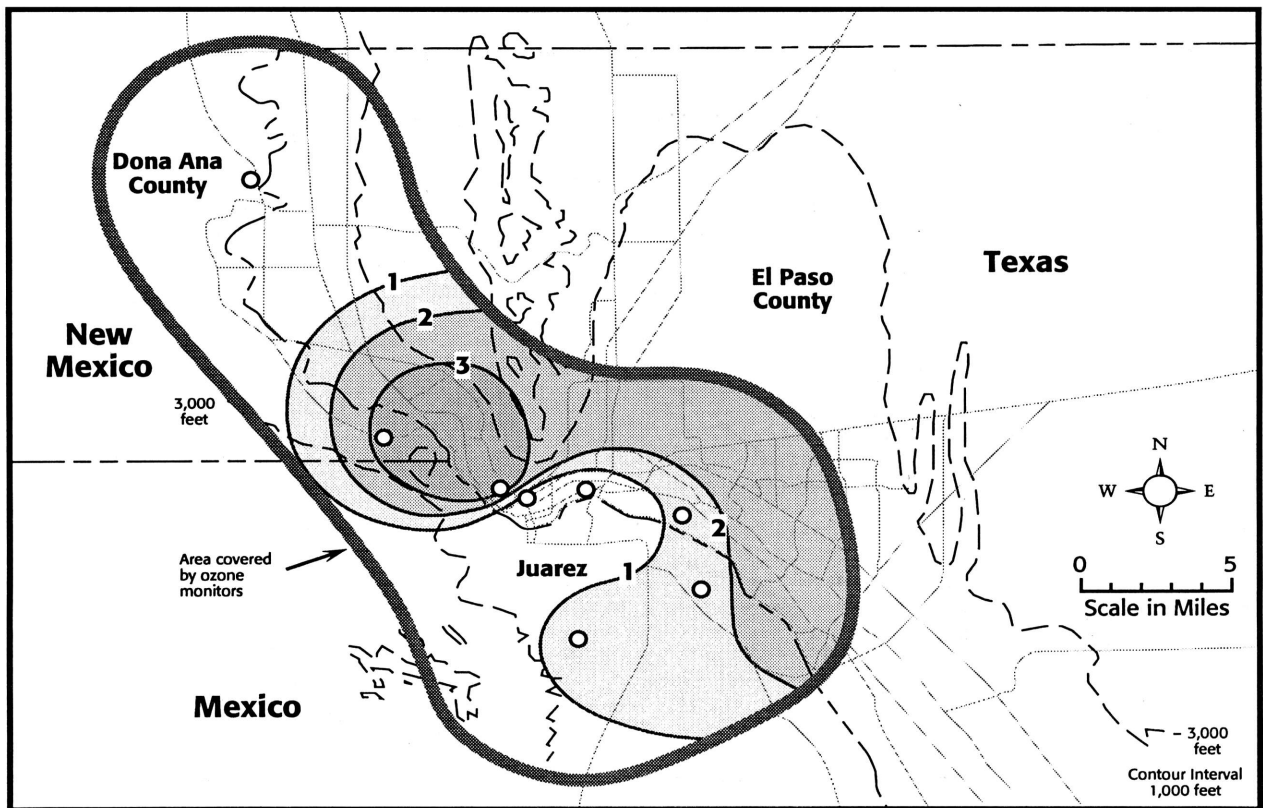


**Key**

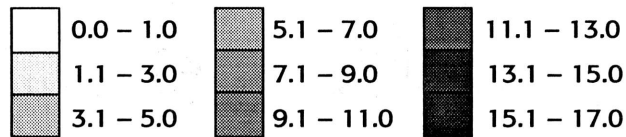
	0.0 – 1.0		5.1 – 7.0		11.1 – 13.0
	1.1 – 3.0		7.1 – 9.0		13.1 – 15.0
	3.1 – 5.0		9.1 – 11.0		15.1 – 17.0

