ANNUAL REPORT ON AIR QUALITY 1986

MAINE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

1986 ANNUAL REPORT ON AIR QUALITY IN THE STATE OF MAINE

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

1. INTRODUCTION

1.1 Purpose and Overview

The purpose of this report is to present the air quality monitoring data generated by and for the Maine Department of Environmental Protection, Bureau of Air Quality Control, and to provide a historical perspective from which the significance of that data can be interpreted. Air Quality monitoring measures the concentrations of various pollutants in the ambient air. The monitoring is in response to State and Federal requirements to determine whether the air we breathe is attaining and maintaining National and State Ambient Air Quality Standards which are designed to protect the health and welfare of the public. Federal Primary Standards are intended to protect public health. Federal Secondary Standards are intended to protect public welfare. The State Standards are at least as strict as Federal Standards and in some cases are more strict. The reasoning behind establishing more stringent standards is that generally air quality in Maine is significantly cleaner than in other areas and should remain cleaner. The current Federal and State Standards are presented in Tables 1-1 and 1-2. Table 1-3 is a summary indicating all the violations of ambient air quality standards in the State by regions. Later on in this report those violations will be listed by the sites at which they occurred.

The majority of data now collected in the State is collected by industry. The Department has required industry to establish monitoring programs primarily when there are air quality problems associated with the industry, or when an industry is planning to build or expand causing a potential increase in air emissions. The State is still collecting monitoring data for long term trends, special studies and for compliance determinations. Ambient air monitoring by both industry and the State will continue in various regions where necessary until such time as standards are being met.

Included in this section are some figures which depict some of the results of air quality monitoring and control in the State. Figures 1-1 through 1-3 display trends or the lack of a trend which have been occurring at several long term key sites around the State.

Figure 1-1, which depicts the annual geometric means for total suspended particulates at several long term sites, shows significant trends at some sites. The two sites which still show significant upward trends are the Research Building site in Westbrook and the Kenduskeag Pump Station site in Bangor. Bangor appears to have reversed their earlier downward trend by the increased use of sand on downtown roads during the winter. Each of the last two years have shown an annual geometric mean extremely close to the annual standard and numerous exceedances of the short term standard. The Westbrook trend is the result of increased development, fugitive emissions from the S. D. Warren facility and a sweeping program that hasn't been comprehensive enough. Some reduction occurred in 1986 but the annual

TABLE 1-1
NATIONAL AMBIENT AIR QUALITY STANDARDS
(1986)

Pollutant	Averaging Time	Concentration
Particulates (TSP)	Annual Geometric Mean:	
	Primary	75 ug/m3
	Secondary	60 ug/m3 *
	Twenty-Four Hour:**	
	Primary	260 ug/m3
	Secondary	150 ug/m3
Lead (Pb)	Calendar Quarter	1.5 ug/m3
Carbon Monoxide (CO)	One Hour**	35 ppm
	Eight Hour**	9 ppm
Ozone (O3)	One Hour***	0.12 ppm
Nitrogen Dioxide (NO2)	Annual Arithmetic Mean	0.05 ppm
Sulfur Dioxide (SO2)	Annual Arithmetic Mean	0.03 ppm
	Twenty-Four Hour**	0.14 ppm
	Three-Hour**	
	Secondary	0.50 ppm
Hydrocarbon	Three Hour**	160 ug/m3

* = Federal Guideline Only.
** = Not to be exceeded more than once per year.
*** = Statistically estimated number of days with exceedances is not to be more than 1 per year.
ppm = Parts of pollutant per million parts of air.
ug/m3 = Micrograms of pollutant per cubic meter of air.

TABLE 1-2
STATE OF MAINE AMBIENT AIR QUALITY STANDARDS
(1986)

Pollutant	Averaging Time	Concentration
Particulates (TSP)	Annual Geometric Mean	60 ug/m3
	Twenty-Four Hour	150 ug/m3
Lead (Pb)	Twenty-Four Hour*	1.5 ug/m3
Carbon Monoxide (CO)	One Hour*	35 ppm(40 mg/m3)
	Eight Hour*	9 ppm(10 mg/m3)
Ozone (O3)	One Hour*	.081 ppm(160 ug/m3)
Nitrogen Dioxide (NO2)	Annual Arithmetic Mean	.053 ppm(100 ug/m3)
Sulfur Dioxide (SO2)	Annual Arithmetic Mean	.022 ppm(57 ug/m3)
	Twenty-Four Hour	.088 ppm(230 ug/m3)
	Three Hour	.439 ppm(1150 ug/m3)
Hydrocarbon	Three Hour*	160 ug/m3

* = Not to be exceeded more than once per year.
PPM = Parts of pollutant per million parts of air.
ug/m3 = Micrograms of pollutant per cubic meter of air.
mg/m3 = Milligrams of pollutant per cubic meter of air.

