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Environmental Monitoring Series

# CARBON MONOXIDE LEVELS IN CHARLOTTE, NORTH CAROLINA



Environmental Monitoring and Support Laboratory  
Office of Research and Development  
U.S. Environmental Protection Agency  
Las Vegas, Nevada 89114

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IN CHARLOTTE, NORTH CAROLINA

by

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## INTRODUCTION AND SUMMARY

A review of the air quality data for Charlotte, North Carolina, taken over the last 3 years (1973-1976)-has shown excessively high ambient carbon monoxide readings. Carbon monoxide levels exceeding the Federal 8-hour average standard were a regular occurrence. The Region IV office of the U.S. Environmental Protection Agency requested assistance from the Monitoring Operations Division of the Environmental Monitoring and Support Laboratory in Las Vegas, Nevada, to determine if the elevated carbon monoxide concentrations are indicative of an area-wide problem or of a localized "hot spot," and to determine if a more comprehensive study designed to collect enough data for modeling the area is necessary.

Arrangements were made by the Environmental Health Division of the Mecklenburg County Health Department for four sampling locations. The positions of the four temporary sampling locations and the position of the County station are shown in Figure 1. Personnel and equipment were deployed from Las Vegas during the second and third weeks of April 1976, and data collection began on April 21. Problems were encountered with controlling the temperature at some of the sampling locations and this in turn caused problems with the air monitors. It was necessary to replace two carbon monoxide monitors with instruments that were less temperature sensitive. Overall, at least 16 days of data were taken at each site that could be compared with data at the County site. Wind speed and direction data were obtained from the U.S. Weather Service station near Douglas Municipal Airport. Data collection ceased on May 20. Hourly averages and maximum 8-hour averages have been prepared, and are analyzed in the body of this report.

## CONCLUSIONS AND RECOMMENDATIONS

The maximum 8-hour averages of carbon monoxide data collected at the County station were found to be higher than those collected at the four temporary sites by factors of 1.4, 1.6, 2.7, and 3.3. Based on these data, it is concluded that the carbon monoxide readings reported by the Mecklenburg County Station are not representative of the metropolitan area of the city of Charlotte.

Monthly maximum carbon monoxide concentrations seem to have followed a decreasing trend since mid-1973; however, further monitoring is necessary to confirm if such a trend exists or if the decreases were caused by some short term changes in meteorology.

Since the data reveal that the Mecklenburg County station is situated at a "hot spot," a more comprehensive study designed to collect data over the greater metropolitan area and to model the carbon monoxide distribution seems unnecessary. Rather, efforts should be directed toward characterizing and controlling the "hot spot."

The data taken by the County station should not be considered representative for the city of Charlotte. A better picture of carbon monoxide concentrations in the metropolitan area can be obtained by dividing the County readings by a factor between 1.4 and 3.4; a rough approximation would be to divide by 2. This type of approximation should only be applied to old data and where no other monitoring data exist. The only valid method to obtain carbon monoxide data that are truly representative of the city is for the County to add additional monitoring sites.

## EXPERIMENTAL PROCEDURES

### Equipment

Four Beckman/Andros 7000 Dual-Isotope Fluorescence carbon monoxide (CO) monitors were deployed for the study. Hewlett-Packard/Moseley 680 recorders were used to collect the data. Problems with zero drift appeared during the first week of set up with two of the Beckman/Andros carbon monoxide monitors, and these two instruments were replaced with Bendix 8501 infrared carbon monoxide analyzers.

### Calibration and Standards

Each monitor was zeroed and spanned every week day during the study. Zero readings were obtained from catalytic scrubbers until May 13, 1976, when a zero air cylinder was obtained from EPA-Athens, Georgia. The zero air cylinder was compared to the zero air obtained from each of the scrubber systems. The commercial zero air cylinder was found to have a concentration of 0.7 parts per million (ppm) of carbon monoxide contaminant. The proper corrections were made to the data collected by the temporary monitoring stations. Zero drift was assumed to be linear between calibrations and the appropriate correction was applied to each hourly average.

The span of each instrument was checked at the same time that the zero was adjusted. Span drift was generally less than 2 percent of full scale. The span value used for calculating concentrations was the average of the readings taken before and after each day's sampling period.

A cross-calibration quality control check was performed on each of the four temporary monitors on April 29-30, 1976 by EPA-Athens, Georgia. The commercial standard used by the Athens lab was rated at 9.5 parts per million, the cross check on each of the four temporary monitors using the span factors calculated from the commercial standard used by Las Vegas produced values of 9.5, 9.6, 9.5, and 9.4. The agreement was remarkably good; however, the commercial standard used by Las Vegas was subsequently compared to a National Bureau of Standards Standard Reference Material and found to be 2.5 percent high. The data for the four temporary stations are corrected to the NBS values. The values reported by the County are referenced to the Region IV standard. The net effect would be to introduce an imprecision between the two sets of data of 2.5 percent.

The errors introduced by inaccurate standards coupled to errors introduced in making zero baseline corrections result in an estimated precision between the EPA data and the county data of  $\pm 5$  percent.

### Sampling Locations and Procedures

The carbon monoxide monitors were set up at sites arranged by the Mecklenburg County Health Department. Three county fire stations and a local court house were used as sampling sites. The instruments were set up on the second floor of each building and teflon sampling lines were run to the outside of the buildings. The intake port of the sampling lines were situated 3 meters above the ground and 1.5 meters away from the wall of the building. The locations of all sampling stations, both the temporary stations and the permanent county stations, are shown in Figure 1.

### Meteorological Data

Hourly surface weather conditions were furnished by the National Weather Service. The data were taken at Douglas Municipal Airport in Charlotte, North Carolina, which is 8.8 kilometers 261° from true north from the County monitoring station. The wind speed is recorded in the appendices in knots, as given by the National Weather Service (1 knot = 1.85 kilometers per hour). The reported data were taken at five minutes before the hour and are not hourly averages.

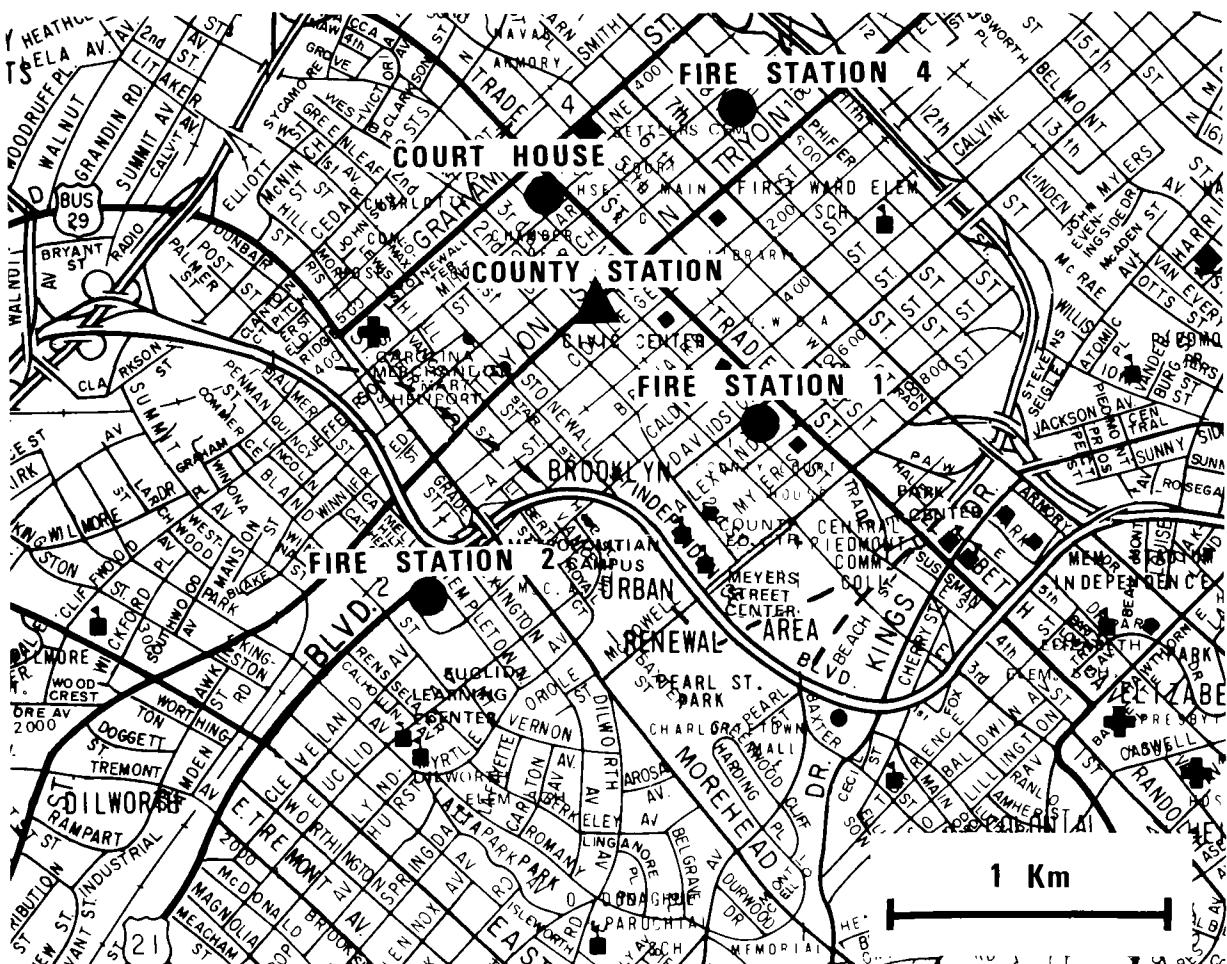


Figure 1. Location of Sampling Stations in the Central Charlotte Area.