○ Ozone Station Location

**Figure 14. Dallas-Fort Worth Expected Annual Ozone Exceedances 1990-92**



**Key**



○ Ozone Station Location

**Figure 15. El Paso Expected Annual Ozone Exceedances 1990-92**

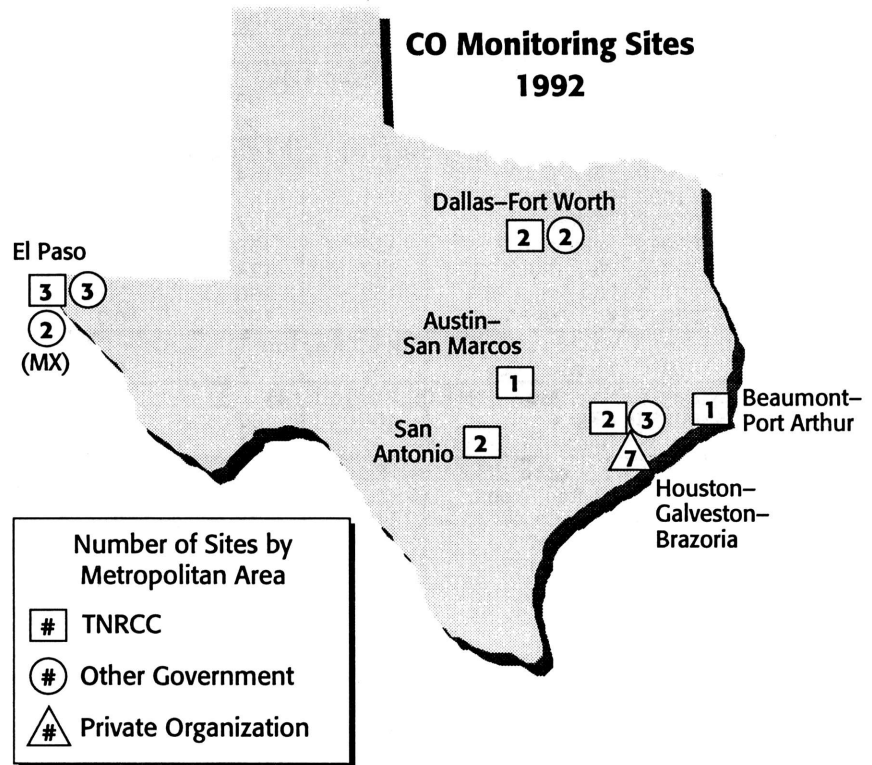
**Table 3. Ozone Summary 1992**

AIRS	Site Name	1-Hr High (ppb)	2nd Day 1-Hr High (ppb)	Exp Exc (days/yr)	Exp Exc 1990-92 (days/yr)	± Percent Completeness
<b>NAAQS ■</b>		125			±1.1	365
<b>Austin-San Marcos MSA (TNRCC Region 11)</b>						
4530014S	Austin NW 3	102	99	0.0	0.0	89
4530003S	Austin N 25	101	89	0.0	0.0	76
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>						
2450101P	SETRPC 40	150	144	3.0	5.4	99
3611100P	SETRPC 42	151	145	5.0	3.0	99
2450102P	SETRPC 43	148	137	7.1	6.4	98
2450009S	Beaumont 2	138	136	2.1	2.7	96
3611001S	West Orange 9	137	124	1.1	2.0	88
2450011S	Port Arthur 28	132	130	3.1	3.5	93
1990002S	Kountze 85	111	107	0.0	0.4	73
<b>Big Bend National Park (TNRCC Region 6)</b>						
3430101G	Brewster County	65	65	0.0	**0.0	90
<b>Corpus Christi MSA (TNRCC Region 14)</b>						
3550025S	West 4	106	97	0.0	0.3	89
3550026S	Tuloso 21	92	91	0.0	0.0	95
<b>Dallas-Fort Worth CMSA (TNRCC Region 4)</b>						
1210002S	Denton Airport	150	141	*	***	73
4391002S	Ft Worth NW 13	149	128	2.1	3.6	94
4392003S	Keller 17	147	115	1.0	3.1	99
0850005S	Frisco 31	144	140	*	***	68
1130069L	Hinton	140	110	1.0	1.0	93
1130045S	Dallas N 5	123	121	0.0	1.8	97
1210054L	Colony	120	110	0.0	1.0	97
1130055L	Bonnieview	100	90	0.0	0.0	93
<b>El Paso-Juarez Area TX NM MX (TNRCC Region 6)</b>						
0060004L	Advance MX	218	164	*	**	63
1410046S	EPNG Building	157	136	*	***	24
1410037S	UTEP 12	142	136	5.1	3.7	97
0060001L	Techno MX	124	115	*	*1.3	49
0130017S	Sunland Park NM	126	115	*	***	54
1410044L	Chamizal	124	114	0.0	*0.0	87
1410028S	East 30	123	118	0.0	1.1	92
0130008S	La Union NM	117	101	0.0	0.0	99
1410027S	Downtown 6	112	108	0.0	0.0	95
<b>Guadalupe Mountains National Park (TNRCC Region 6)</b>						
1090101G	Culberson County	80	77	*	**	70
<b>Houston-Galveston-Brazoria CMSA (TNRCC Region 12)</b>						
2010807P	HRM 7	243	185	12.2	17.0	97
2010801P	HRM 1	229	197	10.3	10.5	96
2011034S	Houston East 1	225	202	6.8	9.4	88
2011035L	Clinton	220	176	8.2	12.9	97
2010062L	Monroe	220	148	6.2	7.9	97
2010059S	Manchester 22	218	160	8.7	8.7	80
2010803P	HRM 3	209	187	10.4	14.1	95
2011037L	Crawford	208	165	4.6	8.5	88
2010804P	HRM 4	208	154	10.1	10.1	97
2010808P	HRM 8	202	171	7.2	11.2	97
2010024S	Aldine 8	200	156	9.4	14.6	85
2011003S	Deer Park 18	198	143	2.3	7.7	87
1670014S	Galveston Airport	198	134	*	***	25
2010046L	N Wayside	183	181	6.3	9.3	96
2010047L	Lang	183	159	6.7	8.5	90
1670056P	TCLMCM 34th St	186	136	*	***	33
2010051L	Croquet	178	152	6.7	13.0	75
2010029S	Harris NW 26	176	161	10.2	8.9	88
0710901P	HRM 11	173	141	6.1	7.0	98
2010065S	Texas Commerce	160	139	*	***	24
0710900P	HRM 10	159	158	3.1	6.5	96
0391003S	Clute 11	134	129	3.7	3.7	82
1671002S	Texas City 10	126	97	1.1	3.2	91
<b>Longview-Marshall MSA (TNRCC Region 5)</b>						
1830001S	Longview 19	129	123	1.1	*1.7	84
<b>San Antonio MSA (TNRCC Region 13)</b>						
0290036S	North 7	107	96	0.0	0.0	94
0290032S	Northwest 23	98	95	0.0	0.0	92
<b>Victoria MSA (TNRCC Region 14)</b>						
4690003S	Victoria 87	106	99	0.0	**	85

- L Local governmental agency monitoring site (at end of AIRS number)
- Air pollution concentration required to exceed the NAAQS
- ± Based on complete days during ozone season according to EPA convention
- ❖ Expected number of days with highest one-hour concentration of 125 ppb or more; annual average must be 1.1 or more days per year over a three-year period to exceed the standard
- \* Each \* indicates one year not meeting EPA completeness criteria; not valid for NAAQS comparison
- P Private monitoring site (at end of AIRS number)
- S State monitoring site (at end of AIRS number)

## Carbon Monoxide

Carbon monoxide is produced by the incomplete combustion of carbon-containing fuels, most notably by automotive engines and power plants. During 1992, carbon monoxide was continuously monitored at 26 sites in Texas. It also was measured by Mexico across the border from El Paso. These sites are displayed in the adjacent map. Two standards have been established for carbon monoxide. To violate one of these standards, two or more one-hour averages of 35.5 ppm or greater or two or more eight-hour averages of 9.5 ppm or greater must be measured at one site during a calendar year. The eight-hour standard has been exceeded periodically in El Paso during the winter months when very stable atmospheric



conditions exist. The one-hour standard for carbon monoxide has never been exceeded in Texas.

Table 4 provides a summary of 1992 carbon

monoxide measurements. The table listings are grouped alphabetically by metropolitan area and arranged in descending order from the highest eight-hour average.



