F O R E W O R D

This is a technical report summarizing air quality data collected during the calendar year 2000. The Community Health & Safety Section of the Health Department maintains the air monitoring network in Fairfax County. The report design is intended to meet the needs of concerned County citizens and organizations and public and private administrators whose decisions must reflect air quality considerations. Air quality summary reports have been issued annually since 1973. Persons requiring additional technical information should contact Community Health & Safety staff to see if more detailed information is available.

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AMBIENT AIR QUALITY AND METEOROLOGY

A. OVERVIEW

The Community Health & Safety Section of the Fairfax County Health Department is authorized by the Fairfax County Code, Chapter 103, in cooperation with Federal and State agencies, to conduct an air monitoring program. The primary purpose of the air monitoring program is to measure the levels of air quality to ensure the protection of human health, welfare and safety, and to the greatest degree feasible, prevent injury to plant and animal life and property. The ambient air monitoring stations are sited in such a manner as to indicate residential, health based pollution concentrations. The objective of this monitoring network is to track ambient air pollutant levels to indicate compliance or non-compliance with Federal standards, to observe effects on pollutant levels from regulatory controls on sources, to develop data for trend analysis, and to provide data for the air quality index and forecasts.

The air quality monitoring program consists of monitoring for the Environmental Protection Agency (EPA) criteria pollutants, ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and particulate matter (PM_{10} and $PM_{2.5}$). In addition, other non-criteria pollutants, total suspended particulates (TSP), nitric oxide (NO), and meteorological parameters, wind direction, wind speed, temperature, and rainfall are monitored.

The pollutant monitoring network maintained and operated by Fairfax County Health Department Community Health & Safety staff consists of the following:

4 Continuous monitoring stations for gaseous pollutants
7 High volume particulate/lead samplers
5 Fractional particulate samplers of 10 micrometers (PM_{10})
3 Fractional particulate samplers of 2.5 micrometers ($PM_{2.5}$)
1 Acid deposition station
5 Meteorological stations

The data are reduced to both monthly and annual terms and are shown in both tabular and graphical forms to reveal seasonal and short-term changes that would be obscured by longer term averaging. Comparisons with applicable standards are emphasized. The Air Quality Annual Report is supplemented with two appendices. Appendix A contains a trend analysis and a set of graphs showing multi-year trends for several air pollutants and several independent factors. Appendix B provides a table and a map of the monitoring stations, which includes the location and descriptive information of each of the stations.

Data reduction is done in-house, and the data are placed in a computer database for use in assessing current air quality, identifying air quality trends, and analyzing periods of elevated concentrations. Pollutant data are sent to the United States Environmental Protection Agency (EPA) for incorporation into the Aerometric Information Retrieval System (AIRS) database, and the Virginia Department of Environmental Quality (VDEQ).

The National Ambient Air Quality Standards (NAAQS), as defined in Title 40 of the Code of Federal Regulations, Part 50, provide a basis for evaluating air quality in Fairfax County. The primary standards define the levels of air quality necessary to protect the public health with an adequate margin of safety. The secondary standards define levels of air quality necessary to prevent any degradation or harm to the total environment.

For this report, gaseous pollutant concentrations are expressed in parts per million (ppm); particulate matter and lead concentrations are expressed in micrograms per cubic meter ($\mu g/m^3$).

B. QUALITY ASSURANCE PROGRAM

The Community Health & Safety Section maintains a quality assurance/control program based on requirements stated in Title 40 of the Code of Federal Regulations, Part 58, Appendix A. This quality assurance (QA) program is used to assure that the monitoring data is of the highest quality and to minimize the loss of data due to instrument malfunctions or out of range operating conditions. A database of the precision, accuracy and audit results are maintained on a microcomputer using software developed by EPA, and are submitted on a quarterly basis to the EPA and VDEQ. The Community Health & Safety Section participates in the EPA National Performance Audit program and the Ambient Air Monitoring Systems Audit program.

C. CRITERIA POLLUTANTS

1. Ozone (O_3)

Ozone is not emitted directly from pollution sources (i.e. smokestacks, tailpipes), but is formed by a complex series of reactions among nitrogen oxides (NO_x) and volatile organic compounds (VOCs) under the influence of solar ultraviolet radiation (sunlight). Two significant sources are the incomplete combustion of gasoline from motor vehicles and emissions from stationary sources such as factories, printers, dry cleaners, and paint shops. Ozone is shorter lived than its precursors, which may build up and redistribute geographically over an extended period of calm wind conditions (air stagnation). Therefore, ozone concentrations show a very strong diurnal (daily) and seasonal cyclical character, with the height of the cycles controlled almost entirely by meteorological conditions.

Ozone is an irritant to the respiratory system and causes health problems because it damages lung tissue, reduces lung function and sensitizes the lung to other irritants. Individuals with existing respiratory impairments such as asthmatics have increased sensitivity to the effects of ozone. Healthy adults and children that engage in moderate physical activity are susceptible to the effects of ozone. In addition to health effects, ozone can have an adverse effect on vegetation.

The 1-hour National Ambient Air Quality Standard (NAAQS) for ozone is defined in terms of the daily maximum hourly average. The primary and secondary standards for ozone are 0.12 ppm hourly average concentration. The standard is attained when over the most recent three calendar years the average number of exceedant days is not greater than one. An exceedant day is one during which one or more observed hourly concentrations exceeds 0.12 ppm.

The 8-hour standard for ozone is defined in terms of the daily maximum eight-hour average. To attain the standard, the 3-year average of the fourth-highest daily maximum 8-hour average of continuous ambient air monitoring data over each year must not exceed 0.08 ppm.

The United States Environmental Protection Agency (EPA) promulgated new national ambient air quality standards for ozone on July 19, 1997. The new primary standard provides increased protection to the public, especially children and at-risk populations. The secondary standard provides protection for vegetation. EPA replaced the current 1-hour NAAQS with an 8-hour standard at a level of 0.08 parts per million (ppm). This revised standard was challenged by private industry in the Courts in 1999. On February 27, 2001, the U.S. Supreme Court issued a ruling to uphold the new ozone standard declaring that EPA's interpretation was in adherence to the constitutionality of the Clean Air Act.

Table 1: Ozone 1-hour

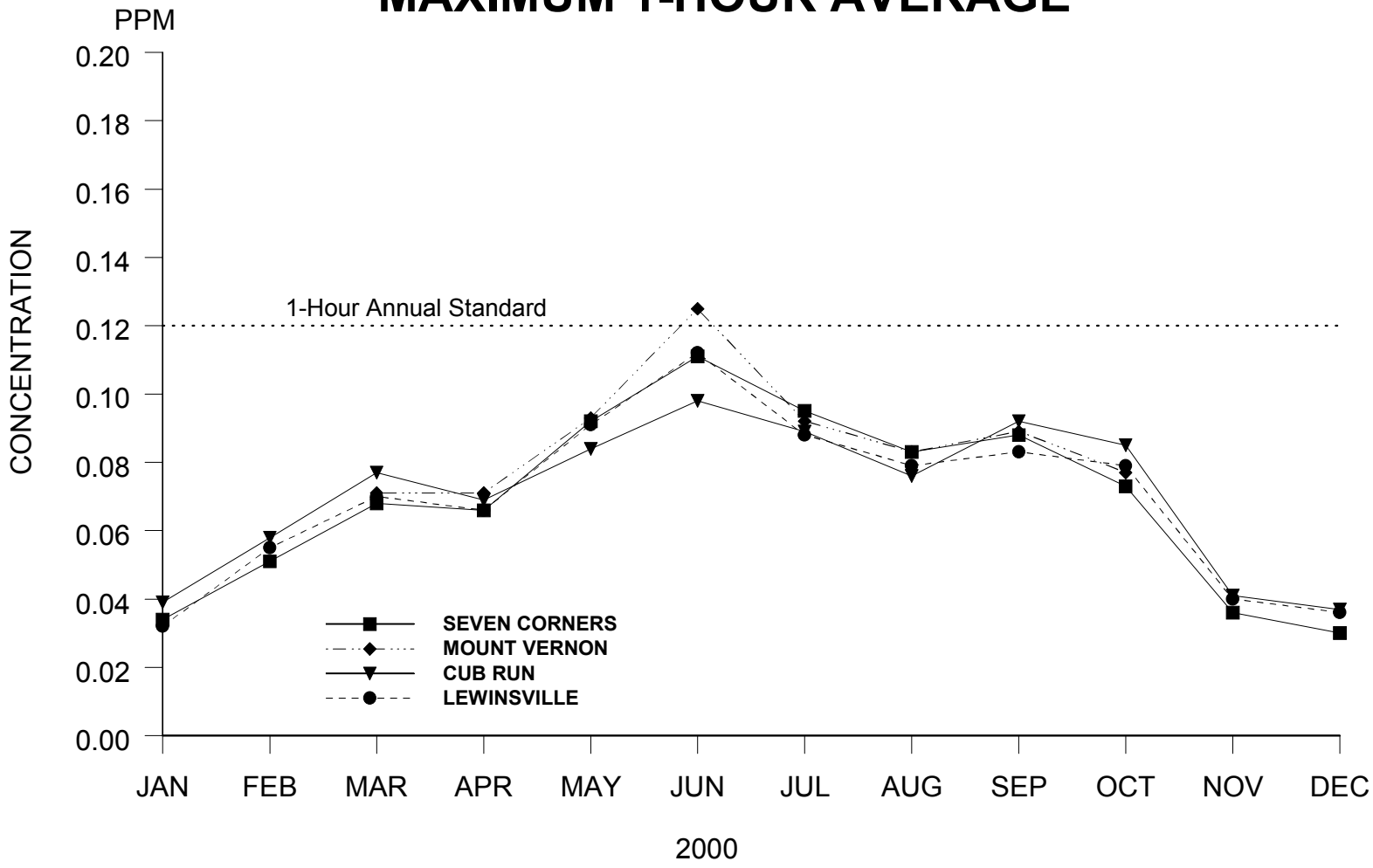
	SEVEN CORNERS	MOUNT VERNON[2]	CUB RUN	LEWINSVILLE	FRANCONIA[1,2]
Highest daily max 1-hr conc., ppm	0.111	0.125	0.098	0.112	0.093
2nd highest daily max 1-hr conc., ppm	0.101	0.114	0.095	0.105	0.091
99th percentile conc., ppm of all 1-hr measurements	0.076	0.083	0.076	0.076	0.070
Number of 1-hr measurements	8714	4807	8592	8740	4984
Number of hours above 0.12 ppm	0	1	0	0	0
Number of exceedant days, 2000	0	1	0	0	0
Average no. of exceedant days, 1998-2000	0.7	1.3	0.7	0.3	0.3

1. A VADEQ monitoring station; ozone monitoring commenced July 1998.
2. These stations are operational only during the ozone season from April through October.