## RESULTS

The hourly averages of carbon monoxide concentration for the four temporary monitoring stations and the County station are summarized in the Appendix. Hourly wind speed and direction readings are also given. The maximum 8-hour average concentrations and the time period covered during the 8 hours were calculated and are summarized in the Appendix.

A comparison of the maximum 8-hour average times is quite interesting. Typically, the four temporary sites had their maximum weekday 8-hour averages in time periods centered around either the morning or evening rush hour traffic. The highest readings at the County station, however, often occurred after the morning rush period and before the evening rush. The County station showed rapid increases in carbon monoxide concentration due to heavy morning and evening rushes, but the traffic patterns throughout the midday seem to be extremely high. The County station has its probe located approximately 3 meters above the sidewalk next to a busy downtown street. The street is bordered by banks, stores, and other office buildings which one might expect to draw a lot of midday business. Additionally, tall buildings around the sampling site would tend to prevent ventilation of the pollutants. The net effect would seem to result in the midday values.

The direction of the wind seems to have an effect on the concentration of carbon monoxide at the County station. The highest 8-hour averages at the County station (April 23, 30, May 10, and 17) occurred when the wind was blowing from the southwest. The monitor is situated next to a street that runs southwest-northeast. In other words, the highest values occur when the wind is blowing along the street.

The maximum 8-hour averages from the four temporary sites and the County site are summarized in Table 1 by date. By examining days when each of the temporary stations had data in common with the County station, it is possible to quantify the amount of bias in the data due to the site location. Fire Station 1 had 22 days of data in common with the County station. Fire Station 2 and the court house each had 17 days of data in common with the County station, and Fire Station 4 had 16 days in common with the County station.

Averages of the maximum 8-hour averages were prepared for each station and for the County station for the days when the stations had data in common. These averages and the ratios are presented in Table 2. The maximum 8-hour average carbon monoxide concentrations at the County station are 1.4 times as high as those at the temporary site in Fire Station 1. The County station data are 3.4 times as high as the data at Fire Station 2, 2.7 times as high as data from Fire Station 4 and 1.6 times as high as the data from the court house site. From these ratios, it must be concluded that the carbon monoxide readings reported for the past few years are not representative of the city

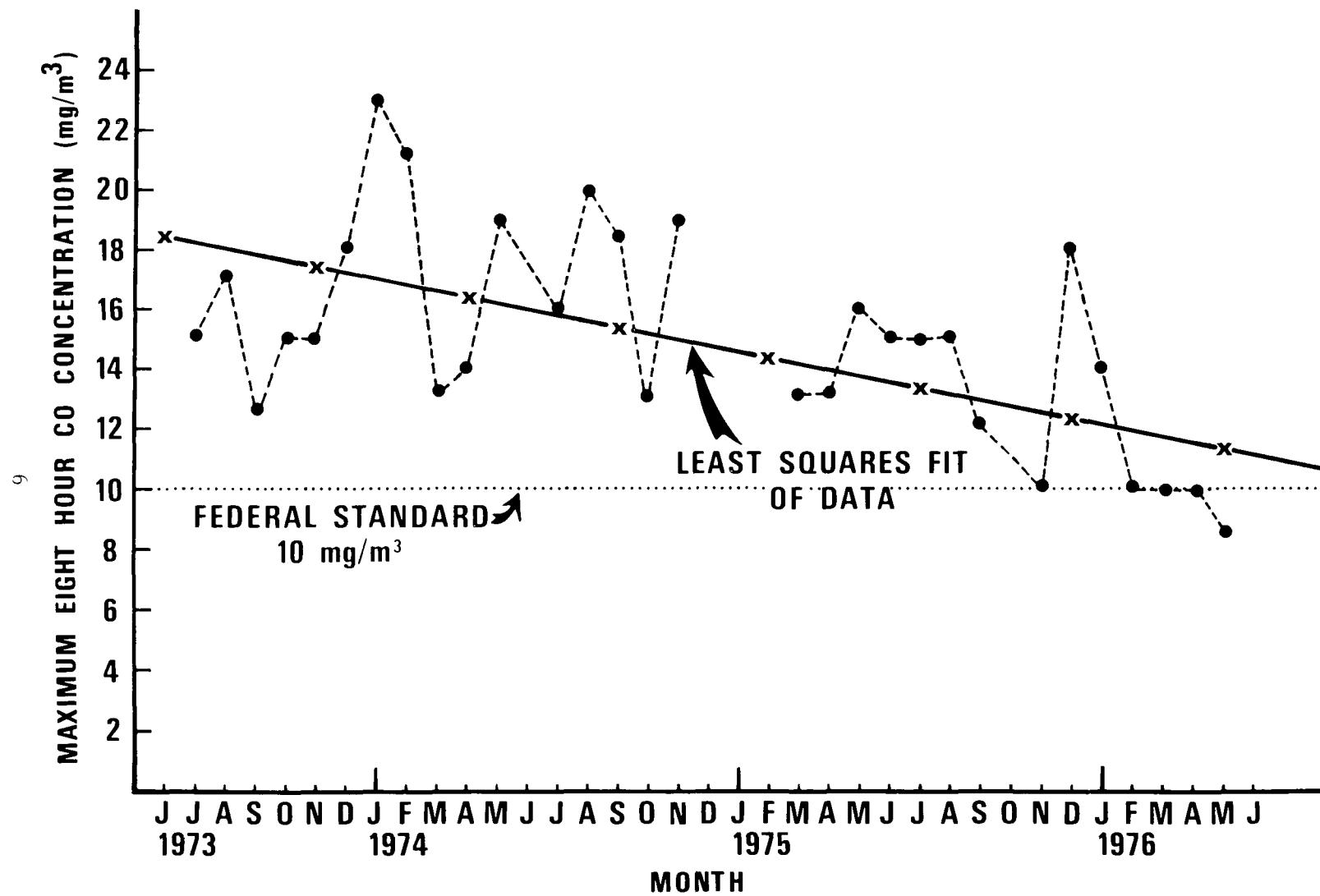


Figure 2. Maximum 8-hour Carbon Monoxide Concentrations by Month.

TABLE 1. MAXIMUM 8-HOUR AVERAGES ( $\text{mg}/\text{m}^3$ )

Dates (1976)	Fire Station 1	Fire Station 2	Fire Station 4	Court	County Station
<b>April:</b>					
22	-	-	-	-	3.7
23	5.5	-	-	-	9.2
24	3.2	-	-	-	3.4
25	0.9	-	-	-	2.6
26	2.7	-	-	-	1.8
27	4.0	1.2	-	3.6	3.0
28	3.6	1.2	-	2.5	4.4
29	4.7	2.2	-	-	5.6
30	2.6	1.1	-	3.8	8.5
<b>May:</b>					
1	2.3	1.7	1.0	3.0	3.5
2	2.4	1.6	0.9	1.3	2.8
3	3.0	1.1	1.1	4.1	-
4	3.7	1.5	0.9	4.4	3.1
5	1.4	0.5	1.3	-	6.3
6	-	-	1.7	3.1	5.7
7	-	1.1	1.7	4.1	6.6
8	3.6	3.7	2.1	3.2	3.6
9	2.9	1.9	1.5	1.7	3.1
10	3.8	1.3	2.4	4.6	8.3
11	3.3	-	2.1	3.4	7.1
12	6.8	-	-	-	5.2
13	-	-	3.3	3.0	6.2
14	4.0	0.6	2.4	2.7	5.9
15	3.0	1.3	1.6	2.2	3.8
16	1.3	0.8	1.3	0.8	1.9
17	3.0	1.2	2.4	4.4	7.5
18	3.0	1.0	2.4	3.9	-
19	2.8	1.6	2.0	-	2.5
20	3.7	2.2	2.3	-	-

TABLE 2. AVERAGE OF MAXIMUM 8-HOUR AVERAGES FOR COMMON DAYS ( $\text{mg}/\text{m}^3$ )

Temporary Station Location	Concentration	County Station Concentration	Ratios	Common Days
Fire Station 1	3.3	4.7	$\frac{4.7}{3.3} = 1.4$	23
Fire Station 2	1.4	4.8	$\frac{4.8}{1.4} = 3.4$	17
Fire Station 4	1.8	4.9	$\frac{4.9}{1.8} = 2.7$	16
Court House	3.1	5.0	$\frac{5.0}{3.1} = 1.6$	17

of Charlotte, and better values for representative data can be obtained by dividing the data from the County station by a factor between 1.4 and 3.4; a conservative factor would be to divide by 2. This practice provides only approximations, and a true picture of the Charlotte area can only be obtained by the addition of more monitoring stations by the County.

It is interesting to note that during the period covered by this study, no violations of the Federal 8-hour standard were observed at the four temporary sites or the County site. These data seem to fit into a pattern. The data for the maximum 8-hour carbon monoxide readings at the County site for the months when the study took place (April and May) are plotted in Figure 2 along with the maximum 8-hour readings for previous months since July 1973. A decreasing trend seems obvious, and a least squares fit of the data indicates that carbon monoxide 8-hour maximum levels at the County station have decreased, on the average, about 30 percent over the past 3 years. It would seem that even though the County station is situated at a "hot spot," the quality of the air at this location is improving. Such decreases in maximum 8-hour averages could be caused by temporary changes in meteorological conditions over the past 2 years, and may be only temporary. Monitoring at this location should be continued for a number of years to confirm or disprove the existence of such a trend. County air pollution officials were unaware of any reasons for such a decreasing trend. However, the Region may wish to investigate possible changes in traffic or industrial emissions and changes in meteorological conditions during this period that could have caused such an apparent trend to develop.