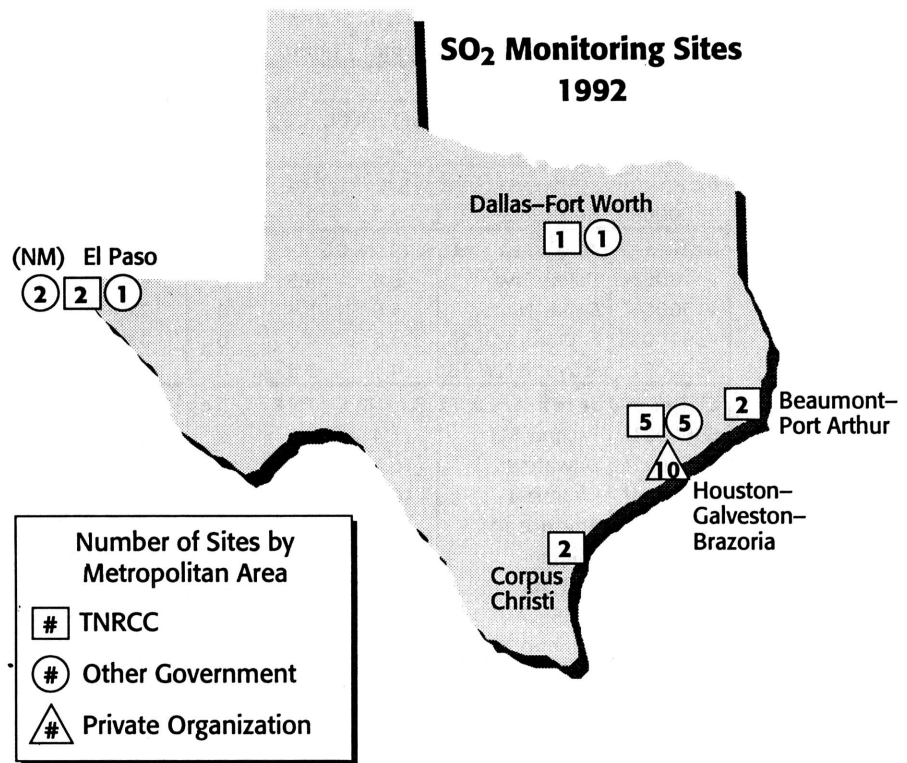
**Table 4. CO Summary 1992**

AIRS	Site Name	◆ 8-Hr			1-Hr			Percent Completeness
		High (ppm)	2nd (ppm)	Exc (#)	High (ppm)	2nd (ppm)	Exc (#)	
NAAQS ■			9.5			35.5		
<b>Austin-San Marcos MSA (TNRCC Region 11)</b>								
4530017S	Downtown 32	4.3	3.7	0	6.9	6.0	0	85
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>								
2450009S	Beaumont 2	2.9	2.4	0	4.8	3.9	0	94
<b>Dallas-Fort Worth CMSA (TNRCC Region 4)</b>								
1310053L	Dallas Ervay	6.4	5.5	0	9.4	8.5	0	93
1130069L	Dallas Hinton	5.6	5.4	0	7.8	7.5	0	93
4391003S	Ft Worth Dtn 16	4.5	4.0	0	5.9	5.6	0	80
4391002S	Ft Worth NW 13	4.1	3.8	0	7.7	6.5	0	92
<b>El Paso-Juarez Area TX NM MX (TNRCC Region 6)</b>								
0060001L	Techno MX	11.4	8.8	0	16.0	16.0	0	82
1410027S	Downtown 6	10.5	9.3	2	17.3	16.0	0	93
1410044L	Chamizal	10.1	9.9	3	21.3	17.7	0	72
0060004L	Advance MX	8.9	7.7	0	16.2	14.8	0	79
1410002L	Tillman	8.6	7.7	0	17.5	14.4	0	97
1410028S	East 30	8.4	7.0	0	13.2	12.3	0	87
1410037S	UTEF 12	6.6	6.4	0	11.6	10.9	0	86
1410029L	Ivanhoe	4.6	4.5	0	8.2	8.2	0	93
<b>Houston-Galveston-Brazoria CMSA (TNRCC Region 12)</b>								
2010047L	Lang	8.6	8.3	0	15.9	13.8	0	93
2010024S	Aldine 8	8.1	8.1	0	10.4	10.1	0	88
2011034S	East 1	7.2	6.6	0	12.4	12.1	0	88
2011035L	Clinton	6.2	4.7	0	8.0	6.8	0	95
2010803P	HRM 3	5.9	5.2	0	8.1	7.0	0	95
2010801P	HRM 1	5.8	5.2	0	9.2	7.9	0	96
2011037L	Crawford	5.1	5.1	0	8.8	8.3	0	94
2010807P	HRM 7	3.7	3.0	0	5.4	5.3	0	97
2010808P	HRM 8	3.0	2.5	0	4.3	3.7	0	98
2010804P	HRM 4	2.4	2.3	0	3.3	3.0	0	96
0710901P	HRM 11	1.0	0.9	0	2.0	1.8	0	98
0710900P	HRM 10	0.9	0.8	0	1.5	1.2	0	96
<b>San Antonio MSA (TNRCC Region 13)</b>								
0290046S	Downtown 27	7.1	5.7	0	12.7	10.8	0	93
0290036S	North 7	4.5	4.1	0	13.5	9.1	0	87

- L Local governmental agency monitoring site (at end of AIRS number)
- P Private monitoring site (at end of AIRS number)
- S State monitoring site (at end of AIRS number)
- Air pollution concentration required to exceed the NAAQS
- ◆ Running average, truncated to tenths
- # Number of exceedances

## Sulfur Dioxide

Sulfur dioxide is produced by burning sulfur-containing fuels, smelting metallic ores containing sulfur, and removing sulfur from fuels. Sulfur dioxide was monitored continuously at 29 TNRCC, other government and private sites in Texas during 1992. In addition, two sites were operated by New Mexico across the state line from El Paso. All are shown in the adjacent map. There are three sulfur dioxide standards. Sulfur dioxide violates the short-term standard if it averages 145 ppb or more during a 24-hour period (from midnight to midnight) more than once a year. The annual average level of sulfur dioxide must be 35 ppb or higher to exceed the long-term standard. A three-hour average sulfur dioxide level must be 550 ppb or higher more than once during a calendar year to violate the secondary standard. There is also a secondary standard of 500 ppb for a three-hour average that



is intended to protect public welfare from any known or anticipated adverse effects of the pollutant at the specified level. The Houston, Beaumont-Port Arthur, El Paso, and Galveston-Texas City areas have historically shown the highest measured sulfur dioxide levels in the state.

Table 5 shows a summary of sulfur dioxide measurements during 1992. The table listings are grouped alphabetically by metropolitan area and arranged in descending order from the highest three-hour average.