Table 2: Ozone 8-hour

	SEVEN CORNERS	MOUNT VERNON[2]	CUB RUN	LEWINSVILLE	FRANCONIA[1,2]
Highest daily max 8-hr conc., ppm	0.100	0.108	0.094	0.101	0.082
4th highest daily max 8-hr conc., ppm	0.080	0.092	0.079	0.082	0.070
99th percentile 8-hr conc., ppm	0.068	0.070	0.077	0.068	0.065
Number of days with 8-hr conc. greater than 0.08 ppm, 2000	2	4	2	2	0
Average of 4th highest 8-hr conc., ppm, 1998-2000	0.090	0.097	0.091	0.086	0.088

OZONE
MAXIMUM 1-HOUR AVERAGE



2. Carbon Monoxide (CO)

Carbon monoxide is a colorless, odorless gas produced by incomplete combustion of carbon compounds in fuels. The primary source of carbon monoxide is motor vehicle exhaust, although other fuel combustion processes such as wood burning stoves, incinerators and industrial sources may be important. Diurnal and seasonal patterns of carbon monoxide concentrations can be detected which correspond to human activities and meteorological factors. Concentrations are generally higher in vicinities of heavy vehicular traffic and fall off rapidly as the distance from a roadway increases. Elevated levels of CO are a winter time phenomena due to inefficient fuel combustion and weather conditions that hamper dispersion. CO is also known to be a participant in the photochemical reactions of ozone formation.

The NAAQS for CO specifies upper limits for one-hour and eight-hour averages. The primary and secondary standards for the 1-hr level are 35 ppm and the 8-hr level is 9 ppm, neither is to be exceeded more than once per year. The 8-hr standard is generally more restrictive.

Carbon monoxide enters the blood stream and reacts chemically with hemoglobin, thereby reducing delivery of oxygen to the body's tissues and organs. The heart and central nervous system are dependent on oxygen utilization; therefore, these are the organ systems most affected by CO exposure. The effects of CO can worsen the conditions of people with chronic heart disease. Other groups more susceptible to the effects of CO are individuals with anemia, pregnant women, infants, elderly people, and fetuses. Low levels of CO exposure may produce symptoms of headache, dizziness, impairment of visual perception, mental function and manual dexterity. High levels may be fatal; however, high exposure levels are unlikely in ambient conditions.

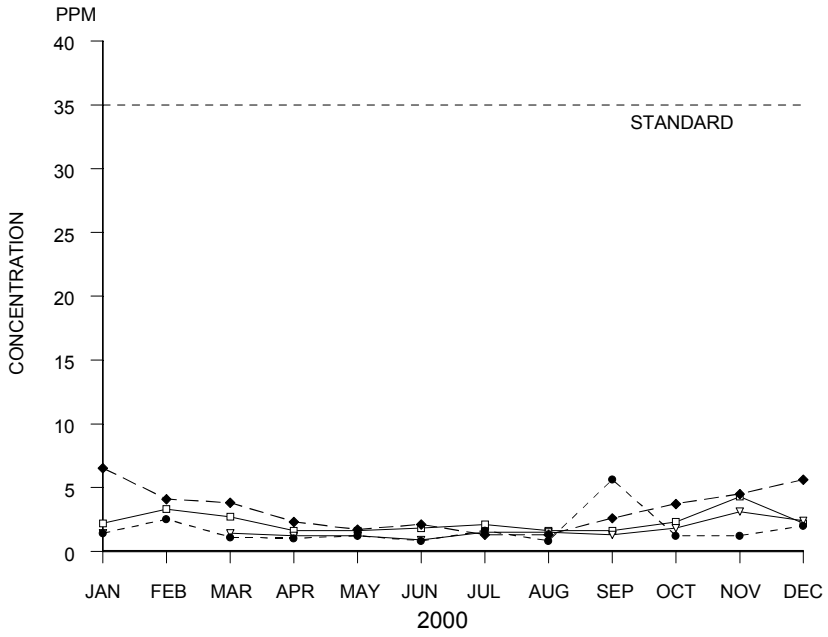
Inside view of monitoring station

Table 3: Carbon Monoxide

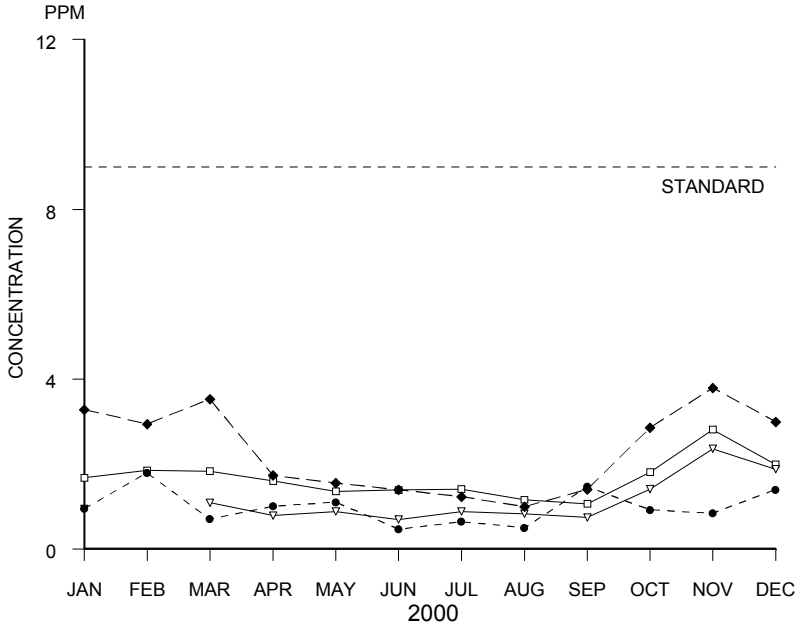
	FRANCONIA	SEVEN CORNERS	CUB RUN	LEWINSVILLE
Annual arithmetic mean, ppm	0.45	0.79	0.36	0.85
Maximum 8-hr conc., ppm	2.36	2.81	1.79	3.79
2nd highest 8-hr conc., ppm	1.88	2.05	1.46	3.53
Maximum 1-hr conc., ppm	3.1	4.3	5.6	6.5
2nd highest 1-hr conc., ppm	2.8	4.2	2.5	5.6
99th percentile 1-hr conc., ppm	1.5	1.8	1.1	2.7
Number of 1-hr measurements	7800	8503	8363	8448
Number of 8-hr conc. above 9 ppm	0	0	0	0

CARBON MONOXIDE

MAXIMUM 1-HOUR AVERAGE



MAXIMUM 8-HOUR AVERAGE



*No data available for Franconia for Jan - March

SEVEN CORNERS
FRANCONIA
CUBRUN
LEWINSVILLE

FEDERAL,STATE, AND COUNTY STANDARDS:

PRIMARY: 1) 35 PPM MAXIMUM 1-HOUR CONCENTRATION,
NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.
2) 9 PPM MAXIMUM 8-HOUR CONCENTRATION,
NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.

SECONDARY: SAME AS PRIMARY.

3. Sulfur Dioxide (SO_2)

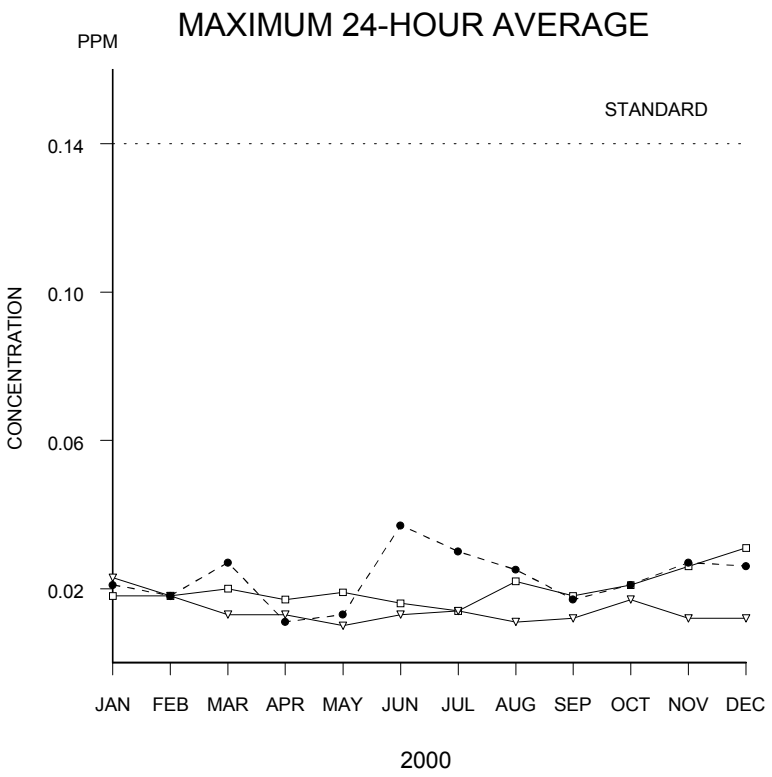
Sulfur dioxide is formed by the combustion of sulfur containing fossil fuels. SO_2 is produced primarily from coal and oil combustion sources such as electric utilities, steel mills, refineries, pulp and paper mills and nonferrous smelters. Sulfur dioxide is an irritant to the nose, throat, lungs, and eyes. Health effects of SO_2 exposure are highly correlated with particulate pollution. High concentrations may affect breathing and aggravate existing respiratory and cardiovascular disease. Subgroups of the population that are especially susceptible to the effects of SO_2 include asthmatics, individuals with bronchitis or emphysema, children and the elderly. Sulfur dioxide is a primary contributor to acid deposition, through atmospheric chemical conversions, causing acidification of water systems, and damage to trees, crops, buildings and statues.

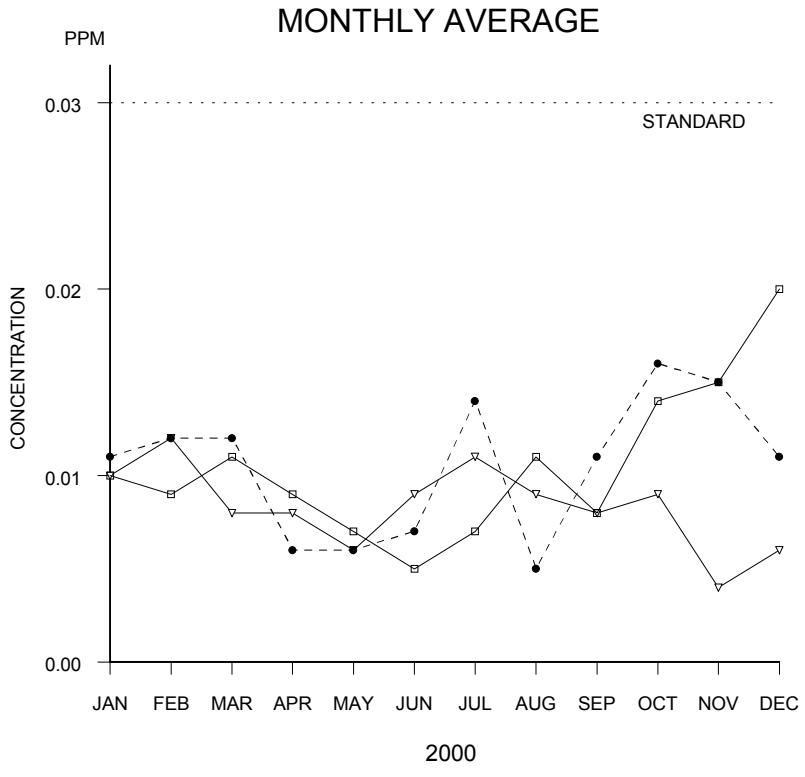
The NAAQS for sulfur dioxide are defined in terms of the annual arithmetic mean concentration, the maximum 24-hour concentration and the maximum 3-hour concentration. The primary standards are expressed in terms of the annual arithmetic mean, set at 0.03 ppm, and the maximum 24-hour concentration, set at 0.14 ppm, which are not to be exceeded more than once per year. The secondary standard is expressed in terms of maximum 3-hour concentration, which is set at 0.5 ppm and is not to be exceeded more than once per year.