It should be noted that even though a decrease in carbon monoxide concentrations appears to have occurred, the Federal 8-hour standard is still being violated regularly at the County site and control actions are indicated.

## APPENDIX

### HOURLY CARBON MONOXIDE AND WIND DATA

#### Notes:

- (1) F.S. 1 = Mecklenburg County Fire Station 1  
F.S. 2 = Mecklenburg County Fire Station 2  
F.S. 4 = Mecklenburg County Fire Station 4
- (2) Wind speed is given in knots and direction in degrees from true north.
- (3) cal = Data missing because of instrument calibration.

WEDNESDAY, 21 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	<u>F.S. 1</u>	<u>F.S. 2</u>	<u>F.S. 4</u>	<u>COURT HOUSE</u>	<u>COUNTY STATION</u>	<u>WIND SPEED</u>	<u>WIND DIRECTION</u>
0000-0100					1.0	6	180
0100-0200					1.0	6	180
0200-0300					0.6	5	180
0300-0400					0.6	5	180
0400-0500					1.0	3	160
0500-0600					1.0	4	140
0600-0700					2.9	4	170
0700-0800					6.5	8	220
0800-0900					7.5	9	220
0900-1000					7.8	9	220
1000-1100					7.8	11	210
1100-1200					7.2	8	200
1200-1300					7.2	10	180
1300-1400					8.4	12	210
1400-1500					7.2	12	200
1500-1600					5.2	10	180
1600-1700					cal	11	200
1700-1800	1.8				5.5	12	170
1800-1900	1.6				2.9	8	180
1900-2000	1.4				2.0	8	180
2000-2100	1.0				2.0	8	170
2100-2200	0.6				1.6	10	230
2200-2300	0.5				1.3	15	200
2300-2400	0				0.6	8	180

Maximum 8-hour average	7.45		
Time period for 8-hour maximum	0700- 1500		
Mean winds	9.9	208°	
Time period	0700-1500		

THURSDAY, 22 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	<u>F.S. 1</u>	<u>F.S. 2</u>	<u>F.S. 4</u>	<u>COURT HOUSE</u>	<u>COUNTY STATION</u>	<u>WIND SPEED</u>	<u>WIND DIRECTION</u>
0000-0100					0.3	10	220
0100-200					0.6	8	190
0200-0300					1.0	5	180
0300-0400					0.6	5	180
0400-0500					1.0	7	160
0500-0600					1.3	7	220
0600-0700					2.6	6	220
0700-0800					6.2	8	260
0800-0900					cal	7	330
0900-1000					cal	7	020
1000-1100					2.6	8	340
1100-1200					2.6	3	140
1200-1300	1.8				4.9	8	300
1300-1400	2.5				3.9	5	330
1400-1500	2.1				2.0	7	330
1500-1600	2.3				2.3	4	020
1600-1700	1.9				2.6	8	280
1700-1800	3.4				2.6	6	260
1800-1900	1.6				1.3	3	260
1900-2000	4.4				5.2	3	230
2000-2100	8.4				5.5	3	240
2100-2200	8.2				6.8	5	270
2200-2300	5.8				2.6	3	280
2300-2400	3.0				2.6	calm	calm
Maximum 8-hour average					3.7		
Time period for 8-H max.					1600- 2400		
Mean winds						4.4	260°
Time period						1600-2400	

FRIDAY, 23 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	1.0				2.0	6	350
0100-0200	2.4				1.3	6	360
0200-0300	2.1				1.3	8	350
0300-0400	1.4				1.0	5	350
0400-0500	1.3				0.6	5	350
0500-0600	0.9				1.0	3	320
0600-0700	2.3				1.3	5	010
0700-0800	6.7				3.3	4	010
0800-0900	11.0				3.3	7	010
0900-1000	7.0				2.6	8	360
1000-1100	5.6				3.9	9	010
1100-1200	2.9				6.5	4	230
1200-1300	3.6				9.1	5	230
1300-1400	3.4				7.8	6	260
1400-1500	2.9				11.0	3	160
1500-1600	2.5				9.1	7	240
1600-1700	cal				13.6	8	230
1700-1800	2.2				11.4	10	210
1800-1900	1.4				5.2	6	190
1900-2000	2.6				3.3	5	190
2000-2100	3.8				3.3	3	140
2100-2200	5.2				2.9	5	220
2200-2300	8.3				4.2	calm(0)	calm
2300-2400	8.9				3.9	calm(0)	calm
Maximum 8-hour average	5.5				9.2		
Time period for 8-H max.	1900- 0300				1100- 1900		
Mean winds						4.6	192°
Time period						1100- 0300	

SATURDAY, 24 APRIL 76

TIME (EDT)	CONCENTRATIONS (mg/m <sup>3</sup> )						WIND SPEED	WIND DIRECTION
	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION			
0000-0100	7.8				3.9		4	110
0100-0200	5.4				2.6		6	170
0200-0300	2.3				1.6		3	110
0300-0400	1.5				1.6		calm(0)	calm
0400-0550	1.8				1.0		calm(0)	calm
0550-0600	2.9				1.0		calm(0)	calm
0600-0700	2.1				2.0		3	130
0700-0800	1.5				2.6		4	220
0800-0900	1.4				2.9		9	210
0900-1000	1.5				3.3		11	250
1000-1100	1.2				3.3		12	250
1100-1200	1.1				3.3		16	200
1200-1300	1.1				2.9		12	180
1300-1400	1.1				3.3		12	190
1400-1500	1.3				2.6		14	200
1500-1600	1.1				2.9		15	230
1600-1700	1.3				3.0		9	200
1700-1800	1.3				3.9		11	230
1800-1900	1.9				3.6		6	210
1900-2000	2.1				3.6		8	200
2000-2100	2.3				3.9		6	220
2100-2200	1.4				3.3		7	170
2200-2300	0.8				2.0		9	180
2300-2400					1.6		8	170

Maximum			
8-hour			
average	3.2		3.4

Time period			
for 8-H max.	0000-	1400-	
	0800	2200	

Mean winds		7.3	194°
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Time period	0000-2200
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SUNDAY, 25 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. <u>1</u>	F.S. <u>2</u>	F.S. <u>4</u>	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.5				1.3	12	190
0100-0200	0.4				1.6	12	200
0200-0300	0.4				1.3	12	180
0300-0400	0.3				1.3	11	210
0400-0500	0.2				1.3	9	200
0500-0600	0.2				1.0	10	190
0600-0700	0.3				0.3	11	190
0700-0800	0.3				1.0	13	200
0800-0900	0.7				1.6	16	200
0900-1000	0.7				1.6	14	200
1000-1100	0.5				2.6	12	220
1100-1200	0.7				3.6	10	210
1200-1300	0.6				2.3	14	240
1300-1400	0.5				2.6	13	220
1400-1500	0.5				2.9	14	220
1500-1600	0.5				2.3	16	240
1600-1700	0.7				2.3	19	240
1700-1800	1.0				2.3	15	230
1800-1900	0.7				2.3	11	230
1900-2000	1.0				2.3	11	240
2000-2100	1.1				2.3	14	240
2100-2200	1.1				1.3	14	240
2200-2300	1.0				1.0	11	240
2300-2400	0.9				0.6	11	230

Maximum  
8-hour  
average      0.9                          2.6

Time period  
for 8-H max. 1600-  
                  2400                                  1000-  
    1800

Mean winds    13.2                                  231°

Time period    1000-2400

MONDAY, 26 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	F.S. <u>1</u>	F.S. <u>2</u>	F.S. <u>4</u>	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.7				0.6	10	240
0100-0200	0.7				0.6	5	300
0200-0300	0.6				1.0	4	300
0300-0400	0.6				1.3	5	330
0400-0500	0.7				1.0	6	330
0500-0600	0.9				1.3	6	320
0600-0700	2.5				1.3	5	310
0700-0800	5.3				2.0	7	310
0800-0900	2.6				1.6	10	340
0900-1000	2.4				2.0	9	360
1000-1100	2.5				1.6	12	320
1100-1200	2.5				1.6	13	330
1200-1300	2.2				1.6	14	330
1300-1400	1.8				1.6	15	300
1400-1500	1.9				2.0	12	310
1500-1600	2.1				2.0	14	340
1600-1700	1.8			3.5	2.3	14	320
1700-1800	0.8			1.5	1.0	12	340
1800-1900	0.7			2.0		8	330
1900-2000	0.9			2.1		6	330
2000-2100	0.5	0.8		1.5		6	340
2100-2200	1.7	0.6		1.4		9	030
2200-2300	1.4	0.5		0.4	1.3	17	030
2300-2400	0.9	0.2		0.2	1.6	9	040

Maximum  
8-hour  
average      2.7                          1.8

Time period  
for 8-H max. 0600-  
                  1400                                  0900-  
    1700