**Table 5. SO<sub>2</sub> Summary 1992**

AIRS	Site Name	3-Hr ⚡			24-Hr ⚡			Annual	Percent Completeness
		High (ppb)	2nd (ppb)	Exc (‡)	High (ppb)	2nd (ppb)	Exc (‡)	Average (ppb)	
NAAQS ■			550			145		35	
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>									
245009S	Beaumont 2	207	107	0	59	45	0	5	94
2450011S	Port Arthur 28	147	103	0	57	43	0	4	89
<b>Corpus Christi MSA (TNRCC Region 14)</b>									
3550025S	West 4	120	107	0	42	20	0	2	85
3550026S	Tuloso 21	57	57	0	16	14	0	1	94
<b>Dallas-Fort Worth CMSA (TNRCC Region 4)</b>									
1130069L	Hinton	20	20	0	10	10	0	2	93
4391002S	Ft Worth NW 13	20	20	0	13	13	0	3	88
<b>El Paso-Juarez Area TX NM MX (TNRCC Region 6)</b>									
1300017S	Sunland Park NM	354	267	0	88	88	0	16	96
1410037S	UTEP 12	300	273	0	64	54	0	12	84
1410027S	Downtown 6	293	240	0	50	48	0	10	77
1410033L	Kern	233	227	0	57	56	0	11	94
0130008S	La Union NM	92	81	0	20	16	0	3	89
<b>Houston-Galveston-Brazoria CMSA (TNRCC Region 12)</b>									
2011035L	Clinton	373	110	0	89	31	0	6	91
2010803P	HRM 3	177	166	0	71	53	0	6	95
2010059S	Manchester 22	127	117	0	42	40	0	6	78
1671002S	Texas City 10	120	103	0	59	39	0	4	94
2010801P	HRM 1	101	89	0	27	24	0	5	96
2011034S	East 1	87	80	0	24	19	0	4	89
1670057P	TCLMCM Seawall	79	50	0	22	19	0	◆ 4	33
2011037L	Crawford	77	60	0	33	32	0	7	86
2010807P	HRM 7	75	62	0	34	21	0	2	97
1670055P	TCLMCM Ave. A	64	47	0	26	18	0	◆ 2	33
1670056P	TCLMCM 34th St.	62	53	0	25	20	0	◆ 2	33
2010046L	North Wayside	57	53	0	19	17	0	5	90
2010808P	HRM 8	57	26	0	10	10	0	1	97
2010004S	Baytown 24	53	50	0	26	23	0	8	87
2010804P	HRM 4	52	48	0	10	10	0	1	97
2010062L	Monroe	50	43	0	19	18	0	4	93
2011003S	Deer Park 18	50	33	0	11	10	0	1	85
2010051L	Croquet	43	27	0	13	13	0	◆ 3	67
0710901P	HRM 11	23	23	0	8	5	0	<1	98
0710900P	HRM 10	21	16	0	5	4	0	<1	96

- L Local governmental agency monitoring site (at end of AIRS number)
- P Private monitoring site (at end of AIRS number)
- S State monitoring site (at end of AIRS number)
- Air pollution concentration required to exceed the NAAQS
- ⚡ Block averages, rounded to hundredths
- ‡ Number of exceedances; must be 2 or more to violate the NAAQS
- ◆ Less than 75% completeness; not valid for NAAQS comparison

## Nitrogen Dioxide

Although there are several oxides of nitrogen produced by high temperature fuel combustion in air, the only standard is for an annual average of nitrogen dioxide. The annual average level of nitrogen dioxide must be 54 ppb or higher to violate the standard. This annual standard has never been exceeded in Texas. In fact, the highest annual average has been no more than 31 ppb in Houston and El Paso during the past five years. Continuous nitrogen dioxide monitors were operated by the TNRCC, and other government and private organizations at 26 sites in the Austin, Beaumont-Port Arthur, Dallas-Fort Worth, El Paso, and Houston metropolitan areas during 1992, as shown in the adjacent map.

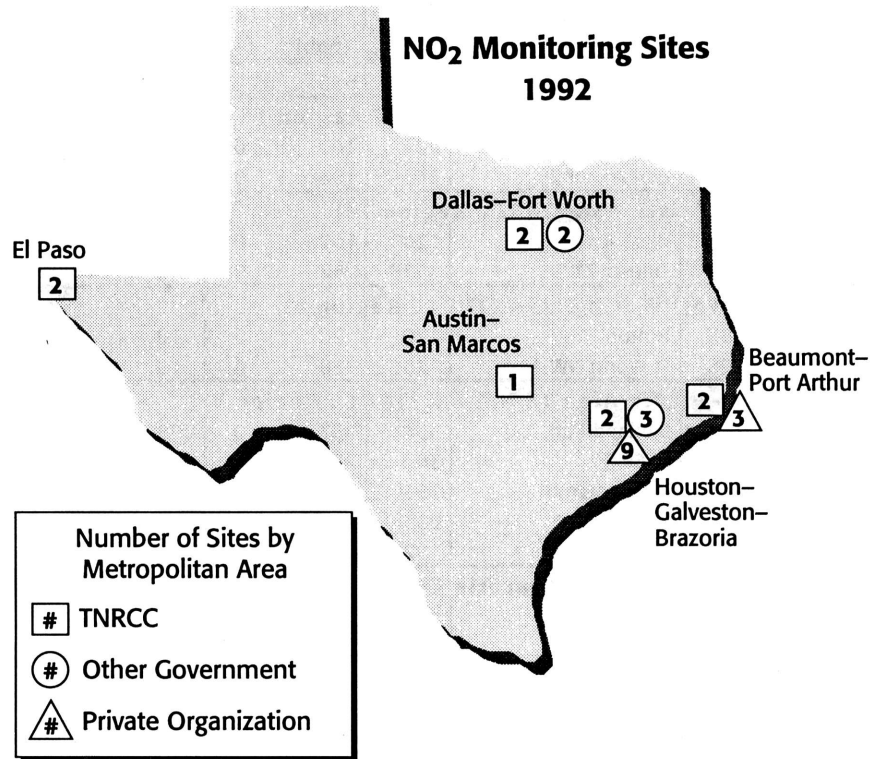


Table 6 shows a summary of nitrogen dioxide measurements during 1992. The table listings are grouped alphabetically by

metropolitan area and arranged in descending order from the highest one-hour average.