Table 4: Sulfur Dioxide

	SEVEN CORNERS	CUB RUN	LEWINSVILLE
Annual arithmetic mean, ppm	0.011	0.008	0.010
Maximum 24-hr conc., ppm	0.031	0.023	0.037
2nd highest 24-hr conc., ppm	0.028	0.018	0.030
Maximum 3-hr conc., ppm	0.057	0.036	0.057
2nd highest 3-hr conc.,ppm	0.044	0.031	0.049
99th percentile 1-hr conc., ppm	0.032	0.022	0.033
Number of 1-hr measurements	8676	8559	8664
Number of 24-hr averages above 0.14 ppm	0	0	0

SULFUR DIOXIDE





CUBRUN
LEWINSVILLE
SEVEN

PRIMARY: 1) 0.03 PPM ANNUAL ARITHMETIC MEAN.
2) 0.14 PPM MAXIMUM 24-HOUR CONCENTRATION.

SECONDARY: 0.5 PPM MAXIMUM 3-HOUR CONCENTRATION,
NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.

4. Oxides of Nitrogen (NO & NO_2)

Oxides of nitrogen are formed by high temperature combustion in both mobile and stationary sources such as electric utility and industrial boilers. Nitric oxide is produced in abundance by these sources and under the influence of sunlight it reacts with certain organic compounds to both generate and destroy ozone and NO_2. The NO concentration is highly variable and strongly seasonal in character (high in winter). The NO_2 concentration is more stable and shows little seasonal influence.

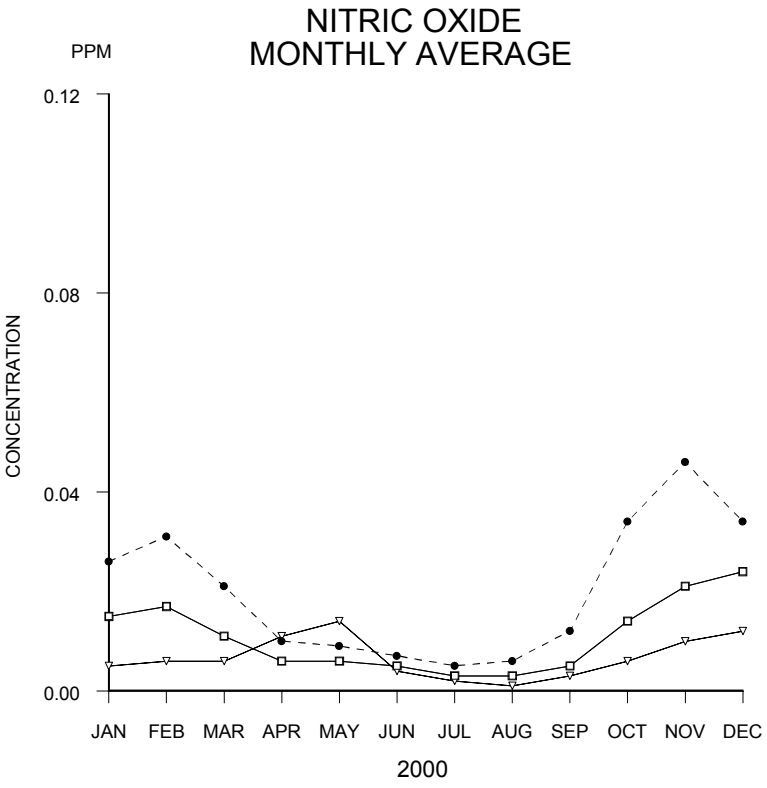
Nitrogen dioxide is a highly reactive oxidant and has a greater toxic potential than NO. Exposure to ambient concentrations of NO_2 may cause changes in airway responsiveness, lower resistance to respiratory infections, and reduce pulmonary function. Subgroups of the population that are especially susceptible to the effects of NO_2 exposure include asthmatics, persons with existing respiratory illness, i.e. emphysema and chronic bronchitis, and children. Studies are not definitive for health effects in healthy individuals. Nitrogen oxides injure vegetation, cause fabrics and dyes to deteriorate, and contribute to metal corrosion. They are important participants in photochemical reactions of ozone formation and acid deposition.

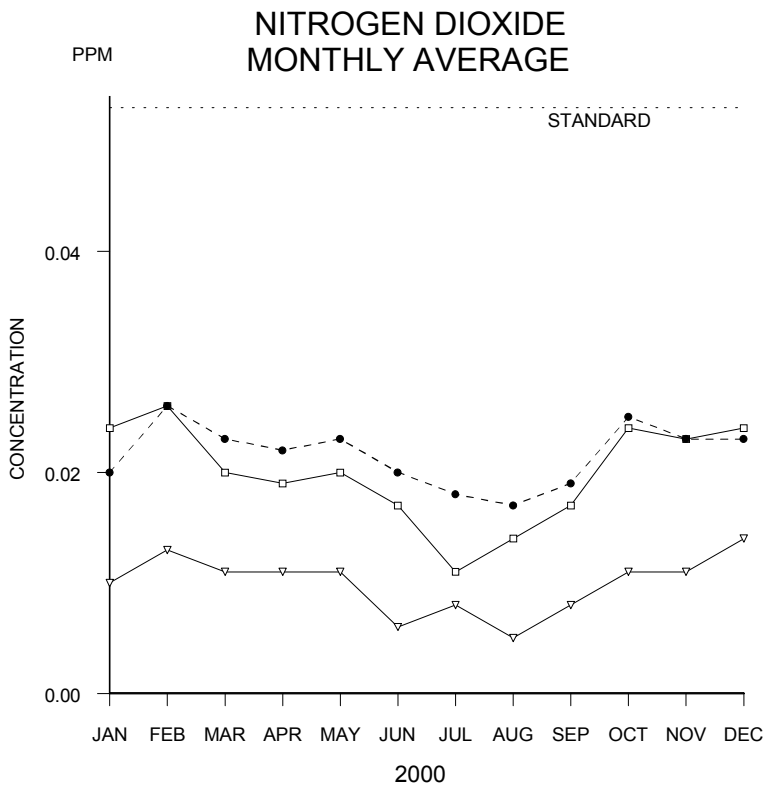
The NAAQS for nitrogen dioxide are defined in terms of the annual arithmetic mean concentration. The primary and secondary standards are 0.053 ppm. No NAAQS have been established for nitric oxide.

Table 5: Oxides of Nitrogen

	SEVEN CORNERS	CUB RUN	LEWINSVILLE
NITRIC OXIDE (NO)			
Annual arithmetic mean, ppm	0.011	0.006	0.020
99^{th} percentile 1-hr conc., ppm	0.109	0.077	0.218
Number of 1-hr measurements	8674	8294	8655
NITROGEN DIOXIDE (NO_2)			
Annual arithmetic mean, ppm	0.020	0.010	0.021
99^{th} percentile 1-hr conc., ppm	0.053	0.033	0.055
Number of 1-hr measurements	8674	8294	8655

OXIDES OF NITROGEN





FEDERAL, STATE, AND COUNTY STANDARDS:

NITROGEN DIOXIDE:

PRIMARY: 0.053 PPM ANNUAL ARITHMETIC MEAN.

SECONDARY: SAME AS PRIMARY

NITRIC OXIDE: NO STANDARD ESTABLISHED.

SEVEN CORNERS
CUBRUN
LEWINSVILLE

5. Particulate Matter

Particulate matter consists of dust, smoke, and other solid or liquid particles small enough to suspend readily in the air. The particles range in size from very fine (a fraction of a micrometer) to the very coarse (about 1000 micrometers). The chemical and physical properties of particulate matter can vary greatly with time, region, meteorology, and type of source. Particulate matter has been associated with increased respiratory symptoms and illnesses in children and adults, and at very high levels has been shown to produce mortality in the elderly and ill.

The Environmental Protection Agency (EPA) revised the NAAQS for particulate matter on July 18, 1997. EPA added standards for particulate matter 2.5 micrometers and below ($PM_{2.5}$) and revised the form of the 24-hour standard for particulate matter 10 micrometers and below (PM_{10}). $PM_{2.5}$ standards are intended to protect against exposures to fine fraction particle pollution and the PM_{10} standards are intended to protect against coarse fraction particles. The constitutionality of these revised standards was challenged by private industry in the Courts in 1999. On February 27, 2001, the U.S. Supreme Court issued a ruling to uphold the new particulate matter standards.

Fairfax County has retained the standard for total suspended particulate (TSP), which is used to evaluate nuisance impacts that cause damage, annoyance, or unreasonable interference with the enjoyment of life and property.

a. Total Suspended Particulate (TSP)

The TSP measure is the weight of material in a unit volume of air, without regard to the size of the particles. The TSP sampler collects particulate matter up to a nominal size (aerodynamic diameter) of 25 to 50 micrometers. Each sample is collected during a 24-hour period, midnight to midnight. A maximum of 61 samples was scheduled for each station during 2000.

County primary and secondary standards are 60 $\mu g/m^3$ for annual geometric mean and 150 $\mu g/m^3$ for maximum 24-hour concentration, the 24-hour concentration is not to be exceeded more than once per year.