Mean winds    11.4        325

Time period    0600-1200

TUESDAY, 27 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.7	0.2		0	1.3	8	040
0100-0200	0.5	0.2		0.1	1.0	3	090
0200-0300	0.6	0.3		0	1.0	4	350
0300-0400	0.5	0.2		0.2	1.0	3	060
0400-0500	0.8	0.3		0.3	1.0	5	060
0500-0600	1.7	0.7		1.4	1.3	4	040
0600-0700	6.5	2.1		5.6	2.9	5	040
0700-0800	10.2	2.9		7.5	3.6	7	020
0800-0900	4.6	1.0		4.3	2.3	8	020
0900-1000	2.7	1.1		3.2	2.9	9	310
1000-1100	1.9	0.6		2.6	cal	7	280
1100-1200	1.9	0.7		2.0	4.2	8	260
1200-1300	2.1	0.7		1.9	2.3	10	260
1300-1400		0.6		1.9	2.3	10	300
1400-1500	1.8	0.6		1.8	1.3	10	220
1500-1600	1.6	0.9		2.0	1.6	10	270
1600-1700	2.5	1.2		2.8	1.6	4	290
1700-1800	1.0	1.3		1.2	1.0	4	060
1800-1900	1.4	0.9		1.3	1.0	5	360
1900-2000	1.2	1.3		1.5	0.6	6	360
2000-2100	1.6	1.4		2.3	1.0	7	340
2100-2200	1.6	1.1		1.4	0.6	8	040
2200-2300	1.4	0.6		0.7	1.0	7	040
2300-2400	1.0	0.6		0.4	0.6	10	050

Maximum 8-hour average	4.0	1.2	3.6	3.0
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Time period for 8-H max.	0500- 1300	0500- 1300	0600- 1400	0600- 1400
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Mean winds	7.6	329
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Time period	0500-1400
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WEDNESDAY, 28 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	F.S. <u>1</u>	F.S. <u>2</u>	F.S. <u>4</u>	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.5	0.6		0.3	0.6	10	070
0100-0200	0.3	0.6			0.6	6	080
0200-0300	0.3	0.6			0.6	8	080
0300-0400	0.4	0.6			0.3	6	070
0400-0500	0.6	0.6			0.6	6	080
0500-0600	1.2	0.7		0.4	2.0	8	090
0600-0700	7.3	1.4		2.1	3.9	10	080
0700-0800	6.5	1.1		3.9	5.9	8	060
0800-0900	4.3	1.0		2.5	2.9	8	050
0900-1000	3.9	1.0		2.6	2.6	8	040
1000-1100	2.3	1.1		2.3	ca1	3	050
1100-1200	2.7	0.7		2.3	2.6	7	360
1200-1300		0.8		1.9	2.6	9	020
1300-1400		1.1		2.3	2.0	4	270
1400-1500	2.3	0.9		1.7	2.3	5	100
1500-1600	2.9	1.0		2.7	6.8	7	140
1600-1700	2.8	0.9			4.9	5	120
1700-1800	2.0	0.7		1.6	4.6	6	130
1800-1900	2.0	0.9		1.4	3.9	4	180
1900-2000	3.2	1.3		1.7	3.9	5	120
2000-2100	4.3	1.9		2.7	4.2	4	120
2100-2200	2.7	1.8		2.0	3.9	4	100
2200-2300	2.6	1.2		1.9	2.6	calm(0)	calm
2300-2400	1.3	0.9		1.2	1.0	8	360

Maximum  
8-hour  
average      3.6      1.2      2.5      4.4

Time period for 8-H max.	0400-	1500-	0600-	1500-
	1200	2300	1400	2300

Mean winds 5.8 77

Time period 0400-2300

THURSDAY, 29 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.9	0.6		0.8	0.6	10	040
0100-0200	0.9	0.6		0.4	0.6	15	070
0200-0300	0.7	0.5		0.2	0.6	11	060
0300-0400	0.7	0.5		0.2	0.3	9	070
0400-0500	0.7	0.6		0.2	0.6	10	070
0500-0600	1.5	0.7		0.6	1.6	6	070
0600-0700	6.1	1.5		2.8	2.0	7	070
0700-0800	11.5	1.8		5.3	cal	10	070
0800-0900	6.5	1.3		3.5		9	070
0900-1000	3.5	0.9		3.0		5	020
1000-1100	2.8	0.7				8	100
1100-1200	2.7	0.7				5	130
1200-1300	2.2				6.3	10	200
1300-1400	2.1	0.7			6.0	10	230
1400-1500		0.9			6.6	9	230
1500-1600	1.5	1.0			8.1	6	210
1600-1700	1.6	1.1			5.8	6	240
1700-1800	1.0	0.7			4.3	5	230
1800-1900	0.8	0.9			4.0	5	140
1900-2000	2.0	2.2		0.9	4.0	calm(0)	calm
2000-2100	3.8	2.2		1.6	4.3	3	130
2100-2200	4.6	2.5		1.5	4.0	4	090
2200-2300	4.2	2.6		1.8	3.2	4	090
2300-2400	2.4	2.1		1.1	2.0	5	120

Maximum 8-hour average	4.7	2.1	5.6
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Time period for 8-H max.	0600- 1400	1900- 0300	1200- 2000
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Mean winds	5.9	136
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Time period	0600-0300
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FRIDAY, 30 APRIL 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.9	1.0		0.2	1.2	4	110
0100-0200	0.6	1.0		0	0.9	5	160
0200-0300	0.6	1.1			1.2	3	180
0300-0400	0.6	0.9			0.9	3	190
0400-0500	0.4	0.8		0	1.4	7	220
0500-0600	0.9	0.7		0.2	2.3	5	160
0600-0700	2.5	1.2		1.1	4.6	7	140
0700-0800	4.4	1.6		2.9	6.0	7	180
0800-0900	3.1	1.2			7.8	6	180
0900-1000	2.5	1.0		3.9	8.3	5	180
1000-1100	2.5	0.5		3.2	8.8	5	190
1100-1200	1.3	0.3		3.5	9.2	10	190
1200-1300	1.9	0.3		3.1	6.3	12	210
1300-1400	2.1	0.3		3.0	8.6	7	180
1400-1500	2.7	0.5		3.0	8.1	8	170
1500-1600	2.9	0.6		4.4	8.9	8	190
1600-1700	2.9	0.7		6.2	9.5	7	160
1700-1800	1.5	0.6		2.9	4.6	5	180
1800-1900	1.1	0.4	0.5	1.7	2.9	7	180
1900-2000	0.9	0.3	0.7	1.7	3.5	10	200
2000-2100	1.1	0.3	0.4	1.3	2.3	8	170
2100-2200	1.1	0.3	0.3	1.2	1.7	8	170
2200-2300	1.0	0.2	0.3	1.1	1.7	7	170
2300-2400	0.9	0.3	0.3	0.9	1.7	10	160

Maximum				
8-hour				
average	2.6	1.1	3.8	8.5

Time period for 8-H max.	0700-	0100-	0200-	0900-	0900-
	1500	0900	1000	1700	1700

Mean winds 7.3 182

Time period 0700-1700

SATURDAY, 1 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.9	0.3	0.4	1.4	0.9	4	140
0100-0200	0.8	0.3	0.3	1.2	0.3	7	140
0200-0300	0.8	0.3	0.2	0.9	0.3	6	130
0300-0400	0.9	0.3	0.1	0.9	0.3	8	130
0400-0500	0.9	0.3	0.1	0.7	0.9	10	150
0500-0600	1.0	0.3	0.1	0.8	0.9	7	180
0600-0700	1.2	0.3	0.3	1.	1.4	8	170
0700-0800	1.2	0.3	0.3	1.5	2.0	12	200
0800-0900	1.6	0.3	0.6	2.5	2.6	12	210
0900-1000	1.8	0.3	1.0	3.4	3.2	10	220
1000-1100	1.7	0.5	1.1	4.3	4.3	10	240
1100-1200	1.7	0.4	1.0	4.0	3.7	13	220
1200-1300	1.6	0.6	1.1	3.0	3.7	18	220
1300-1400			0.8	2.7	4.3	15	220
1400-1500	1.2	0.8	0.9	2.3	2.9	16	220
1500-1600	1.5	0.8	1.1	1.9	2.6	17	230
1600-1700	1.4	0.8	0.8	2.0	3.2	12	230
1700-1800	1.3	0.9	0.9	1.7	2.3	15	210
1800-1900	1.2	0.9	0.8	1.7	2.6	9	200
1900-2000	1.9	1.4	1.1	3.7	1.7	6	090
2000-2100	2.6	1.5	1.3	4.6	2.0	4	110
2100-2200	2.3	1.4	1.1	3.6	4.3	6	200
2200-2300	1.5	1.1	0.5	2.1	3.5	3	250
2300-2400	1.6	1.2	0.6	2.6	2.3	3	300

Maximum 8-hour average	2.3	1.7	1.0	3.0	3.5
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Time period for 8-H max.	1900- 0300	1400- 0300	1900- 0300 or 1400- 2200	0800- 1600	0900- 1700
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Mean winds	9.5	220
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SUNDAY, 2 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	2.7	1.4	1.0	1.3	2.0	5	010
0100-0200	3.2	3.5	1.3	2.3	2.3	3	340
0200-0300	2.2	1.7	1.1	1.7	1.7	3	240
0300-0400	1.8	1.0	0.5	1.0	0.9	calm(0)	calm
0400-0500	1.9	1.1	0.5	1.0	0.9	5	010
0500-0600	2.1	1.0	0.9	0.9	0.9	3	060
0600-0700	2.7	1.5	0.6	1.2	1.4	4	340
0700-0800	2.6	1.3	0.9	1.1	1.2	3	080
0800-0900	2.7	1.1	1.2	1.2	1.2	4	090
0900-1000	2.5	0.9	0.8	0.9	1.2	2	100
1000-1100	1.8	0.9	0.8	0.9	2.3	4	140
1100-1200	1.8	0.8	0.8	1.3	2.3	6	140
1200-1300	1.2	0.7	0.7	0.9	2.3	10	270
1300-1400	1.8	0.9	0.7	0.9	3.2	10	210
1400-1500	1.7	0.7	0.6	0.8	2.6	8	250
1500-1600	1.6	0.8	0.8	0.8	2.3	9	230
1600-1700	1.6	0.7	0.9	0.7	2.6	12	230
1700-1800	1.4	0.9	0.9	0.6	2.6	12	230
1800-1900	1.5	1.1	0.9	1.1	2.6	9	220
1900-2000	1.6	1.2	1.0	1.2	2.9	9	230
2000-2100	1.6	1.3	1.0	1.0	3.2	10	240
2100-2200	1.5	1.1	1.0	0.9	2.0	9	240
2200-2300	1.3	0.8	1.0	0.6	1.7	9	230
2300-2400	1.1	0.6	0.3	0.2	1.2	9	250