**Table 6. NO<sub>2</sub> Summary 1992**

AIRS	Site Name	1-Hr		Annual	Percent Completeness
		High (ppb)	2nd (ppb)	Average (ppb)	
NAAQS ■				54	
<b>Austin-San Marcos MSA (TNRCC Region 11)</b>					
4530017S	Downtown 32	80	80	◆ 17	66
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>					
2450101P	SETRPC 40	127	117	5	86
3611001S	West Orange 9	80	60	12	98
2450102P	SETRPC 43	70	60	10	90
2450009S	Beaumont 2	50	50	8	97
3611100P	SETRPC 42	49	47	8	98
<b>Dallas-Fort Worth CMSA (TNRCC Region 4)</b>					
1130055L	Bonnieview	260	250	12	89
1130069L	Hinton	90	90	21	90
4391002S	Ft Worth NW 13	80	80	14	89
1130045S	Dallas N 5	70	70	14	86
<b>El Paso-Juarez Area TX NM MX (TNRCC Region 6)</b>					
1410027S	Downtown 6	230	160	31	84
1410037S	UTEP 12	130	130	21	90
<b>Houston-Galveston-Brazoria CMSA (TNRCC Region 12)</b>					
2011034S	East 1	360	110	17	87
2011035L	Clinton	140	110	23	82
2011037L	Crawford	110	100	28	81
2010047L	Lang	100	90	◆ 22	33
2010024S	Aldine 8	70	70	◆ 15	33
2010801P	HRM 1	☒	☒	27	95
2010803P	HRM 3	☒	☒	22	95
2010807P	HRM 7	☒	☒	19	98
2010804P	HRM 4	☒	☒	17	96
2010808P	HRM 8	☒	☒	13	97
0710901P	HRM 11	☒	☒	12	98
0710900P	HRM 10	☒	☒	8	95
1670056P	TCLMCM 34th St.	☒	☒	8	87
1670057P	TCLMCM Seawall	☒	☒	◆ 8	64

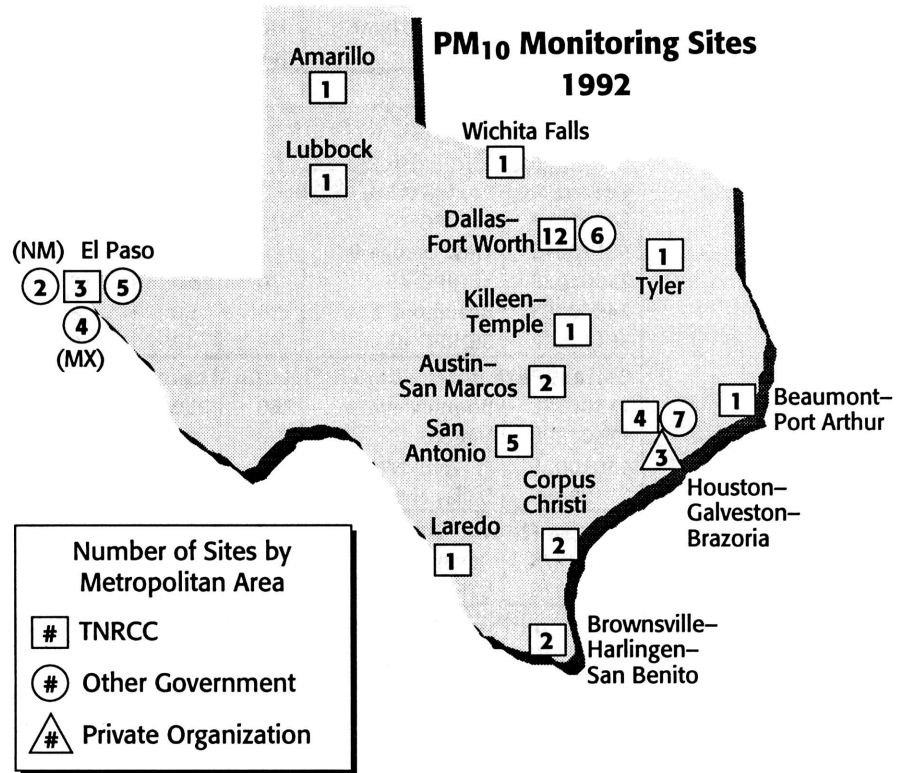
- L Local governmental agency monitoring site (at end of AIRS number)
- P Private monitoring site (at end of AIRS number)
- S State monitoring site (at end of AIRS number)
- Air pollution concentration required to exceed the NAAQS
- ☒ Data not available
- ◆ Less than 75% completeness; not valid for NAAQS comparison

## Respirable Particulate Matter

Particulate matter in the atmosphere is produced by a wide variety of natural and man-made sources. It includes both solid and liquid particles, except for water or ice, that can be emitted directly into the air or formed by chemical reactions in the atmosphere. Respirable particulate matter, particles below about 10 microns in size, are more likely to be deposited deep in the lungs, where they present the most direct health concern.

To violate the 24-hour standard for respirable particulate matter, the expected number of exceedance days must be 1.1 days or more over a three-year period. An exceedance day is each day that a 24-hour average of  $155 \mu\text{g}/\text{m}^3$  or more is measured. EPA-required calculations are used to arrive at the number of expected exceedance days to account for missing data.

To violate the annual standard, the annual average concentration must be  $51 \mu\text{g}/\text{m}^3$  or greater for a three-year period. Each annual average must be calculated from four complete calendar quarterly averages. For a calendar quarter to be complete, at least 75 percent of the scheduled samples must be valid.



During 1992, this pollutant was monitored by the TNRCC, and other government and private organizations at 58 sites in Texas. It was also monitored adjacent to El Paso at two sites in New Mexico and four sites in Mexico. The sampling schedules are either daily, every other day, or every sixth day, depending upon the expected probability of the site exceeding the standard. A respirable particulate matter exceedance day occurs if the 24-hour average exceeds the standard. Then, the expected exceedance days are determined from the actual number of measured exceedances with

adjustments to account for missing data according to EPA guidelines. In order to demonstrate attainment of the standard, the average annual number of expected exceedances must not exceed 1.0 day per year over a three-year period.

Table 7 provides a summary of the 1992 respirable particulate matter measurements at each monitoring site. The table listings are grouped alphabetically by metropolitan area and arranged in descending order from the highest 24-hour average.