TSP samplers at Gunston monitoring site

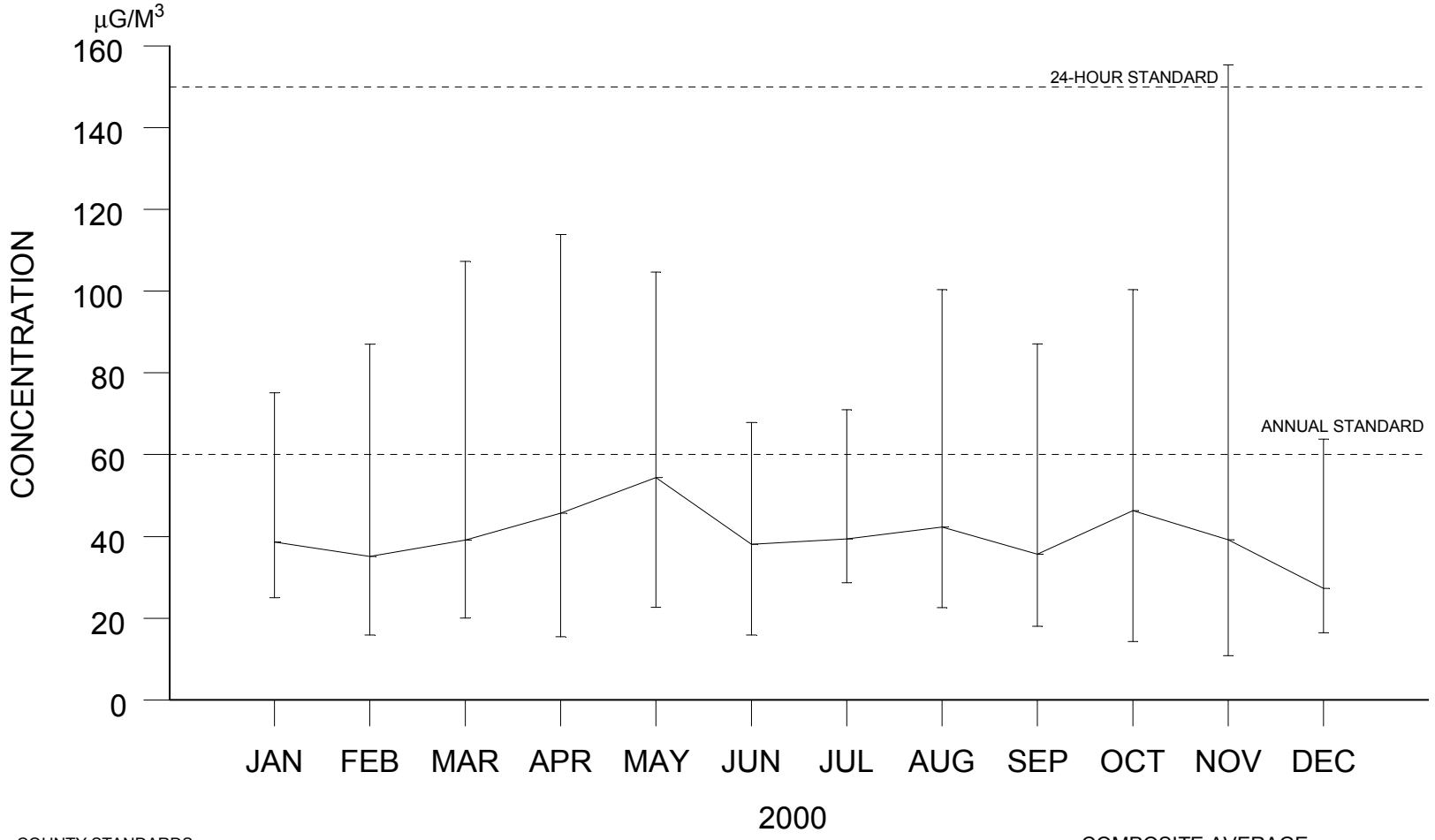
Table 6: Total Suspended Particulates

	BUSH HILL	CLERMONT	THOMAS EDISON	GUNSTON	I-95	OCCOQUAN HILL	SPRINGFIELD	ALL STATIONS
Number of samples	47	60	57	56	56	59	59	394
Annual geometric mean, µg/m3	32.7	32.3	41.4	32.2	56.1	47.0	42.2	39.7
Maximum 24-hr sample, µg/m3	92.2	78.6	104.7	74.3	155.4	126.1	125.6	155.4
2nd highest 24-hr sample, µg/m3	74.4	77.8	102.4	73.2	107.4	113.9	79.2	113.9

Table 7: Total Suspended Particulates
Monthly Geometric Mean, $\mu g/m^3$

	BUSH HILL	CLERMONT	THOMAS EDISON	GUNSTON	I-95	OCCOQUAN HILL	SPRINGFIELD	ALL STATIONS
January	N/A	31.5	40.2	36.18	41.6	48.9	35.5	38.6
February	31.7	26.0	30.6	21.9	41.6	32.3	44.4	35.1
March	34.3	29.6	41.4	58.0	58.0	40.4	46.4	39.1
April	40.8	41.1	57.3	51.0	51.0	49.1	41.5	45.7
May	50.2	48.8	64.6	70.9	70.9	54.3	51.9	54.4
June	31.7	34.0	36.0	47.1	47.1	47.8	44.9	38.1
July	33.5	34.7	37.0	55.1	55.1	46.2	40.6	39.4
August	27.8	32.8	38.2	85.5	85.5	59.0	44.1	42.3
September	29.8	28.2	39.0	47.4	47.4	43.1	37.9	35.7
October	33.6	34.5	50.5	87.0	87.0	56.7	49.7	46.3
November	29.2	26.7	46.6	68.9	68.9	50.1	36.4	39.2
December	25.8	26.5	27.4	31.7	31.7	30.8	34.1	27.3

TOTAL SUSPENDED PARTICULATES MONTHLY GEOMETRIC MEAN WITH MAXIMUM / MINIMUM 24-HOUR SAMPLES



COUNTY STANDARDS:

60 µG/M^3 ANNUAL GEOMETRIC MEAN.

150 µG/M^3 MAXIMUM 24-HOUR CONCENTRATION, NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.

COMPOSITE AVERAGE

b. Particulate Matter 10 Micrometers (PM_{10})

The PM_{10} measurement is a size specific indicator of particulate matter in the ambient air. The PM_{10} sampler collects particulates with an aerodynamic diameter less than or equal to a nominal 10 micrometers. The PM_{10} measure is the weight of this size specific material in a unit volume of air.

The NAAQS are defined in terms of the 24-hour average concentration and the annual arithmetic mean. The primary standard for 24-hour average concentration is 150 $\mu g/m^3$. The standard is attained when the 3-year average of the 99th percentile of the monitored concentrations at the highest monitor in an area is less than or equal to 150 $\mu g/m^3$. The primary standard for annual arithmetic mean is 50 $\mu g/m^3$. The standard is attained when the 3-year average of the annual arithmetic PM_{10} concentrations at each monitor within an area is less than or equal to 50 $\mu g/m^3$.

PM_{10} sampler at Occoquan Hill site

PM_{10} with filter exposed

Table 8: Particulate Matter 10 Micrometers

	CUB RUN	LUCK	MOUNT VERNON	OCCOQUAN HILL	SPRINGFIELD	ALL STATIONS
Number of samples	52	54	45	56	55	262
Annual arithmetic mean, $\mu g/m^3$	19.25	20.74	20.44	19.56	20.26	20.05
Maximum 24-hr sample, $\mu g/m^3$	52.7	64.8	52.2	47.1	52.0	64.8
99^{th} percentile of 24-hr samples, $\mu g/m^3$	52.7	64.8	52.2	47.1	52.0	52.2
24-hr samples above 150 $\mu g/m^3$	0	0	0	0	0	0

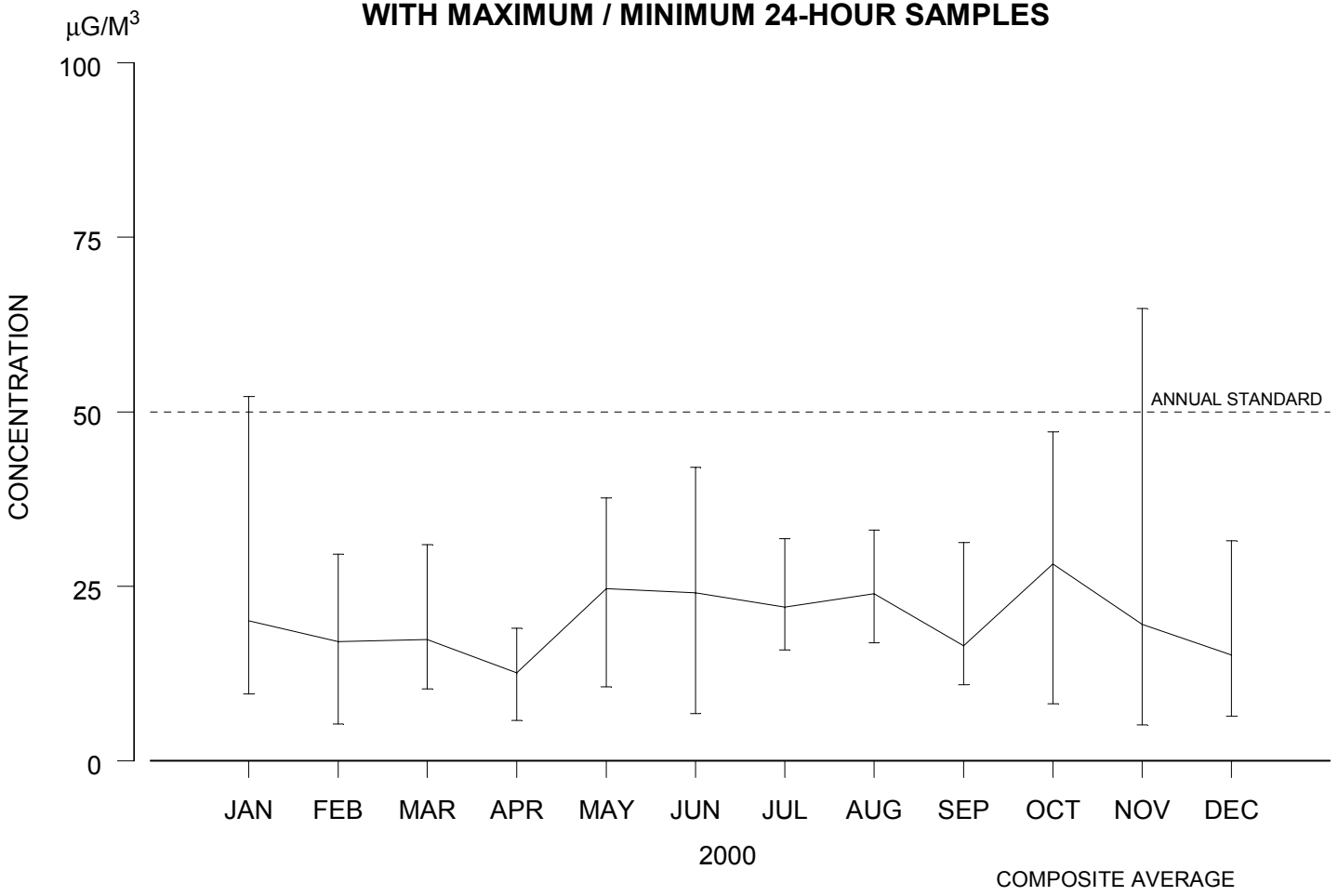
Table 9: Particulate Matter 10 Micrometers

Monthly Arithmetic Mean, $\mu g/m^3$

	CUB RUN	LUCK	MOUNT VERNON	OCCOQUAN HILL	SPRINGFIELD	ALL STATIONS
January	19.1	21.3	27.7	16.6	15.7	20.1
February	16.9	14.6	22.0	13.3	18.7	17.1
March	16.0	19.8	16.5	15.6	19.1	17.4
April	13.3	12.5	13.4	12.1	11.7	12.6
May	16.6	27.8	26.2	26.6	26.0	24.7
June	23.0	24.5	28.5	21.7	22.7	24.1
July	21.0	19.7	23.3	23.1	23.2	22.1
August	23.8	26.0	22.0	25.4	22.4	23.9
September	17.5	13.4	16.2	19.0	16.4	16.5
October	25.6	27.0	N/A	30.9	29.2	28.2
November	23.1	23.5	N/A	11.5	20.1	19.6
December	14.3	16.8	15.8	15.5	13.6	15.2

PARTICULATE MATTER PM_{10} MONTHLY ARITHMETIC MEAN

WITH MAXIMUM / MINIMUM 24-HOUR SAMPLES



PRIMARY: 50 µG/M^3 ANNUAL ARITHMETIC MEAN, 3-YEAR AVERAGE OF ANNUAL VALUES MUST BE LESS THAN OR EQUAL TO 50 µG/M^3.