Maximum 8-hour average	2.4	1.6	0.9	1.3	2.8
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Time period for 8-H max.	0000- 0800	0000- 0800	0100- 0900 or 1500- 2300	0000- 0800	1300- 2100
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Mean winds	6.3	127
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Time period	0000-2300
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MONDAY, 3 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.9	0.6	0.1	0.2	1.1	5	250
0100-0200	0.8	0.4	0	0.1	1.2	5	220
0200-0300	0.6	0.3	0	0	0.6	4	230
0300-0400	0.6	0.3	0.2	0	0.9	5	220
0400-0500	0.7	0.3	0.0	0.1	1.2	5	230
0500-0600	1.2	0.9	0.2	0.6	2.6	6	230
0600-0700	2.8	1.8	1.1	3.5	6.3	9	250
0700-0800	4.7	1.8	3.0	6.2		10	250
0800-0900	3.5	1.0	1.5	4.4		8	270
0900-1000	3.1	0.7	0.9	5.6		13	290
1000-1100	3.1	1.3	0.6	4.5	cal	7	280
1100-1200	2.5	0.7	0.5	1.0	2.6	14	310
1200-1300	2.1	cal	0.5	3.9	1.4	12	290
1300-1400	2.4	0.6	0.4	2.0	2.0	9	340
1400-1500	2.9	0.8	0.9	4.0	1.7	8	290
1500-1600	2.5	1.0	0.9	5.3	2.3	9	300
1600-1700	4.8	2.1	0.8	6.7	4.0	8	340
1700-1800	1.3	0.8	0.5	1.7	0.9	10	
1800-1900	2.2	1.1	0.8	2.2		8	340
1900-2000	2.4	1.0	0.7	7.2		14	320
2000-2100	1.9	0.9	0.4	2.7		8	330
2100-2200	1.8	1.0	0.8	1.5	0.9	8	340
2200-2300	1.8	1.2	0.9	1.3	0.9	4	350
2300-2400	1.5	1.0	0.7	0.7	0.9	7	330

Maximum  
8-hour  
average      3.0      1.1      1.1      4.1

Time period  
for 8-H max.    0700-    0400-                  0400-  
                      1500    1200                  1700  
                       or                          or  
                      1500-                  1200-  
                      2300                  2000

Mean winds    8.9      297  
Time period    0400-2300

TUESDAY, 4 MAY 76

CONCENTRATIONS ( $\text{mg}/\text{m}^3$ )

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	1.4	0.7	0.8	0.5	0.9	6	340
0100-0200	1.1	0.7	0.7	0.2	0.6	6	340
0200-0300	1.0	0.6	0.1	0.3	0.6	6	360
0300-0400	0.9	0.5	0.2	0.3	0.6	10	350
0400-0500	1.1	0.7	0.3	0.7	0.6	6	360
0500-0600	1.8	1.4	1.2	1.3	1.2	6	010
0600-0700	4.5	2.7	2.0	0.5	2.6	8	350
0700-0800	5.9	2.0	0.3	0.8	2.9	10	020
0800-0900	3.9	1.3	0.4	5.0	2.0	12	030
0900-1000	3.3	1.2	0.7	5.1	2.6	10	050
1000-1100	3.2	1.0	0.5	6.2	2.3	8	320
1100-1200	3.2	1.1	0.6	5.7	2.0	7	350
1200-1300	2.8	1.1	0.4	4.3	1.7	6	040
1300-1400	2.7	1.1	0.4	2.7	1.7	9	070
1400-1500	cal	cal	0.2	cal	2.0	4	280
1500-1600	3.5	1.7	0.7	3.0	2.3	7	270
1600-1700	2.6	1.2	0.7	3.2	7.8	3	230
1700-1800	1.4	0.8	0.3	1.7	2.9	6	190
1800-1900	1.0	0.7	0.7	1.3	3.5	6	180
1900-2000	2.6	1.2	1.6	1.5	2.3	4	180
2000-2100	2.7	1.5	1.6	1.4	2.3	5	170
2100-2200	2.4	1.3	1.1	1.0	1.7	5	150
2200-2300	1.7	0.8	0.7	1.2	1.2	5	170
2300-2400	0.9	0.7	0.3	0.7	0.6	4	170

Maximum 8-hour average	3.7	1.5	0.9	4.4	3.1		
Time period for 8-H max.	0600- 1400	0500- 1300	1900- 0300	0800- 1500	1300- 2100		
Mean winds						7.0	110
Time period						0600-2100	

WEDNESDAY, 5 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.8	0.4	0.2	0.7	0.3	3	150
0100-0200	1.0	0.3	0.2	0.7	0.3	calm	calm
0200-0300	0.6	0.3	0.2	0.8	0.6	4	150
0300-0400	0.6	0.3	0.3	0.8	0.9	3	180
0400-0500	0.6	0.3	0.3	0.9	0.9	calm	calm
0500-0600	1.0	0.3	1.1	0.9	2.0	4	130
0600-0700	3.2	0.4	1.6	1.0	5.5	5	180
0700-0800	2.7	0.8	3.0		6.9	10	210
0800-0900	1.2	0.8	1.4		6.0	13	220
0900-1000	0.9	0.6	1.2		5.5	11	210
1000-1100	1.0	0.2	0.8		cal	10	200
1100-1200	0.9	0.3	0.9		7.2	10	220
1200-1300	1.4	0.2	0.7		6.3	12	210
1300-1400	0.7	0.2	0.7		6.3	8	180
1400-1500	0.9	0.2	0.7		5.5	14	190
1500-1600	1.5	0.2			5.8	10	180
1600-1700	1.5	0.2	0.7		5.2	12	200
1700-1800	0.2	0.2	0.4	1.1	1.7	10	210
1800-1900	1.5	0.4	0.6	1.2	1.7	6	180
1900-2000		0.4	1.0	1.7	2.3	6	170
2000-2100		0.2	0.5	1.5	2.3	7	170
2100-2200			0.4	0.7	0.9	8	170
2200-2300			0.2	0.6	0.6	9	170
2300-2400			0.5	0.5	0	6	180

Maximum  
8-hour  
average 1.4 0.5 1.3 6.3

Mean winds 9.2 196

Time period 0500-1400

THURSDAY, 6 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100			0.1	0.4	0	7	170
0100-0200			0	0.5	0	7	180
0200-0300			0.1	0.5	0	10	200
0300-0400			0.1	0.5	0	7	190
0400-0500			0.1	0.7	0	5	180
0500-0600			1.5	1.2	2.3	4	320
0600-0700			2.0	4.3	1.4	3	240
0700-0800			2.4	5.7	5.2	8	240
0800-0900			1.8	3.6	5.2	9	220
0900-1000			1.7	2.6	4.9	11	230
1000-1100			1.6	2.5	6.6	11	230
1100-1200			1.3	2.1	5.8	11	200
1200-1300			1.0	2.1	6.9	9	180
1300-1400			1.2	1.6	4.6	9	200
1400-1500			1.4	2.0	4.9	10	160
1500-1600			1.5	2.9	5.8	13	200
1600-1700			1.8	3.3	6.3	10	189
1700-1800					2.9	8	180
1800-1900	0.6	1.7	1.2	2.9	6	180	
1900-2000	1.1	2.3	1.5	2.6	6	170	
2000-2100	1.4	2.4	1.5	2.3	6	140	
2100-2200	1.2	1.7	1.2	1.4	5	150	
2200-2300	0.6	0.8	1.2	0.9	10	190	
2300-2400	0.3	0.5	0.5	0.6	8	180	
Maximum 8-hour average			1.7	3.1	5.7		
Time period for 8-H max.			0500- 1300	0600- 1400	0900- 1200		
Mean winds						9.0	217
Time period						0500-1700	

FRIDAY, 7 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100		0.2	0.1	0.4	0.3	9	190
0100-0200		0.1	0	0.6	0.9	7	210
0200-0300		0.1	0.1	0.6	0.6	8	220
0300-0400		0.1	0	0.3	0.9	5	190
0400-0500		0.1	0	0.5	0.9	8	190
0500-0600		0.2	0.4	0.4	2.6	8	210
0600-0700		0.3	1.4	2.9	3.2	10	190
0700-0800		1.3	2.0	4.4	8.9	10	230
0800-0900		0.6	1.9	3.7	7.8	9	220
0900-1000		0.7	1.3	3.2	7.2	12	240
1000-1100		0.8	1.3	3.2	cal	11	220
1100-1200		0.7	1.8	3.1	9.8	11	260
1200-1300		0.7	1.4	3.7	5.8	13	280
1300-1400		0.7	1.3	2.9	2.3	12	280
1400-1500		1.0	1.7	3.2	2.6	8	260
1500-1600		1.3	1.6	4.3	5.2	8	280
1600-1700		1.8	1.7	5.8	4.0	7	230
1700-1800		0.7	1.6	2.6	4.6	7	250
1800-1900	1.5	0.8	1.5	2.7	4.6	4	300
1900-2000	1.7	1.3	2.3		4.0	6	240
2000-2100	1.9	0.9	1.5	2.0	4.0	6	220
2100-2200	3.5	1.0	1.6	1.8	3.7	4	310
2200-2300	1.6	1.0	1.4	2.1	4.0	3	300
2300-2400	1.5	1.4	1.3	2.5	1.7	6	360
Maximum 8-hour average		1.1	1.7	4.1	6.6		
Time period for 8-H max.		1600- 2400	1400- 2200	0900- 1700	0700- 1500		
Mean winds						8.2	259
Time period						0700-2400	