**Table 7. PM<sub>10</sub> Summary 1992**

AIRS	Site Name	24-Hr High (µg/m <sup>3</sup> )	Exp Exc	Exp Exc 1990-92 (days/yr)	Annual Average (µg/m <sup>3</sup> )	Valid Days	Percent Completeness	Valid Qtrs
NAAQS ■		155		*1.1	51			
<b>Amarillo MSA (TNRCC Region 1)</b>								
3750004S	Amarillo	32	*0.0	***	*16.8	53	87	3
<b>Austin-San Marcos MSA (TNRCC Region 13)</b>								
4530010S	Ridgetop	78	0.0	*0.0	21.9	60	98	4
4530016S	East Austin	78	0.0	0.0	23.1	60	98	4
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>								
2450009S	Beaumont 2	108	0.0	0.0	25.7	59	97	4
<b>Brownsville-Harlingen-San Benito MSA (TNRCC Region 15)</b>								
0610004S	Brownsville	85	0.0	0.0	30.8	58	95	4
0612002S	San Benito	73	0.0	0.0	23.7	58	95	4
<b>Corpus Christi MSA (TNRCC Region 14)</b>								
3550020S	Navigation	98	*0.0	*0.0	*29.9	53	87	3
3550012S	Leopard	97	*0.0	**0.0	*28.2	54	89	3
<b>Dallas-Fort Worth CMSA (TNRCC Region 4)</b>								
1390006S	Midlothian 6	99	*0.0	***	27.9	49	80	3
1130018L	Morrell	91	0.0	0.0	29.5	57	93	4
1130035L	Coit	84	0.0	0.0	26.3	59	97	4
1130070S	Chalk Hill	82	0.0	**0.0	23.4	55	90	4
1130020L	Lancaster	78	0.0	0.0	22.2	57	93	4
1130057S	Boys Club	75	0.0	0.0	26.5	58	95	4
4390023S	Worth Hgts	70	0.0	0.0	24.7	58	95	4
1390084S	Midlothian 84	52	0.0	**0.0	18.9	61	98	4
1390008S	Midlothian 8	52	*0.0	***	*15.9	45	74	3
1130050L	Convention	51	*0.0	**0.0	*25.9	43	70	2
4390029L	FAA	51	0.0	*0.0	19.5	56	92	4
1390007S	Midlothian 7	50	*0.0	**0.0	*17.3	48	77	3
4390060L	Geddes	47	*0.0	**0.0	*20.2	51	84	3
1390004S	Midlothian 4	47	0.0	*0.0	17.2	58	95	4
1130072S	Cedar Hill	37	*0.0	***	*19.2	23	38	2
1390011S	Midlothian 11	34	*0.0	***	*16.4	21	34	1
1390005S	Midlothian 5	30	*0.0	***	*19.0	24	39	2
1390009S	Midlothian 9	21	*0.0	***	18.7	3	5	0
<b>El Paso-Juarez TX NM MX (TNRCC Region 6)</b>								
0060004L	Advance MX	314	10.0	**64.6	114.3	58	95	4
0060003L	Zenco MX	212	2.0	*14.2	58.3	56	92	4
0060002L	Pestalozzi MX	189	*2.0	**12.2	*58.2	50	82	3
1410002L	Tillman	166	2.0	2.1	39.9	337	92	4
1410041S	Vilas	146	0.0	0.0	43.6	59	97	4
0060001L	Techno MX	135	0.0	0.0	40.3	55	90	4
1410038L	Riverside	116	0.0	0.0	32.3	57	93	4
1410044L	Chamizal	113	*0.0	**0.0	*25.5	320	87	3
0130016S	Anthony NM	110	0.0	0.0	39.1	175	97	4
0130017S	Sunland NM	109	0.0	0.0	32.0	359	98	4
1410043S	Socorro	88	0.0	*0.0	41.0	57	93	4
1410029L	Ivanhoe	49	0.0	*0.0	22.0	59	97	4
1410010L	NE Clinic	47	0.0	0.0	21.1	59	97	4
1410045S	Lindbergh	41	0.0	0.0	22.0	58	95	4

- L Local governmental agency monitoring site (added to end of AIRS site number)
- P Private monitoring site (added to end of AIRS site number)
- S State monitoring site (added to end of AIRS site number)
- Air pollution concentration required to exceed the NAAQS
- \* Expected number of days over 155 µg/m<sup>3</sup>; annual average not to exceed 1.1 days per year over a three-year period
- \* Each \* indicates one year not meeting EPA completeness criteria; not valid for NAAQS comparison
- ⊕ Including exceptional event days when unusual, uncontrollable events occurred (primarily dust storms)
- ☒ Data not available

**Table 7. PM<sub>10</sub> Summary 1992☉ (continued)**

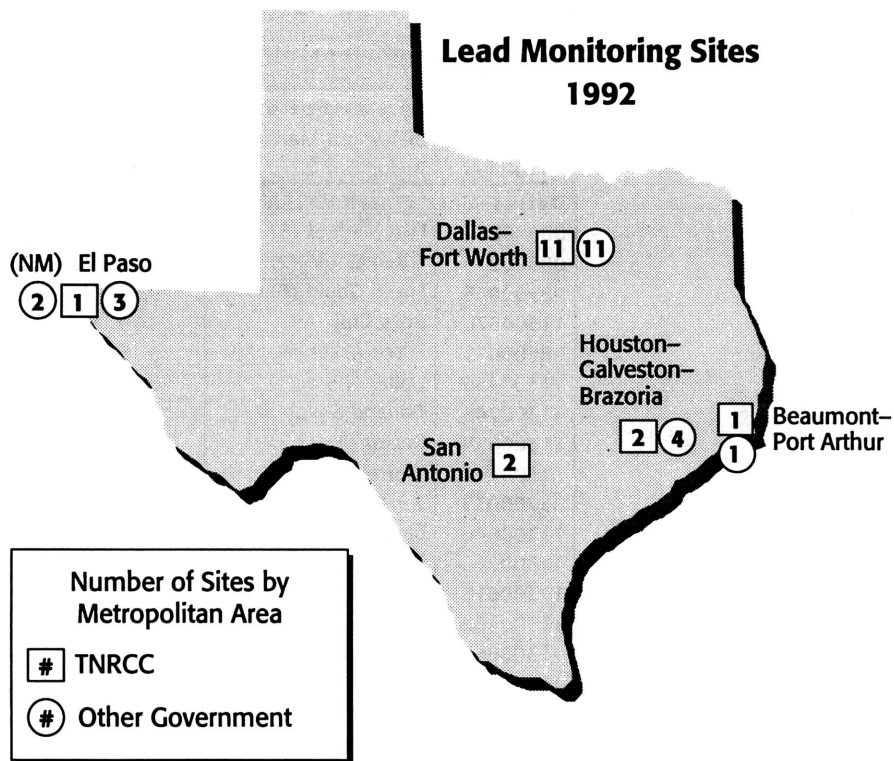
AIRS	Site Name	24-Hr High (µg/m <sup>3</sup> )	Exp Exc	Exp Exc 1990-92 (days/yr)	Annual Average (µg/m <sup>3</sup> )	Valid Days	Percent Completeness	Valid Qtrs
NAAQS ■		155		*1.1	51			
<b>Houston-Galveston-Brazoria CMSA (TNRCC Region 12)</b>								
2015002S	Pasadena	114	*0.0	***	*31.9	48	79	3
1671002S	Texas City 10	111	*0.0	***	*24.8	48	79	3
2010054L	Kress	108	0.0	*0.0	33.9	60	98	4
2011035L	Clinton	103	0.0	**0.0	38.3	176	97	4
1670053L	Tx City Nessler	103	*0.0	***	*23.8	39	64	1
2010062L	Monroe	103	*0.0	**0.0	*27.5	52	85	3
2011037L	Crawford	103	0.0	0.0	29.7	57	93	4
2010803P	HRM 3	102	☒	☒	34.0	☒	☒	☒
2010045L	Bingle	100	0.0	*0.0	25.8	57	93	4
2011034S	East 1	99	*0.0	**0.0	*33.8	45	74	2
2010801P	HRM 1	97	☒	☒	30.0	☒	☒	☒
2010024S	Aldine 8	62	*0.0	***	*29.9	46	75	2
1670004L	Tx City Fire Sta	50	*0.0	**0.0	*22.7	41	67	2
2010807P	HRM 7	48	☒	☒	22.0	☒	☒	☒
<b>Killeen-Temple MSA (TNRCC Region 9)</b>								
0270001S	Temple	63	0.0	*0.0	18.0	60	98	4
<b>Laredo MSA (TNRCC Region 15)</b>								
4790015S	Laredo	123	*0.0	***	*32.5	48	79	2
<b>Lubbock MSA (TNRCC Region 2)</b>								
3030001S	Lubbock	78	0.0	0.0	22.1	170	94	4
<b>San Antonio CMSA (TNRCC Region 13)</b>								
0290036S	North 7	74	0.0	0.0	21.4	61	100	4
0290034S	Texas Culture	72	0.0	0.0	28.6	59	97	4
0290042S	East Kelly	58	0.0	*0.0	25.0	59	97	4
0910004S	New Braunfels 4	22	*0.0	***	*10.9	14	23	1
0910003S	New Braunfels 3	20	*0.0	***	*12.6	14	23	1
<b>Tyler MSA (TNRCC Region 5)</b>								
4230003S	Tyler	75	0.0	*0.0	19.4	53	87	4
<b>Wichita Falls MSA (TNRCC Region 3)</b>								
4850002S	Wichita Falls	65	*0.0	**0.0	*22.5	49	80	3