150 µG/M^3 24-HOUR CONCENTRATION, 3-YEAR AVERAGE OF THE 99 th PERCENTILE OF THE MONITORED CONCENTRATIONS AT THE HIGHEST MONITOR IN AN AREA MUST BE LESS THAN OR EQUAL TO 150 µG/M^3.

SECONDARY: SAME AS PRIMARY.

c. Particulate Matter 2.5 Micrometers ($PM_{2.5}$)

The $PM_{2.5}$ measurement is a size specific indicator of particulate matter in the ambient air. The $PM_{2.5}$ sampler collects particulates with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers. The $PM_{2.5}$ measurement is the weight of this size specific material in a unit volume of air.

The new primary annual $PM_{2.5}$ standard is set at 15 $\mu g/m^3$, annual arithmetic mean. The annual standard is attained when the 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations is less than or equal to 15 $\mu g/m^3$ from single or multiple community-oriented monitors. The new primary 24-hour $PM_{2.5}$ standard is set at 65 $\mu g/m^3$. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile of the 24-hour $PM_{2.5}$ at each population-oriented monitor within an area is less than or equal to 65 $\mu g/m^3$.

The $PM_{2.5}$ monitoring network has been put in place in Fairfax County and quality assurance procedures for the samplers developed by EPA and the Virginia Department of Environmental Quality (VADEQ) have been implemented. Sampling for $PM_{2.5}$ started in January 1999.

PM 2.5 sampler

The following table contains data that was collected in 2000.

Table 10: Particulate Matter 2.5 Micrometers

Monthly Arithmetic Mean, $\mu g/m^3$

	FRANCONIA	LEWINSVILLE	SEVEN CORNERS*
January	14.6	12.8	12.6*
February	13.8	16.7	15.5*
March	9.9	10.5	10.5*
April	9.2	10.1	8.7
May	15.3	17.0	17.6
June	18.3	19.1	19.5
July	16.9	16.9*	16.8
August	16.5	17.1*	17.8
September	11.6	12.0*	12.2
October	18.0	18.6	17.3*
November	12.3	14.9	17.1*
December	14.6	14.5	14.3*
Number of Observations	318	104	91
Maximum Value	37.5	47.7	47.0
Annual Mean	14.1	15.1*	15.4*

*Less than 75% of data captured for the quarter.

*Annual mean based on incomplete data for 2000.

6. Lead (Pb)

Lead is emitted into the atmosphere by certain industries such as smelters and battery manufacturers. Airborne lead is associated with particles ranging between 0.1 and 5.0 micrometers in diameter. Particle size and shape are important factors in determining the deposition and suspension of lead in the atmosphere and the retention and absorption of lead into the human lung.

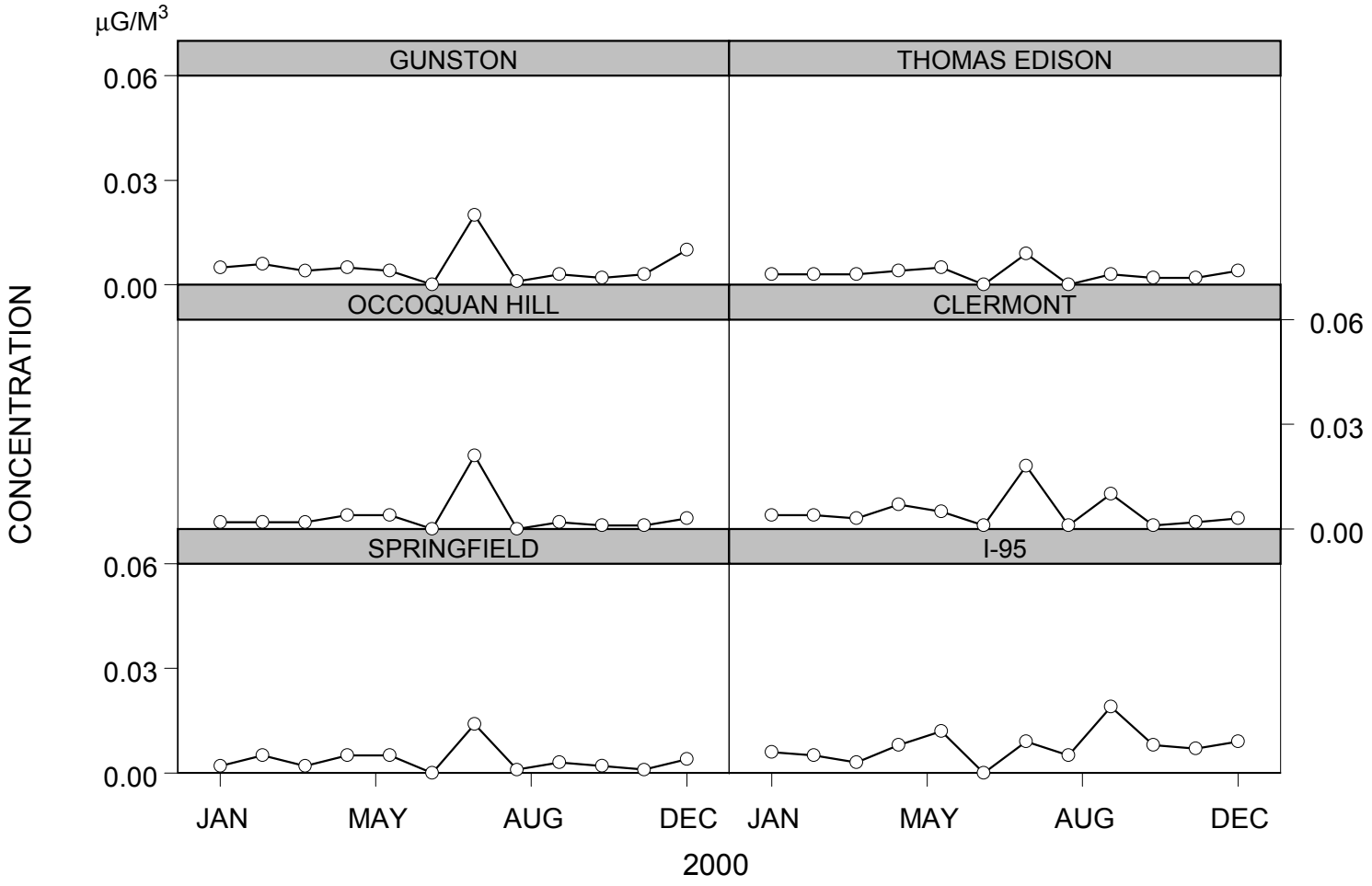
Lead interferes with the blood forming system, the nervous system, the renal system, vitamin D metabolism, and can affect the normal functions of the reproductive and cardiovascular systems. Certain subgroups of the population are more susceptible to the effects of lead. Low levels of lead absorption by young children can cause permanent mental retardation. Lead has also been associated with high blood pressure in adults.

The NAAQS for lead are defined in terms of the quarterly arithmetic mean. The primary and secondary standards for lead are 1.5 $\mu g/m^3$ quarterly arithmetic mean.

Table 11: Lead

	BUSH HILL	CLERMONT	GUNSTON	I-95	OQQOQUAN HILL	SPRINGFIELD	THOMAS EDISON
Number of 24-hr measurements	47	60	57	56	59	59	57
Maximum 24-hr sample, $\mu g/m^3$	0.055	0.055	0.058	0.029	0.076	0.057	0.017
Maximum monthly average, $\mu g/m^3$	0.013	0.018	0.020	0.019	0.021	0.014	0.009
Maximum quarterly average, $\mu g/m^3$	0.007	0.010	0.008	0.010	0.008	0.006	0.004
2^{nd} highest quarterly average, $\mu g/m^3$	0.004	0.004	0.005	0.008	0.003	0.003	0.003

LEAD MONTHLY MEAN



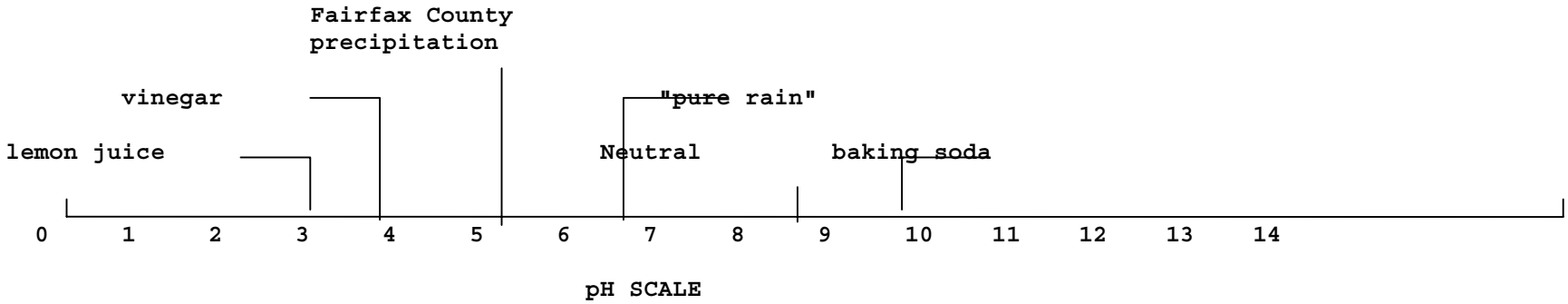
FEDERAL, STATE, AND COUNTY STANDARDS:

PRIMARY: 1.5 µG/M^3 MAXIMUM ARITHMETIC MEAN
PER CALENDAR QUARTER.

SECONDARY: SAME AS PRIMARY

D. Acid Deposition

Acidic precipitation is a phenomenon resulting primarily from the reaction of sulfur oxides and nitrogen oxides which in combination with atmospheric oxygen and moisture form sulfuric and nitric acids. These acids can then be deposited by wet deposition (rain, snow, ice, and fog). Rain and snow are the two primary mechanisms of deposition. In the absence of moisture intermediate products, sulfates, nitrates, and other aerosols are formed and deposited in dry form. The amount of acidity in precipitation can be determined by measuring the pH of a sample. pH is based on a logarithmic scale. A pH of 7.0 is neutral, less than 7.0 is acidic, and greater than 7.0 is basic. Since the scale is logarithmic, a pH change from 7.0 to 6.0 is a ten-fold increase in acidity.



In sensitive areas of the country, acidic precipitation has caused acidification of freshwater ecosystems such that aquatic life can no longer survive. Acidic precipitation is also suspected to be a corrosive which can damage statuary, stone structures, and automobile finishes. Direct effects upon humans have not been established.