SATURDAY, 8 MAY 76

CONCENTRATIONS ( $\text{mg}/\text{m}^3$ )

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	1.2	0.8	0.4	1.9	1.2	10	040
0100-0200	1.1	0.8	0.3	1.0	1.2	8	050
0200-0300	1.2	0.6	0.2	0.4	0.9	8	050
0300-0400	1.4	0.7	0.2	0.4	0.9	9	060
0400-0500	2.1	0.7	0.2	0.4	0.9	8	060
0500-0600	2.3	0.8	0.0	0.8	0.9	13	040
0600-0700	3.2	0.9	0.1	0.9	1.4	12	060
0700-0800	3.8	1.2	0.2	1.2	1.4	11	070
0800-0900	3.9	1.4	0.5	1.9	1.4	15	060
0900-1000	3.9	1.5	0.6	1.6	2.0	12	050
1000-1100	4.7	1.4	0.8	2.9	2.6	11	060
1100-1200	3.5	1.3	0.7	2.3	2.3	12	070
1200-1300	3.0	1.3	0.2	2.2	2.0	9	050
1300-1400	2.6	1.7	0.7	2.0	2.3	10	050
1400-1500	3.4	2.0	0.6	1.7	2.3	9	050
1500-1600	3.0	1.3	0.7	2.0	2.9	9	050
1600-1700	2.1	1.2	0.5	1.8	2.3	8	040
1700-1800	2.1	1.0	0.2	1.4	2.3	8	070
1800-1900	2.7	1.0	0.1	1.5	2.6	5	060
1900-2000	3.5	1.3	0.8	1.4	3.5	3	110
2000-2100	4.0	2.1	1.2	1.8	3.5	calm(0)	calm
2100-2200	4.1	2.5	2.4	2.6	4.0	calm(0)	calm
2200-2300	3.0	2.8	2.7	3.4	3.7	calm(0)	calm
2300-2400	2.5	3.5	2.9	3.8	3.7	3	310

Maximum  
8-hour  
average 3.6 3.7 2.1 3.2 3.6

Time period for 8-H max.	0700-	2000-	2000-	2000-	2000-
	1500	0400	0400	0400	0400

Mean winds 6.0 61

Time period 0700-0400

SUNDAY, 9 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	1.8	4.9	2.5	3.0	3.2	calm(0)	
0100-0200	3.5	3.7	1.5	2.0	2.3	calm(0)	
0200-0300	3.7	5.3	1.5	4.3	4.6	calm(0)	
0300-0400	4.5	4.5	2.8	4.9	3.7	calm(0)	
0400-0500	2.7	3.6	1.2	2.6	2.6	calm(0)	
0500-0600	1.8	3.0	1.2	1.8	2.0	calm(0)	
0600-0700	2.2	2.4	0.8	1.6	1.7	calm(0)	
0700-0800	2.4	1.2	0.8	1.6	2.0	6	080
0800-0900	2.4	1.1	0.9	2.0	2.0	6	060
0900-1000	2.1	1.1	1.0	1.3	2.3	5	060
1000-1100	1.8	1.0	0.9	1.2	2.0	3	100
1100-1200	1.3	0.9	0.9	1.5	2.3	8	130
1200-1300	1.1	0.8	0.9	1.5	2.9	5	030
1300-1400	1.2	0.8	0.7	1.5	2.0	3	140
1400-1500	1.2	0.9	0.8	1.6	2.3	5	250
1500-1600	0.8	0.9	0.8	1.5	3.2	4	240
1600-1700	0.7	0.8	0.8	1.4	3.7	5	300
1700-1800	1.0	0.8	0.9	1.6	3.5	7	180
1800-1900	1.3	0.8	1.0	1.4	3.5	6	210
1900-2000	1.7	1.2	1.3	1.8	3.2	4	180
2000-2100	2.2	1.2	1.6	1.3	2.9	4	230
2100-2200	1.6	1.4	1.5	1.2	2.6	calm(0)	calm
2200-2300	1.6	1.2	1.2	1.3	1.7	calm(0)	calm
2300-2400	1.7	1.0	0.8	0.8	0.9	calm(0)	calm

Maximum  
8-hour  
average 2.9 1.9 1.5 1.7 3.1

Time period					
for 8-H max.	0100-	2000-	0000-	2000-	2000-
	0900	0400	0800	0400	0400
			or	or	or
		0400-		0400-	1400-
			1200	1200	2200

Mean winds 2.9 136

Time period 2000–2200

MONDAY, 10 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	F.S. <u>1</u>	F.S. <u>2</u>	F.S. <u>4</u>	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	1.7	0.9	0.7	0.7	1.2	calm(0)	calm
0100-0200	1.1	1.0	0.4	0.7	1.2	4	140
0200-0300	1.1	0.6	0.3	0.7	1.4	calm(0)	calm
0300-0400	1.6	0.7	0.3	0.9	1.2	calm(0)	calm
0400-0500	1.1	0.7	1.3	1.8	1.4	calm(0)	calm
0500-0600	2.5	0.9	3.2	3.4	4.9	calm(0)	calm
0600-0700	8.0	2.4	4.6	7.1	7.2	3	050
0700-0800	9.6	2.9	4.8	8.4	8.9	3	220
0800-0900	3.4	1.5	2.0	4.9	8.3	8	250
0900-1000	2.8	0.9	1.5	3.9	8.3	6	240
1000-1100	2.8	0.6	1.1	3.7	10.1	6	200
1100-1200	1.7	0.6	0.7	3.2	9.2	5	180
1200-1300	2.1	0.4	0.7	2.2	8.9	6	140
1300-1400	3.0	0.5	0.7	2.2	6.0	8	190
1400-1500	2.5	0.4	0.6		cal	7	240
1500-1600		0.8	0.5	1.9	cal	8	230
1600-1700	2.2	0.8	0.5	2.9	8.6	8	210
1700-1800	1.0	0.6	0.0	1.8	2.9	8	220
1800-1900	1.6	0.9	0.1	1.8	2.3	4	190
1900-2000	2.3	1.3	0.0	1.7	3.2	calm(0)	calm
2000-2100	3.5	1.7	1.3	1.8		3	130
2100-2200	2.4	1.9	0.4	1.0		3	130
2200-2300	2.4	1.5	0.1	0.7		3	150
2300-2400	3.4	1.5	0.0	0.5		calm(0)	calm
Maximum 8-hour average	3.8	1.3	2.4	4.6	8.3		
Time period for 8-H max.	0600- 1400	0100- 0900	0400- 1200	0500- 1300	0700- 1500		
Mean winds						4.0	189
Time period						0100-1500	

TUESDAY, 11 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	<u>F.S. 1</u>	<u>F.S. 2</u>	<u>F.S. 4</u>	<u>COURT HOUSE</u>	<u>COUNTY STATION</u>	<u>WIND SPEED</u>	<u>WIND DIRECTION</u>
0000-0100	1.3	1.0	2.9	0.3		4	140
0100-0200	0.3	0.5	1.9	0.4		6	140
0200-0300	0.1	0.2	1.3	0.3		6	170
0300-0400	0.0	0.2	1.1	0.3		6	150
0400-0500	0.1	0.1	1.2	0.4		3	150
0500-0600	0.4	0.1	1.3	0.8		4	140
0600-0700	2.7	0.5	2.8	3.4		5	230
0700-0800	6.1	2.2	4.9			8	270
0800-0900	3.6	1.2	1.8	3.7	cal	3	250
0900-1000	3.1	1.1	1.9	3.3	8.1	5	240
1000-1100	3.5	1.0	2.2	2.5	9.2	6	240
1100-1200	2.2		2.2	3.3	9.2	7	200
1200-1300	2.7		1.8	3.4	8.1	10	200
1300-1400	2.1		1.2	2.4	6.3	11	240
1400-1500	2.3		1.1	2.4	6.9	11	230
1500-1600	3.5		1.9	2.4	5.8	12	270
1600-1700	2.3		1.7	4.9	3.5	8	250
1700-1800	2.0		0.6	1.4	1.7	7	280
1800-1900	2.1		1.1	1.5	0.6	5	320
1900-2000	2.5		0.6	1.3	0	6	230
2000-2100	2.4		0.6	1.5	4.6	5	180
2100-2200	2.4		0	1.4	2.9	4	150
2200-2300	2.0		1.0	0.8	1.7	4	180
2300-2400	1.4		0.5	0.8	1.2	5	220
Maximum 8-hour average	3.3		2.1	3.4	7.1		
Time period for 8-H max.	0600- 1400		0500- 1300	0600- 1400	0900- 1700		
Mean winds						7.1	219
Time period						0300-1200	