- L Local governmental agency monitoring site (at end of AIRS number)
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- S State monitoring site (at end of AIRS number)
- Air pollution concentration required to exceed the NAAQS
- \* Expected number of days over 155 µg/m<sup>3</sup>; annual average not to exceed 1.1 days per year over a three-year period
- \* Each \* indicates one year not meeting EPA completeness criteria; not valid for NAAQS comparison
- ☉ Including exceptional event days when unusual, uncontrollable events occurred (primarily dust storms)
- ☒ Data not available



## Lead

Lead was analyzed from particulate filters collected at 36 monitoring sites in Texas by the TNRCC and other government organizations during 1992. In addition, New Mexico operated two monitors across the state line from El Paso. All these sites are shown in the adjacent map. In most areas of the state, lead in the ambient air is the result of automotive sources burning leaded fuels. In a few areas, lead is also released into the air by lead smelters. Since leaded gasoline is being phased out, atmospheric lead from automotive sources has been decreasing in recent years. Lead occurs in the ambient air as particulate matter and is collected on high-volume filters with other particulate matter. The filters are subjected to x-ray fluorescence or atomic absorption analysis to determine lead content. The standard is violated if the average concentration of lead measured during one



calendar year quarter is  $1.55 \mu\text{g}/\text{m}^3$  or greater.

In the past, the lead standard was exceeded only at monitoring sites near active lead smelters. The highest lead levels in 1992 were recorded at sites that were near lead smelters in the Dallas and El Paso metropolitan areas.

Table 8 provides a summary of the 1992 lead measurements at each monitoring site. The table listings are grouped alphabetically by metropolitan area and arranged in descending order from the highest quarterly average.

**Table 8. Lead Summary 1992**

AIRS	Site Name	Qtr High ( $\mu\text{g}/\text{m}^3$ )	No. of Qtrs Exc NAAQS	Valid Days	Valid Qtrs
NAAQS ■		1.55			
<b>Beaumont-Port Arthur MSA (TNRCC Region 10)</b>					
2451010L	Beaumont Marina	0.02	0	15	1
2450009S	Beaumont 2	0.02	0	57	4
<b>Dallas-Fort Worth CMSA (TNRCC Region 4)</b>					
0850003S	Frisco 5th St (3) Ⓢ	0.91	0	60	4
0850002S	Frisco Gould (2) Ⓢ ✕	0.58	0	10	0
0850006S	Frisco Gould (6) Ⓢ ✕	0.25	0	34	2
1130057L	Boys Club Ⓢ	0.19	0	103	4
0850001S	Frisco Acker Ⓢ	0.13	0	58	4
1130045S	Dallas N 5	0.09	0	54	4
1130074S	Garland Shiloh Ⓢ	0.08	0	45	3
1130065L	Rector Ⓢ	0.06	0	363	4
1130018L	Morrell	0.06	0	60	4
2570003S	Terrell Virginia	0.06	0	23	1
1130064L	Sargent Ⓢ	0.05	0	364	4
1130073S	Palmer Paper Ⓢ	0.05	0	57	4
1130061L	Earhart	0.05	0	58	4
1130046L	M L King	0.05	0	61	4
1130066L	Nolen Ⓢ	0.04	0	364	4
1130050L	Convention	0.04	0	60	4
1130029L	Douglas	0.04	0	57	4
4391003S	Ft Worth Dtn 16	0.03	0	56	4
1130047L	Sunnyvale	0.03	0	76	3
1130071S	Farmers Branch	0.03	0	60	4
4390023S	Worth Heights	0.02	0	58	4
1310070L	Chalk Hill	0.02	0	54	4
<b>El Paso-Juarez Area TX NM MX (TNRCC Region 6)</b>					
0130004S	Race Track NM	0.40	0	61	4
0130017S	Sunland NM	0.38	0	61	4
1410002L	Tillman	0.26	0	60	4
1410027S	Downtown 6	0.22	0	57	4
1410033L	Kern	0.17	0	55	4
1410010L	Northeast	0.10	0	60	4
<b>Houston-Galveston-Brazoria CMSA (TNRCC Region 12)</b>					
2010054L	Kress	0.02	0	60	4
2011035L	Clinton	0.02	0	56	4
1671002S	Texas City 2	0.02	0	56	4
2011034S	Houston East	0.02	0	58	4
2010048L	Fulton	0.01	0	57	4
2010045L	Bingle	0.01	0	59	4
<b>San Antonio MSA (TNRCC Region 13)</b>					
0290034S	ITC	0.03	0	60	4
0290050S	Airport	0.02	0	61	4