Rain and snow samples are collected from our monitoring station at Occoquan, Virginia on a weekly basis. The samples are returned to our laboratory in Fairfax and are analyzed for pH and conductivity. The Virginia Department of Environmental Quality conducts further analysis on our samples for cations and anions, and determines the anion-cation balance.

No standards have been established but "pure rain" should have a pH in the range of 5.2 to 5.6 due to its mixing with atmospheric carbon dioxide and other natural atmospheric constituents.

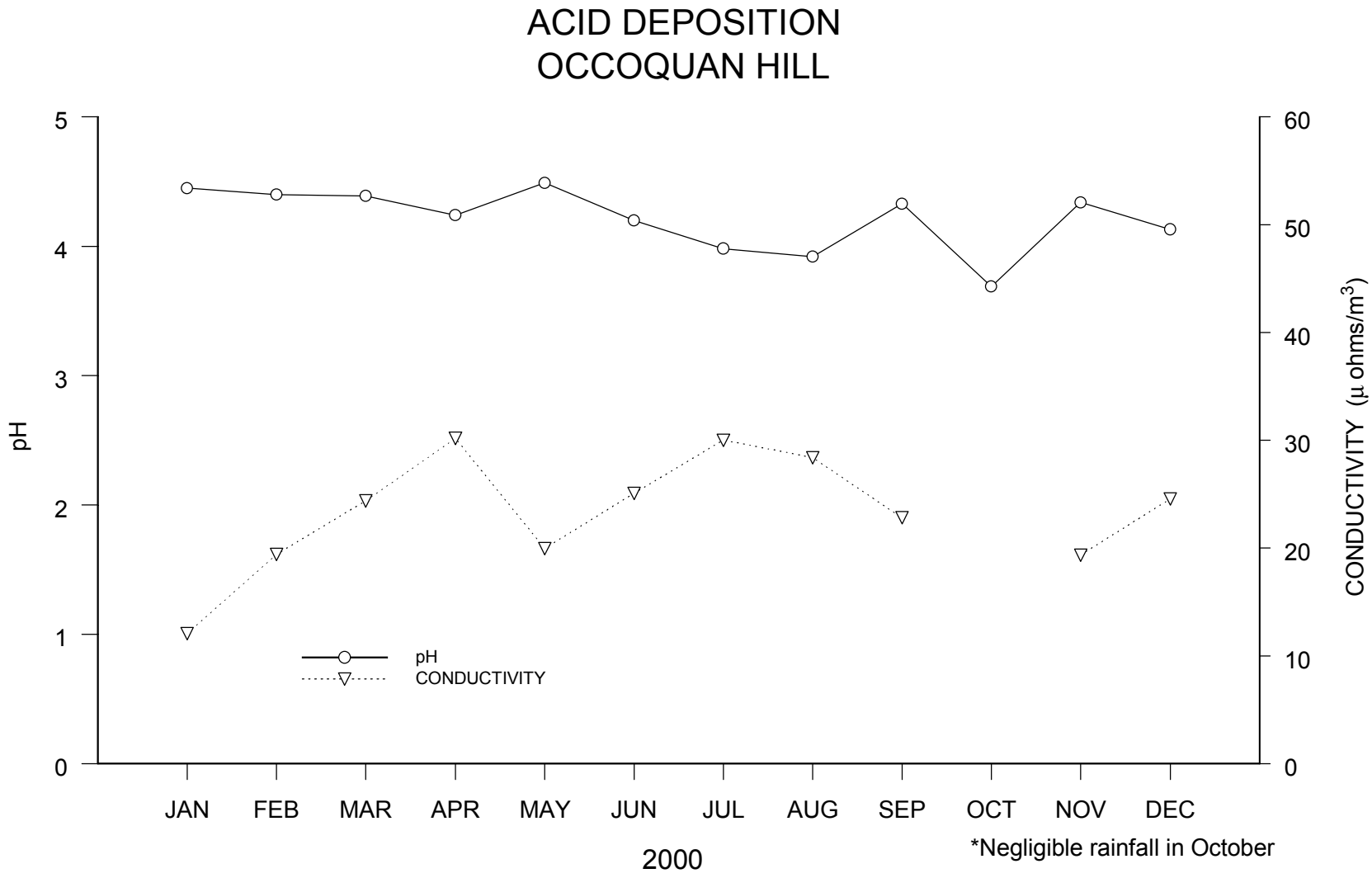
Table 12: Acid Deposition Occoquan Hill Site
Monthly Volumetric Weighted Average

	pH*	CONDUCTIVITY* (μMHO)	TOTAL RAINFALL
January	4.45	12.08	3.20
February	4.40	19.42	1.83
March	4.39	24.38	2.97
April	4.24	30.18	4.59
May	4.49	19.96	2.46
June	4.20	25.07	4.21
July	3.98	29.99	5.93
August	3.92	28.39	3.68
September	4.33	22.82	4.17
October	3.69	N/A	0.03
November	4.34	19.34	1.29
December	4.13	24.55	1.68

Table 13: Acid Deposition Occoquan Hill Site
Quarterly And Annual Volumetric Weighted Average

	pH*	CONDUCTIVITY* (μMHO)
First Quarter	4.41	19.45
Second Quarter	4.29	26.11
Third Quarter	4.08	26.91
Fourth Quarter	4.23	23.01
Annual 2000	4.22	24.97

* Volume weighted average indicates what the level would be if all samples had been mixed together.



ph and Conductivity monthly values are volume weighted averages.

Acid rain sampler at Occoquan Hill monitoring station

E. Regional Air Quality

1. Air Quality Index

The U.S. Environmental Protection Agency (EPA) requires the use of an Air Quality Index (AQI) for reporting air quality levels to the general public. The AQI is a system which condenses five air pollutant concentration values (PM_{10}, SO_2, CO, O_3, and NO_2) into a single number as an indicator of air quality. The index values are then grouped into air quality descriptor categories as shown in Table 14. The EPA adopted changes to this index, formerly named the Pollutant Standards Index (PSI), which became effective October 4, 1999. Some of the changes to this index are the addition of another descriptor category for "unhealthy for sensitive groups", new breakpoints for the ozone sub-index in terms of 8-hour, and reporting this index in a color format to the public.

Table 14: Air Quality Index

Index Value	Descriptor Category	Color
0-50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy for sensitive groups	Orange
151-200	Unhealthy	Red
201-300	Very unhealthy	Purple
301-500	Hazardous	Maroon

The Metropolitan Washington Council of Governments (C.O.G.) is responsible for reporting daily air quality levels to the public in this region. C.O.G. collects air quality data from selected monitoring stations on a daily basis, calculates a maximum index value and forecasts the air quality levels for the following day, and reports this by color format to the media for dissemination to the public. During regional air pollution advisories, C.O.G. collects hourly air quality data from these monitoring stations throughout the region as a basis for continuing or canceling the advisory. When the index exceeds or will probably exceed 100, and when specific weather conditions exist, a Health Advisory may be issued by C.O.G. This Health Advisory is directed towards sensitive populations such as the elderly and those with respiratory disorders. There were 2 Code Red observations and 10 Code Orange observations issued during 2000.

2. Regional Ozone Exceedances

The Washington DC, Maryland, and Virginia air quality control region is classified as a serious non-attainment area for ozone. This region had until 1999 to attain the 1-hour ozone NAAQS, but did not achieve it. Washington, D.C., Maryland, and Virginia petitioned EPA and was granted an extension until 2005.

An exceedant day is a day when an ozone monitoring site exceeds the NAAQS of 0.12 ppm for at least one hour. There were two ozone exceedant days in the air quality control region in 2000. Fairfax County had one ozone exceedant day in 2000. The details are shown in Table 15a below.

Violations of the 8-hour standard are reported , although there are no designated 8-hour non-attainment areas at this time. These violations are shown in Table 15b.

TABLE 15a: REGIONAL OZONE EXCEEDANCES 1-HOUR AVERAGE

DATE	LOCATION	MAXIMUM 1 HOUR OZONE (PPM)
May 13	Greenbelt, MD	0.128
June 10	Greenbelt , MD	0.142
	Suitland, MD	0.127
	*Mount Vernon, VA	0.125