TABLE 1-3
NUMBER OF AMBIENT AIR QUALITY VIOLATIONS BY REGIONS
(1986)

POLLUTANT	REGIONS 107	108	109	110	111	TOTALS
Total Suspended Particulates						
Annual Geometric Mean*						
State	0	0	0	1	?	1
Federal	0	0	0	0	?	0
Twenty-four Hour						
State	8	13	15	17	?	53
Federal	0	1	0	0	?	1
Lead						
Twenty-four Hour						
State	0	0	0	0	?	0
Federal	0	0	0	0	?	0
Carbon Monoxide						
One Hour	?	?	?	0	?	0
Eight Hour	?	?	?	0	?	0
Ozone						
One Hour						
State	55	?	71	143	0	269
Days						
Federal	1	?	0	3	0	4
Nitrogen Dioxide						
Annual Arithmetic Mean	?	?	?	?	?	?
Sulfur Dioxide						
Annual Arithmetic Mean						
State	0	0	0	0	?	0
Federal	0	0	0	0	?	0
Twenty-four Hour						
State	0	0	0	0	?	0
Federal	0	0	0	0	?	0
Three Hour						
State	0	0	0	0	?	0
Federal	0	0	0	0	?	0

* Annual Means generated by only a few samples are not included in this summary.
? No monitoring done for this pollutant within this region during 1986.

FIGURE 1 - 1
FIVE YEAR TREND - TOTAL SUSPENDED PARTICULATES

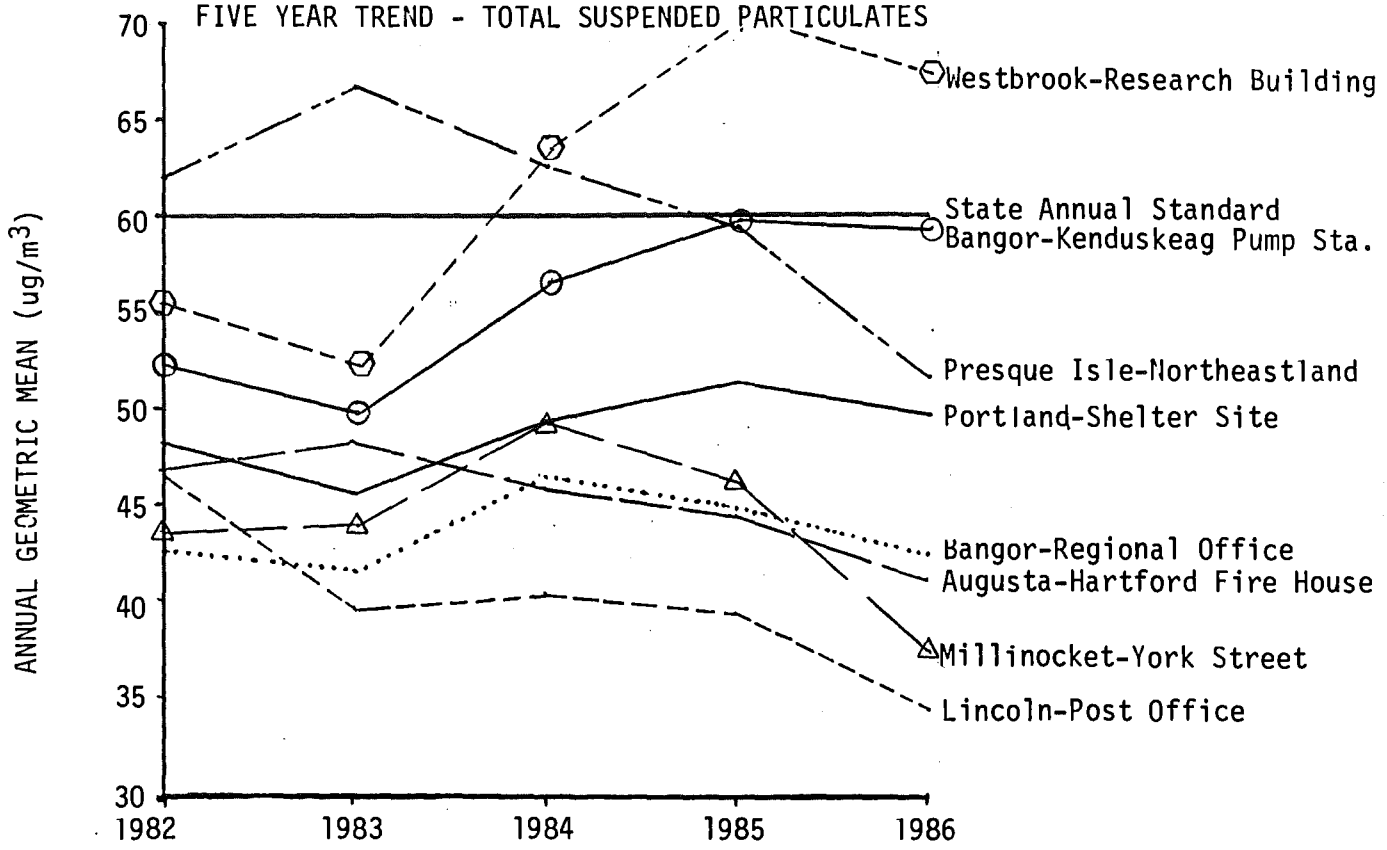
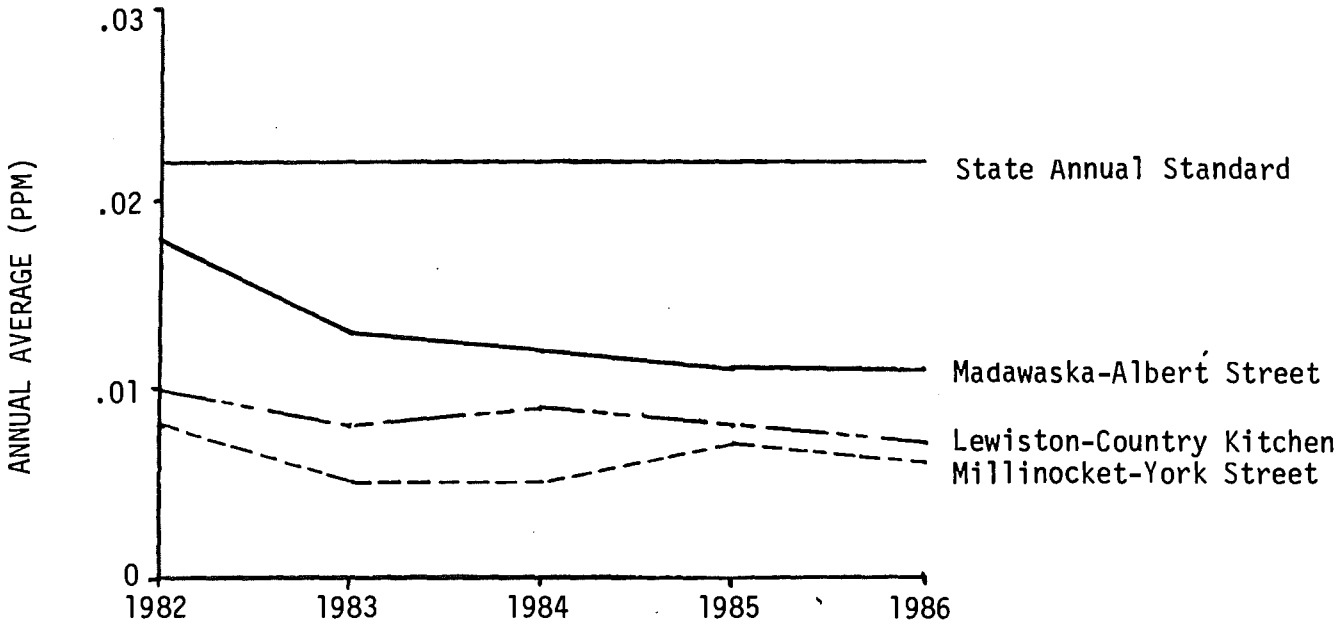