L Local governmental agency monitoring site (at end of AIRS number)

S State monitoring site (at end of AIRS number)

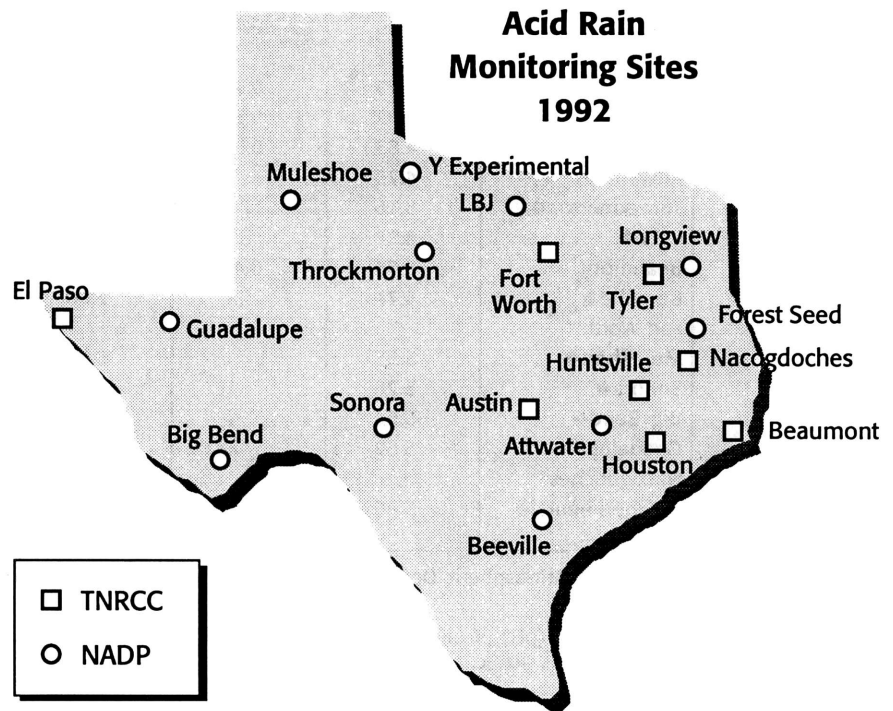
■ Air pollution concentration required to exceed the NAAQS

Ⓢ Site near lead smelter

✕ Relocated during 1992

## Acid Rain

Acid rain was monitored by the TNRCC or the federal government at 19 sites in Texas during 1992. During that year, the TNRCC participated in the National Atmospheric Deposition Program (NADP) and National Trends Network (NTN) by sponsoring automated samplers in Longview and Forest Seed that captured rainfall over one-week periods. These samples were forwarded to the NADP for analysis and the results were published. The TNRCC also conducted seven-day rainfall sampling at Huntsville and event monitoring at seven additional locations shown in the adjacent map. Event samples were collected during individual rainstorms, and pH and conductivity of the samples were measured immediately in the field. The samples were then forwarded to Austin where pH



and conductivity measurements were repeated.

The pH scale is a logarithmic measure of acidity or alkalinity. A pH of 7 is neutral, with higher numbers corresponding to increased alkalinity and lower numbers to increased acidity.

Unpolluted rainwater has a slightly acidic pH of 5.6. This acidity is caused by the formation of carbonic acid from carbon monoxide in the atmosphere.

Table 9 provides a summary of acid rain measurements during 1992.

**Table 9. Acid Rain Summary 1992**

Site	Average pH	Standard Deviation	Maximum pH	Minimum pH	Number of Samples
Longview♣	4.60		6.15	4.15	43
Austin	5.00	0.03	5.36	4.41	15
Forest Seed♣	4.87		6.65	4.06	44
Huntsville	4.79	0.21	5.02	4.34	16
Tyler	4.82	0.36	5.28	4.43	4
Houston	4.83	0.50	5.95	4.04	17
Attwater♣	4.79		6.66	4.20	36
Throckmorton♣	5.16		6.19	4.64	9
L.B.J.♣	4.94		7.46	4.07	40
Beaumont	5.03	0.40	5.54	4.45	11
Beeville♣	4.71		7.00	3.87	38
Fort Worth					0
Muleshoe♣	5.55		6.97	4.76	30
Sonora♣	5.26		7.26	4.30	41
Big Bend♣	5.54		7.42	4.94	35
Guadalupe♣	5.52		7.66	4.77	34
Nacogdoches					0
Y Experimental♣	5.40		7.22	4.86	11
El Paso					0

♣ National Atmospheric Deposition Program/National Trends Network site

**Note:** Acidity (pH) of unpolluted rainwater is 5.6. Lower values are more acidic and higher values are less acidic.

# ***Abbreviations/Acronyms***

## ***Pollutants***

CO	Carbon monoxide
NO <sub>2</sub>	Nitrogen dioxide
O <sub>3</sub>	Ozone
PM <sub>10</sub>	Particulate matter of ten microns or less
SO <sub>2</sub>	Sulfur dioxide

## ***Measurement Units***

pH	a measure of acidity
ppb	parts per billion (volume ratio)
ppm	parts per million (volume ratio)
µg/m <sup>3</sup>	micrograms (10 <sup>-6</sup> grams) per cubic meter

## ***Other***

2nd Day	Second highest daily maximum one-hour average
Ann	Annual
AIRS	Aerometric Information Retrieval System
CMSA	Consolidated Metropolitan Statistical Area
days/yr	days per year
EPA	U. S. Environmental Protection Agency
Exc	Exceedances (number of times NAAQS was exceeded)
Exp Exc	Expected Exceedances (for O <sub>3</sub> and PM <sub>10</sub> using EPA methods)
Hr	Hour
HRM	Houston Regional Monitoring Corporation
MSA	Metropolitan Statistical Area
MX	Mexico
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NM	New Mexico
No.	Number
NTN	National Trends Network
PMSA	Primary Metropolitan Statistical Area
Qtr(s)	Quarter (calendar)
SETRPC	Southeast Texas Regional Planning Commission
TCLMCM	Texas City/La Marque Community Air Monitoring Network
TNRCC	Texas Natural Resource Conservation Commission