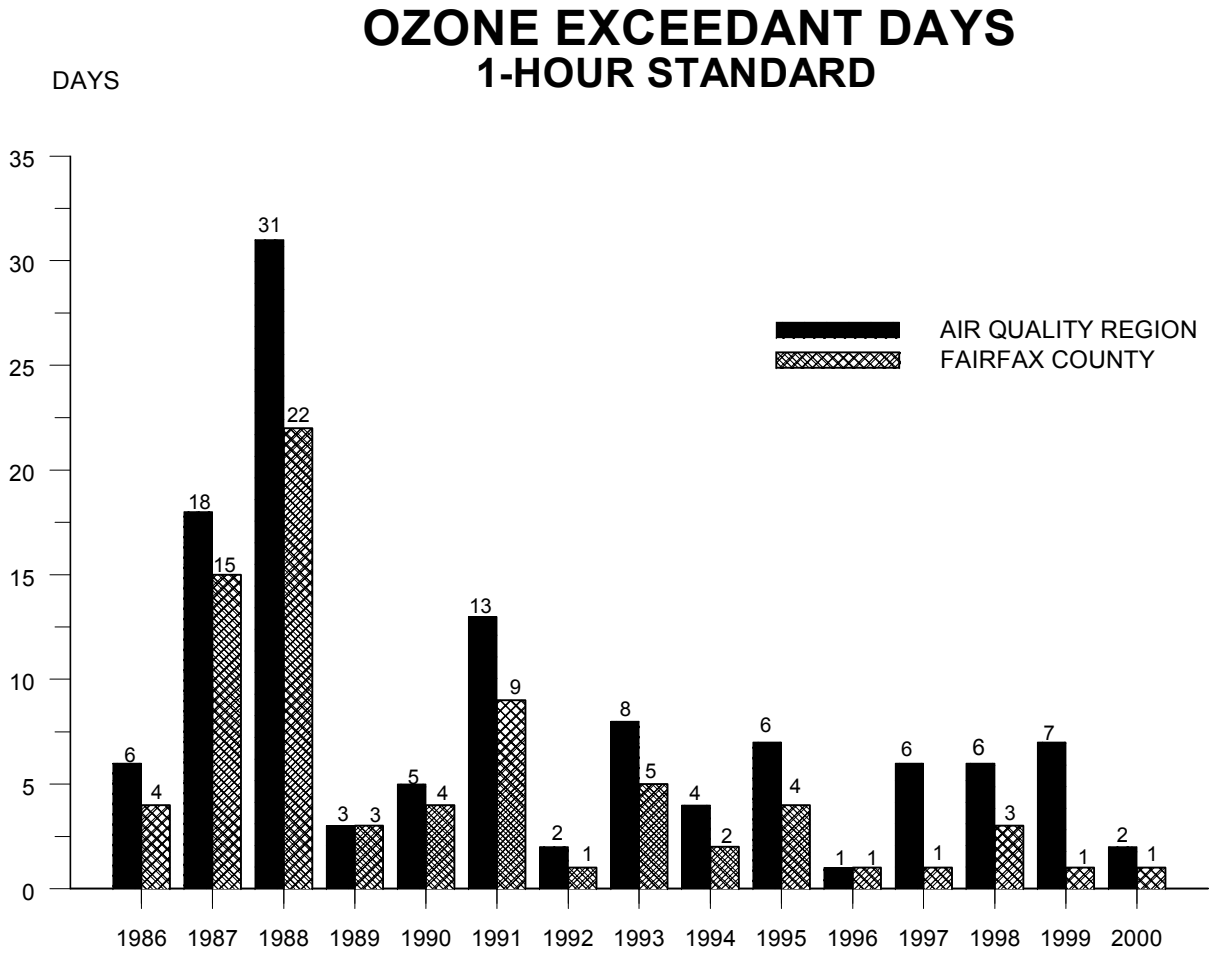
*Fairfax County Monitoring Station

TABLE 15b: REGIONAL OZONE EXCEEDANCES 8-HOUR AVERAGE

DATE	LOCATION	MAXIMUM 1 HOUR OZONE (PPM)
May 6	Takoma, MD	0.093
May 7	Takoma, MD	0.094
May 8	Takoma, MD	0.102
May 13	Greenbelt, MD	0.088
June 2	Frederick County, MD	0.090
June 9	*Mount Vernon, VA	0.100
	*Cub Run, VA	0.094
	*Lewinsville, VA	0.093
	*Seven Corners	0.093
June 10	Greenbelt, MD	0.117
	*Cub Run, VA	0.092
	*Lewinsville, VA	0.101
	*Mount Vernon, VA	0.108
	*Seven Corners, VA	0.100
June 11	*Mount Vernon, VA	0.093
June 12	S. Maryland, Charles County, MD	0.102
	*Mount Vernon, VA	0.092
July 9	Greenbelt, MD	0.088

*Fairfax County Monitoring Station

The following graph is a comparison of the number of ozone exceedant days observed in the air quality control region (including Fairfax County) with those observed just in Fairfax County.



F. METEOROLOGY

1. Overview

Pertinent and representative localized meteorological data are an essential and ongoing integral part of the County's air quality monitoring program. Continuous and accurate observations of local conditions relating to temperature, wind flow (speed and direction) and precipitation are fundamental elements used in the day to day evaluation and understanding of air quality conditions and assessment of long-term trends within the County.

The County's meteorological observing equipment has evolved from simple battery powered, mechanical recorder devices requiring manual reduction of data to more modern electronic sensors and data average devices capable of real-time call up and output of instantaneous values or hourly and daily averages of temperature, wind and precipitation. Paramount along with these improvements, the meteorological sensors have always been employed in close proximity with the continuous air quality monitors to assure the most representative data practical.

Some meteorological data produced by other agencies at nearby locations are acquired and used by the agency. Data from Dulles and Washington National Airports and Davison Army Airfield (Ft. Belvoir), although tailored for aviation support, are particularly useful in establishing long term averages, for quality control work, and to compliment agency data. Therefore, some of the pertinent airport data are tabulated and displayed in this report.

County and agency computers, data loggers, and other electronic devices are exploited in the acquisition, reduction and processing of meteorological data. For this report, the data, unless otherwise described, is processed, tabulated and displayed in a manner similar to that done for the air quality pollutant data. In addition, data for this and all prior years are archived in electronic format and is readily available for interested County and other governmental agencies, contractors, and Fairfax County citizens.

2. Temperature

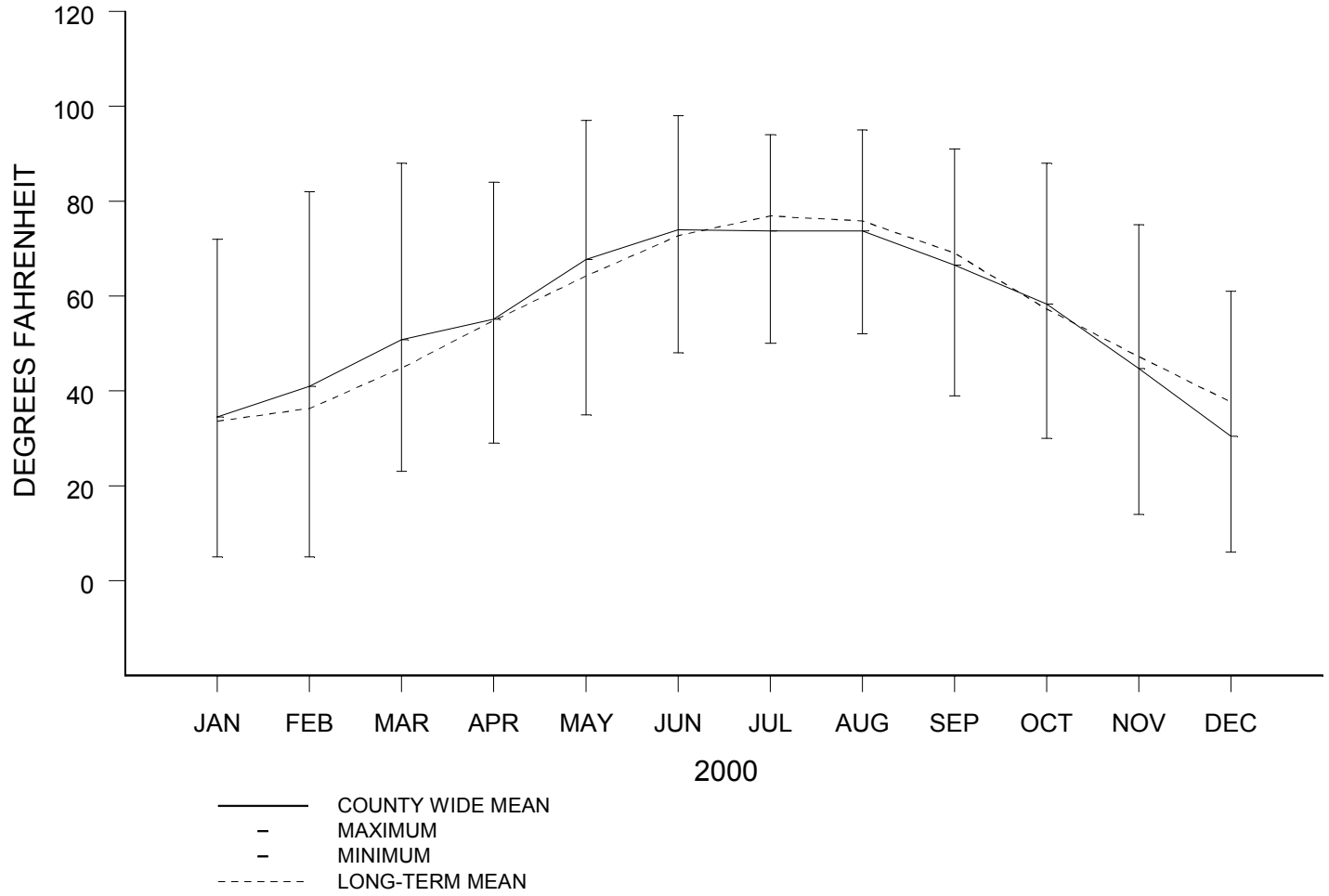
The annual average maximum or minimum temperature is obtained by averaging all daily maximum or minimum temperatures. The annual mean value is the average of all hourly average temperature observations, and is independent of any recorded or calculated maximum or minimum.

Table 16: Temperature

	Annual Average Daily Maximum °F	Annual Mean Temperature °F	Annual Average Daily Minimum °F
	Maximum	Mean	Minimum
COUNTY STATIONS			
Seven Corners	63.5	54.8	47.1
Lewinsville	66.0	56.5	47.7
Mount Vernon	67.6	57.0	46.6
Occoquan Hill	65.7	55.7	47.8
Luck Quarry	66.7	55.2	43.6
AIRPORTS			
Dulles	64.7	54.2	43.1
National	65.4	56.7	48.7
Davison	67.1	56.6	46.1

MONTHLY MEAN TEMPERATURE

WITH MAXIMUM AND MINIMUM DAILY EXTREMES



3. Rainfall

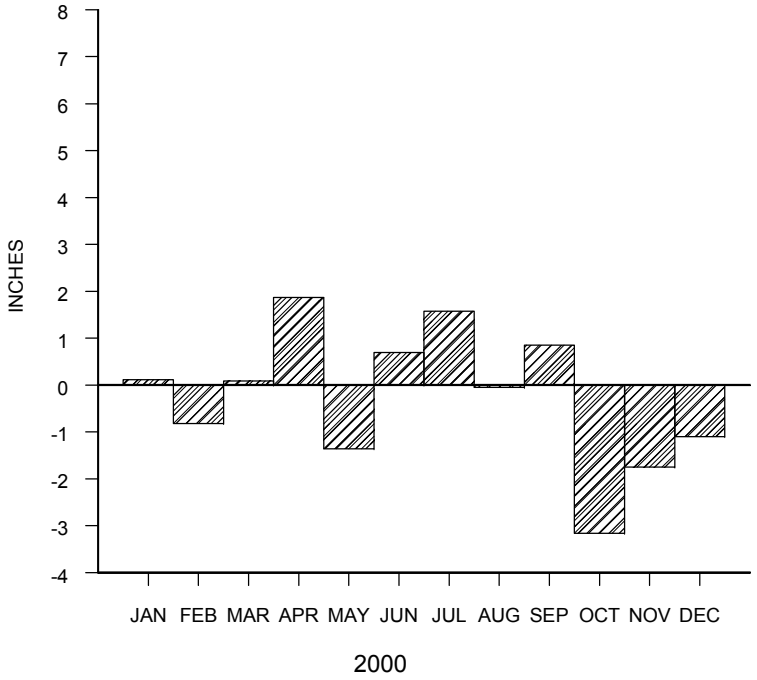
Rainfall is stated as the accumulated depth in inches as measured by county and airport rain gauges. October 2000 set an all-time record low for rainfall in Virginia. It was the driest month (0.05 inches) in Fairfax County since monitoring began in 1974. Rainfall was well below normal (3.11 inches) in 2000.