WEDNESDAY, 12 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	<u>F.S. 1</u>	<u>F.S. 2</u>	<u>F.S. 4</u>	<u>COURT HOUSE</u>	<u>COUNTY STATION</u>	<u>WIND SPEED</u>	<u>WIND DIRECTION</u>
0000-0100	1.0		0.4	0.7	1.2	3	220
0100-0200	1.0		0.3	0.4	0.6	3	180
0200-0300	1.2		0	0.4	0.6	calm(0)	calm
0300-0400	2.3		0		0.6	calm(0)	calm
0400-0500	5.2		1.0		1.7	calm(0)	calm
0500-0600	13.3		2.2		2.9	3	270
0600-0700	12.3		3.3		1.7	4	330
0700-0800	7.6		3.7		5.2	4	270
0800-0900	5.4		2.2		2.9	7	070
0900-1000	3.6		1.4		1.7	7	320
1000-1100	3.5		1.9		1.7	5	250
1100-1200	3.4		1.9		2.3	6	310
1200-1300	3.3		2.6		4.0	8	300
1300-1400	3.2		3.3		4.6	8	290
1400-1500	3.2				5.2	9	200
1500-1600	3.6				6.9	9	240
1600-1700	2.4				8.1	7	230
1700-1800	2.4				3.5	8	220
1800-1900				1.7	4.0	5	230
1900-2000				2.4	4.6	3	130
2000-2100				2.8	4.6	5	140
2100-2200				2.5	2.3	calm(0)	calm
2200-2300				1.2	1.2	calm(0)	calm
2300-2400				0.6	0.6	4	110
Maximum 8-hour average	6.8				5.2		
Time period for 8-H max.	0400- 1200				1300- 2100		
Mean winds						5.4	249
Time period						0400-2100	

THURSDAY, 13 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100				0.4	0.6	4	140
0100-0200				0.2	0.6	3	130
0200-0300				0.1	0.6	4	120
0300-0400			1.5	0.1	0.8	calm(0)	calm
0400-0500			2.1	0.8	0.9	3	110
0500-0600			0.5	2.5	2.9	4	080
0600-0700			4.4	2.7	8.1	5	070
0700-0800			4.8	2.8	11.2	9	090
0800-0900			3.5	4.0	7.2	6	040
0900-1000			3.5	4.3	4.9	5	090
1000-1100			3.5	2.9	4.9	9	080
1100-1200			2.2	2.6	3.2	8	120
1200-1300			1.8	2.4	5.5	9	120
1300-1400			2.4	2.0	4.3	7	100
1400-1500			2.3	2.0	4.9	7	120
1500-1600			2.2	1.6	5.8	14	140
1600-1700			2.1	1.6	4.3	12	130
1700-1800			1.2	0.5	1.4	13	120
1800-1900	1.0	0.2	1.0	0.6	1.4	8	140
1900-2000	0.7	0.3	1.1	0.7	1.2	8	160
2000-2100	0.6	0.2	1.0	0.7	0.6	9	150
2100-2200	0.4	0.1	0.2	0.4	0.3	10	160
2200-2300	0.1	0	0.1	0.1	0.6	8	140
2300-2400	0	0	0	0.1	0.9	8	150
Maximum 8-hour average			3.3	3.0	6.2		
Time period for 8-H max.			0600- 1400	0500- 1300	0600- 1400		
Mean winds						7.0	89
Time period						0500-1400	

FRIDAY, 14 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

<u>TIME (EDT)</u>	F.S. <u>1</u>	F.S. <u>2</u>	F.S. <u>4</u>	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	1.1	0.6	0.1	0.1	0.3	7	130
0100-0200	1.1	0.6	0.2	0.0	0.3	6	140
0200-0300	0.9	0.6	0.2	0.1	0.3	8	140
0300-0400	0.7	0.5	0.2	0.2	0.3	7	150
0400-0500	0.6	0.4	0.1	0.2	0.3	7	170
0500-0600	1.1	0.4	0.5	0.3	1.4	4	140
0600-0700	3.7	0.6	1.5	1.7	2.9	9	160
0700-0800	6.4	0.8	2.6	3.0	5.8	10	150
0800-0900	4.3	0.7	2.2	3.6	4.9	11	170
0900-1000	3.5	0.9	1.7	2.5	5.2	13	170
1000-1100	3.8	0.4	2.0	2.9	6.0	10	180
1100-1200	3.6	0.5	2.4	2.7	5.8	12	200
1200-1300	3.5	0.6	2.3	2.6	7.8	9	170
1300-1400	2.9	0.5	2.0	1.8	6.0	12	200
1400-1500	3.1	0.5	3.3	2.2	cal	11	180
1500-1600	3.2	0.5	3.1	2.2	5.5	12	120
1600-1700	3.1	0.4	3.0	3.0	4.3	13	190
1700-1800	1.5	0.5	2.2	1.0	1.7	14	130
1800-1900	0.8	0.7	2.0		1.7	10	130
1900-2000	0.9	0.4	1.5	1.0	1.7	18	140
2000-2100	0.9	0.2	0.7	1.1	1.4	8	140
2100-2200	0.8	0.2	0.6	0.8	0.9	12	150
2200-2300	0.2	0.1	0.5	0.7	0.6	12	140
2300-2400	0	0	0	0.4	0	12	150
Maximum 8-hour average	4.0	0.6	2.4	2.7	5.9		
Time period for 8-H max.	0600- 1400	0600- 1400	1000- 1800	0900- 1700	0700- 1800		
Mean winds						11.5	176
Time period						0700-1700	

SATURDAY, 15 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.2	0.1	0.2	0.2	0	10	140
0100-0200	0.2	0	0.2	0.2	0	11	140
0200-0300	0	0.1	0	0.1	0	12	140
0300-0400	0.1	0	0.1	0.1	0	11	150
0400-0500	0	0.1	0	0.1	0	9	160
0500-0600	0.3	0.1	0.1	0.2	0.3	12	150
0600-0700	0.5	0.1	1.3	0.5	0.6	14	140
0700-0800	0.8	0.2	0.6	0.5	0.9	13	140
0800-0900	1.1	0.3	0.9	0.8	1.2	14	150
0900-1000	1.4	0.1	0.9	1.0	1.2	14	160
1000-1100	1.4	0.2	1.1	0.9	1.2	15	160
1100-1200	1.4	0.2	1.3	1.2	1.7	15	160
1200-1300	2.0	0.3	1.6	1.4	2.3	7	120
1300-1400	1.4	0.3	1.3	1.1	1.7	15	180
1400-1500	1.0	0.3	0.9	1.4	2.6	7	200
1500-1600	2.0	0.5	1.7	2.7	4.6	5	110
1600-1700	3.1	1.4	2.4	2.8	4.9	4	100
1700-1800	3.0	1.7	1.9	2.1	4.6	6	100
1800-1900	4.1	1.3	1.6	2.0	4.6	5	100
1900-2000	3.6	1.7	1.7	2.2	4.0	4	090
2000-2100	3.2	1.6	1.5	2.1	2.6	7	090
2100-2200	2.3	1.0	1.0	1.8	2.3	5	090
2200-2300	2.4	1.0	0.2	2.0	2.6	3	070
2300-2400	1.6	0.7	0.9	2.2	0.6	7	050
Maximum 8-hour average	3.0	1.3	1.6	2.2	3.8		
Time period for 8-H max.	1500- 2300	1600- 2400	1200- 2000	1500- 2300	1500- 2300		
Mean winds						4.9	94
Time period						1500-2300	

SUNDAY, 16 MAY 76

CONCENTRATIONS ( $\text{mg}/\text{m}^3$ )

<u>TIME (EDT)</u>	<u>F.S. 1</u>	<u>F.S. 2</u>	<u>F.S. 4</u>	<u>COURT HOUSE</u>	<u>COUNTY STATION</u>	<u>WIND SPEED</u>	<u>WIND DIRECTION</u>
0000-0100	1.0	0.5	0.6	1.2	0.3	7	090
0100-0200	0.6	0.3	0.3	0.7	0.6	8	120
0200-0300	0.3	0.1	0.2	0.5	0.3	5	130
0300-0400	0	0	0.1	0.4	0	12	130
0400-0500	0	0	0	0.1	0	4	170
0500-0600	0.3	0.2	0.3	0.1	0	4	140
0600-0700	0.5	0.2	0.5	0.4	0.6	7	190
0700-0800	0.4	0.3	0.3	0.6	0.9	11	200
0800-0900	0.4	0.2	0.8	0.9	1.4	10	230
0900-1000	0.5	0.3	0.9	0.8	1.4	11	220
1000-1100	1.0	0.3	0.8	0.8	1.7	12	240
1100-1200	1.1	0.4	1.3	0.9	2.0	11	230
1200-1300	1.1	0.6	1.1	0.9	1.0	10	230
1300-1400	1.3	0.8	1.2	0.5	1.4	14	230
1400-1500	1.2	0.8	1.1	0.7	2.3	13	220
1500-1600	1.1	0.8	1.3	0.7	2.6	10	220
1600-1700	1.2	0.9	1.4	0.7	2.3	10	230
1700-1800	1.4	0.9	1.5	0.9	1.4	10	200
1800-1900	1.5	1.1	1.2	1.0	1.7	8	210
1900-2000	1.2	1.0	0.8	0.7	1.2	7	170
2000-2100	0.9	0.5	0.9	0.6	0.6	10	170
2100-2200	0.9	0.4	1.3	0.4	0.3	11	180
2200-2300	0.7	0.3	0.2	0.4	0	11	180
2300-2400	0.0	0.2	0.2	0.2	0	8	210
Maximum 8-hour average	1.3	0.8	1.3	0.8	1.9		
Time period for 8-H max.	1200- 2000	1200- 2000	1100- 1900	1100- 1900	0900- 1700 or 1100- 1900		
Time period					0900-1900		