Table 17: Rainfall

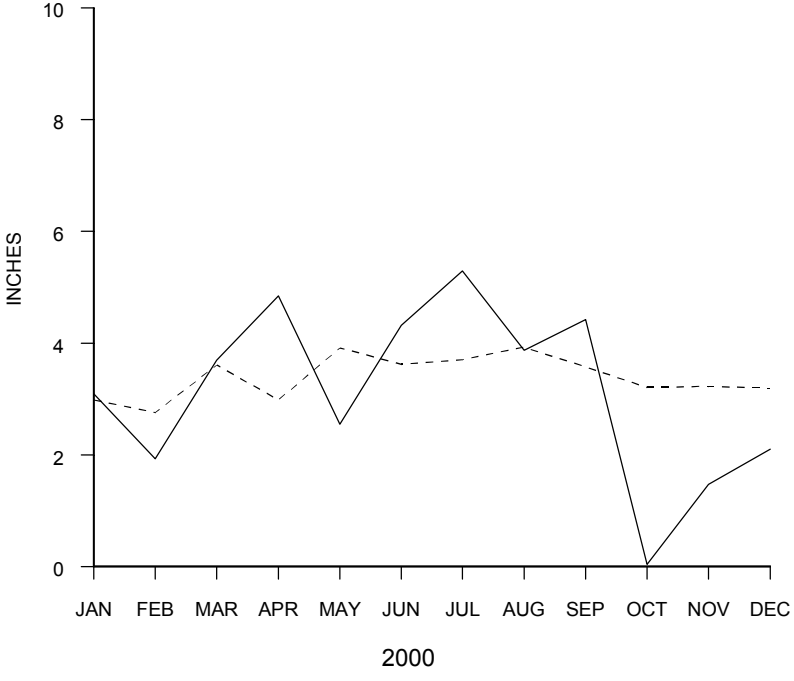
	RAINFALL (inches)
COUNTY STATIONS	
Cub Run	35.44
Seven Corners	37.74
Lewinsville	36.76
Mount Vernon	35.85
Occoquan Hill	36.04
Luck Quarry	35.58
AIRPORTS	
Dulles	36.83
National	40.66
Davison	46.53
ANNUAL COUNTYWIDE MEAN	37.60
LONG TERM MEAN FROM THREE AIRPORT SITES	40.71

RAINFALL

DEPARTURE



DEPTH



DEPARTURE: THE DIFFERENCE BETWEEN THE LONG TERM 3 AIRPORT AVERAGE AND THE AVERAGE OF THE OBSERVED AMOUNTS AT ALL STATIONS.

MONTHLY MEAN
LONG TERM AVERAGE

4. Wind

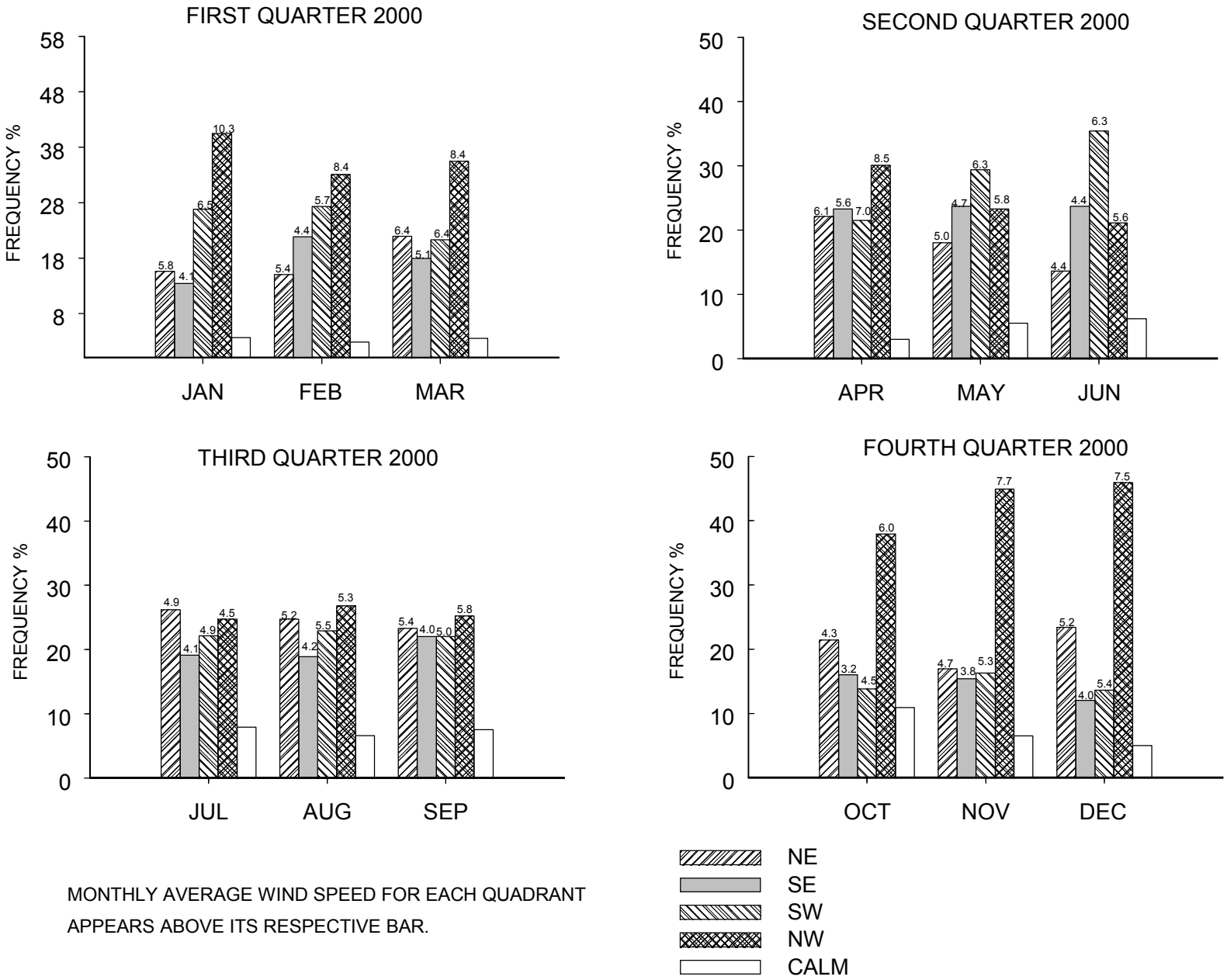
Wind direction observations are grouped by quadrant as follows: All occurrences of wind from 349° true through 078° true inclusive are classed as northeast winds; similarly winds from 079° through 168° true are southeast; winds from 169° through 258° true are southwest; and winds from 259° through 348° true are northwest. Frequency is the number of hourly observations in a quadrant stated as a percentage of all wind observations. Similarly, the mean wind speed for a quadrant is the average of all hourly wind speeds whose associated directions fall within the quadrant.

Table 18: Wind Direction and Mean Wind Speed

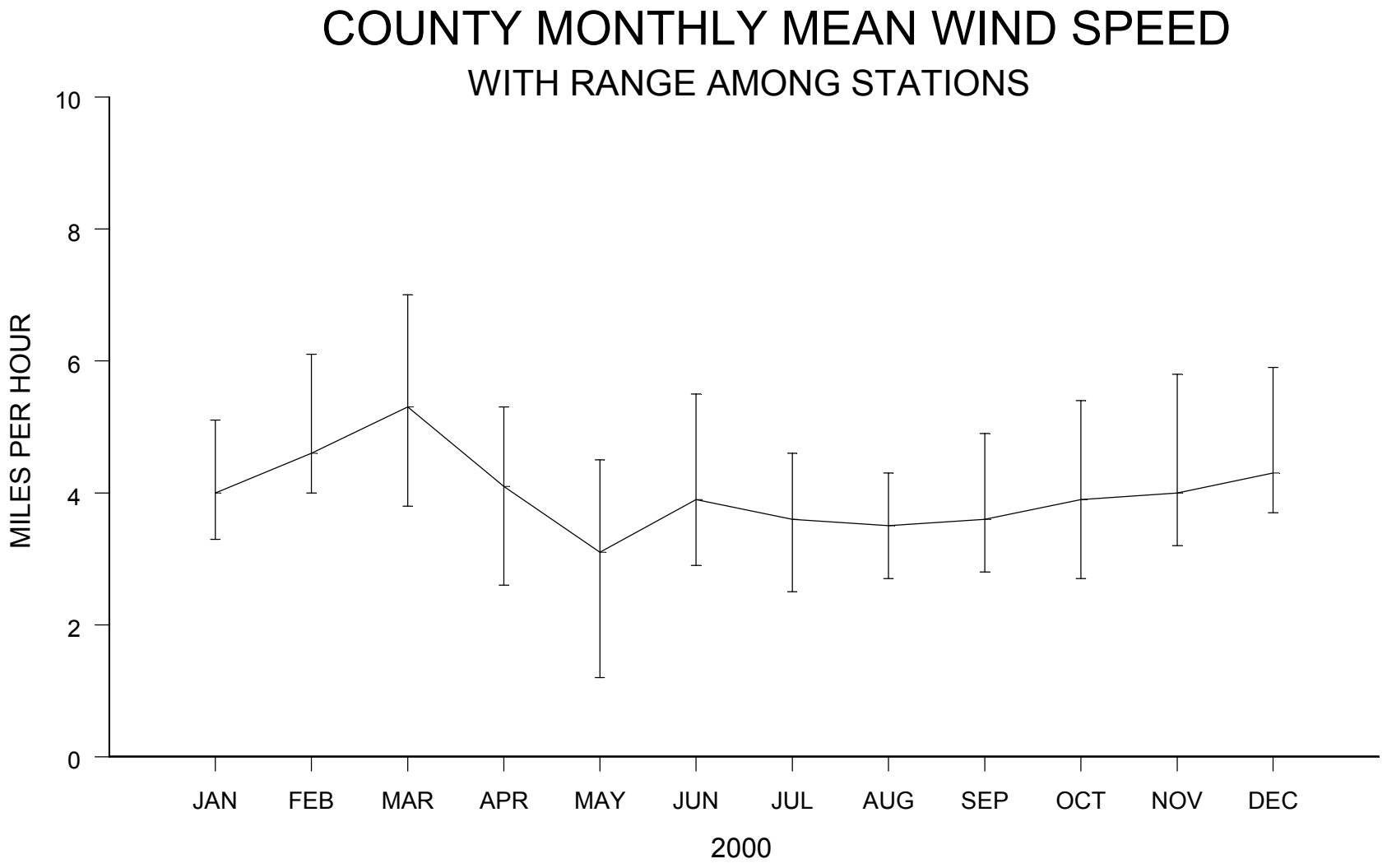
Table Format: Frequency (percent of time)
Miles per hour

	NORTHEAST	SOUTHEAST	SOUTHWEST	NORTHWEST	CALM
COUNTY STATIONS					
Seven Corners	14.0 4.1	15.7 5.2	28.1 5.5	42.2 7.9	0.1
Lewinsville	35.9 4.5	25.9 3.8	18.4 3.0	19.7 3.1	0.1
Luck Quarry	13.0 3.2	24.6 4.0	21.3 4.9	26.6 3.6	14.6
Mount Vernon	20.6 3.3	19.6 3.0	25.1 4.4	34.5 5.0	0.2
Occoquan Hill	13.8 5.2	19.5 3.4	18.3 4.1	46.4 6.3	2.0
AIRPORTS					
Dulles	21.1 7.4	7.9 6.4	23.3 8.0	27.7 10.1	20.0
National	23.3 8.9	11.6 7.3	31.1 8.8	27.6 11.9	6.5
Davison	18.9 3.6	26.5 4.5	16.6 5.8	36.8 9.0	1.1

WIND SPEED AND DIRECTION



MONTHLY AVERAGE WIND SPEED FOR EACH QUADRANT APPEARS ABOVE ITS RESPECTIVE BAR.


COUNTY MONTHLY MEAN WIND SPEED
WITH RANGE AMONG STATIONS
MILES PER HOUR
10
8
6
4
2
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
2000

Weather station at Occoquan Hill

Rain gauge sampler