MONDAY, 17 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.1		0	0.4	0.3	4	220
0100-0200		0.2	0.1	0.2	0.6	4	240
0200-0300	0.1		0.2	0.2	0.9	4	180
0300-0400	0.1		0.1	0.2	0.3	8	220
0400-0500	0.1	0.1	0.6	1.2	0.9	8	250
0500-0600	0.6	0.2	1.2	1.6	2.6	4	180
0600-0700	3.5	0.5	2.5	4.9	8.3	7	200
0700-0800	5.7	1.3	3.1	6.9	7.2	8	240
0800-0900	2.8	0.8	2.2	4.5	7.5	10	230
0900-1000	2.1	0.6	2.2	4.8	cal	7	250
1000-1100	2.7	0.7	2.4	3.7	7.2	9	220
1100-1200	2.3	1.0	2.3	3.5	7.5	12	230
1200-1300	2.6	0.9	2.4	4.3	7.2	13	240
1300-1400	1.9	1.0	2.3	2.4	6.3	15	240
1400-1500	2.2	1.3	2.2	3.4	7.5	14	240
1500-1600	2.6	1.3	2.1	3.3	8.9	14	220
1600-1700	2.9	1.3	2.7	3.4	7.8	14	230
1700-1800	1.6	1.0	2.1	4.2	2.0	14	220
1800-1900	1.5	1.0	2.3	1.3		11	230
1900-2000	1.6	1.1	2.3	1.2		6	230
2000-2100	1.8	1.0	2.5	1.5		8	220
2100-2200	1.6	1.2	2.2	1.1		8	230
2200-2300	1.6	0.9	2.1	1.0		6	230
2300-2400	1.1	1.0	2.2	0.8		7	220

Maximum  
8-hour  
average 3.0 1.2 2.4 4.4 7.5

Time period for 8-H max.	0600-	1400-	0600-	0500-	0900-
	1400	2200	1400	1400	1700

Mean winds 10.1 231

**Time Period** 0600-1400

TUESDAY, 18 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100		0.1	0.5	0.4		7	240
0100-0200			0.2	0.4		4	220
0200-0300		0.1	0.3	0.4		calm(0)	calm
0300-0400		0.1	0.1	0.4		3	270
0400-0500	0.1	0.1		0.3		4	230
0500-0600	0.7	0.3	0.7	1.0		5	190
0600-0700	3.0	1.6	2.9	5.2		4	260
0700-0800	7.3	1.4	4.2	7.0		6	210
0800-0900	3.9	1.0	3.4	4.4		9	210
0900-1000	2.3	0.9	2.1	3.6		9	240
1000-1100	2.0	0.8	1.8	3.7	cal	12	240
1100-1200	1.8	0.8	1.7	2.5	7.2	13	220
1200-1300	2.2	0.8	2.1	2.0	5.2	15	230
1300-1400	1.5	0.7	1.0	3.0	1.4	12	330
1400-1500	3.3	1.0	0.3	3.4	1.2	7	310
1500-1600	3.2	1.1	0.3	5.4	1.4	13	320
1600-1700	1.3		0.3	4.9	1.4	15	340
1700-1800	0.7	0.6		1.1	0.3	16	340
1800-1900	0.9	0.6		0.8		13	320
1900-2000	0.9	0.7		1.5		6	320
2000-2100	0.9	0.9		1.1	0.6	4	330
2100-2200	1.0	1.0		0.7	0.3	4	310
2200-2300	0.9	0.9		0.4		6	340
2300-2400	0.6	0.8		0.1		4	010

Maximum  
8-hour  
average 3.0 1.0 2.4 3.9

Time Period  
for 8-H max. 0700- 0600- 0600- 0600-  
1500 1400 1400 1400

Mean winds 10.0 257

Time period 0600-1500

WEDNESDAY, 19 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100		0.7		0.1		5	290
0100-0200	0.1	0.8	0.2	0.1	0.3	4	270
0200-0300	0.2	0.9	0.1	0.1	0.3	6	270
0300-0400	0.1	0.6	0.1	0.1	0.3	4	260
0400-0500	0.9	0.7	0.5	0.1	0.3	6	260
0500-0600	1.1	1.5	1.0	0.8	2.6	4	270
0600-0700	4.3	2.9	2.9	4.1	4.0	6	270
0700-0800	6.5	2.8	2.4	4.6	3.7	8	280
0800-0900	2.4	1.3	2.0		2.0	11	260
0900-1000	1.7	1.1	1.8		3.2	12	240
1000-1100	2.3	1.2	2.0		2.0	11	280
1100-1200	1.7	1.1	1.5		1.2	15	280
1200-1300	1.8	1.0	1.7		1.4	14	270
1300-1400	1.8	1.3	2.1		2.6	15	270
1400-1500	1.6	1.3	1.8		1.7	15	270
1500-1600	2.1	1.5	1.5		2.9	13	270
1600-1700	1.9	1.5	2.1		2.9	11	280
1700-1800	1.0	0.7	0.8		2.0	15	250
1800-1900	0.2	1.0	1.3		1.4	14	260
1900-2000	0.3	0.7	1.7		1.4	5	280
2000-2100	0.4	1.4	1.7		2.0	6	290
2100-2200	0.8	1.4	1.5		1.2	4	220
2200-2300	0.7	0.9	1.3		0.3	6	300
2300-2400	0.4	1.0	1.2		0.6	3	240

Maximum  
8-hour  
average 2.8 1.6 2.0 2.5

Time Period	for 8-H max.	0600-	0500-	0600-	0500-
		1400	1300	1400	1300

Mean winds 11.1 269

Time period 0500-1400

THURSDAY, 20 MAY 76

CONCENTRATIONS (mg/m<sup>3</sup>)

TIME (EDT)	F.S. 1	F.S. 2	F.S. 4	COURT HOUSE	COUNTY STATION	WIND SPEED	WIND DIRECTION
0000-0100	0.1	0.8	0.5		0.6	4	020
0100-0200	0.2	0.6	0.2		0.6	calm(0)	calm
0200-0300	0.3	0.5			0.6	4	300
0300-0400		0.5	0.6		0.6	5	270
0400-0500	0.6	0.8	0.9		2.3	5	090
0500-0600	3.4	2.8	1.5		3.2	4	240
0600-0700	10.5	5.5	4.4		4.3	calm(0)	calm
0700-0800	12.8	5.5	3.4		4.9	5	320
0800-0900	2.8	1.5	1.7		2.0	5	290
0900-1000	1.5	0.5	2.0		3.2	4	240
1000-1100	1.3	0.3	1.9		6.0	10	220
1100-1200	1.0	0.2	2.1		6.6	13	230
1200-1300	0.8	0.3	1.7			15	200
1300-1400	0.5	0.2	1.6			14	230
1400-1500	0.7	0.4	1.8			11	230
1500-1600	0.9	0.3	1.8			8	250
1600-1700		0.4	2.0			8	240
1700-1800			1.3			11	230
1800-1900			1.9			7	230
1900-2000						9	220
2000-2100						7	220
2100-2200						5	230
2200-2300						5	200
2300-2400						4	240

Maximum  
8-hour  
average 3.7 2.2 2.3

Time Period  
for 8-H max.0500- 0100- 0600-  
                  1300 0900 1400

Mean winds 6.7 268

Time period 0100-1400

**TECHNICAL REPORT DATA**  
*(Please read Instructions on the reverse before completing)*

1. REPORT NO. EPA-600/4-77-013	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE  CARBON MONOXIDE LEVELS IN CHARLOTTE, NORTH CAROLINA		5. REPORT DATE February 1977
7. AUTHOR(S) Norman E. Hester and John Prince		6. PERFORMING ORGANIZATION CODE
9. PERFORMING ORGANIZATION NAME AND ADDRESS Environmental Monitoring and Support Laboratory Office of Research and Development U.S. Environmental Protection Agency Las Vegas, Nevada 89114		8. PERFORMING ORGANIZATION REPORT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency-Las Vegas, NV Office of Research and Development Environmental Monitoring and Support Laboratory Las Vegas, Nevada 89114		10. PROGRAM ELEMENT NO. 1AD606
		11. CONTRACT/GANT NO.
15. SUPPLEMENTARY NOTES John Prince is an employee of Lockheed Electronics Co., 4220 South Maryland Parkway. Suite 120, Las Vegas, Nevada 89109		13. TYPE OF REPORT AND PERIOD COVERED Tech. Support Apr.-May 1976
		14. SPONSORING AGENCY CODE EPA/600/07
16. ABSTRACT Four temporary monitoring stations were set up in Charlotte, North Carolina during the months of April and May 1976. Results from the temporary stations were compared with data from the local monitoring station to determine if the local station was producing data representative of the city or of a localized hot spot.  The maximum 8-hour averages of carbon monoxide data collected at the county station were found to be higher than those collected at the four temporary sites by factors of 1.4, 1.6, 2.7, and 3.3. Based on these results, it was concluded that the local station was not representative of the metropolitan area.		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS  Air pollution Carbon Monoxide Measurements	b. IDENTIFIERS/OPEN ENDED TERMS  Charlotte, North Carolina Mecklenburg County EPA Region VIII Air quality Monitoring	c. COSATI Field/Group  13B 07B, C 14B
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