FIGURE 1 - 2
FIVE YEAR TREND - SULFUR DIOXIDE



geometric mean still exceeds the standard by a significant amount. Both Bangor and Westbrook will need increased control efforts to maintain and/or achieve compliance.

Presque Isle has continued to show improvement and is showing a very significant downward trend over the last three years. The overall air quality has improved a lot, but short term violations continue to occur and additional efforts will be needed to bring the area into compliance. The use of a cleaner sand on winter roads and a bypass for Presque Isle to keep through traffic out of the downtown area may be the only solution to the particulate problem.

Figure 1-2 indicates the sulfur dioxide trends at three sites with a long term history. All three sites appear to indicate relatively stable sulfur dioxide levels over the last three to four years.

Figure 1-3 depicts the number of hourly violations of the State ozone standard. As can be seen from the graphs, the violations vary greatly from year to year and do show a very significant reduction in the number of violations during 1986. However, meteorological conditions are responsible for a lot of the variability from year to year so it is too early to tell if existing state applied control strategies are having any significant effect on the basic ozone problem.

Data summarized in this report is available for review in the Department headquarters in Augusta and copies can be obtained from that office for a nominal fee.

1.2 Monitoring Sites

Air quality data are developed using two basic methods; 1) the continuous monitoring of gaseous pollutants and; 2) the periodic sampling of particulate and gaseous pollutants. In addition to pollutant monitoring there is also the continuous monitoring of meteorological parameters.

Continuous gaseous monitoring was done at thirty-four sites in Maine during 1986. Carbon Monoxide was monitored at one of these stations, ozone at nine, and sulfur dioxide at twenty-four.

Particulate sampling was done at fifty-five sites in Maine during 1986. Fifty-three of these stations monitored total suspended particulates. Fourteen of these sites also collected fine particulate fractions. Also, lead monitoring was done at four stations. Six sites were analyzed for sulfates and nitrates. There were also two sites collecting acid rain data as part of the state monitoring network.

In addition to pollutant monitoring, wind speed and direction was recorded at twenty-one sites around the State during 1986. Some of these sites also recorded other meteorological parameters such as sigma (stability) and temperature, precipitation and solar radiation.

FIGURE 1 - 3
FIVE YEAR TREND - OZONE

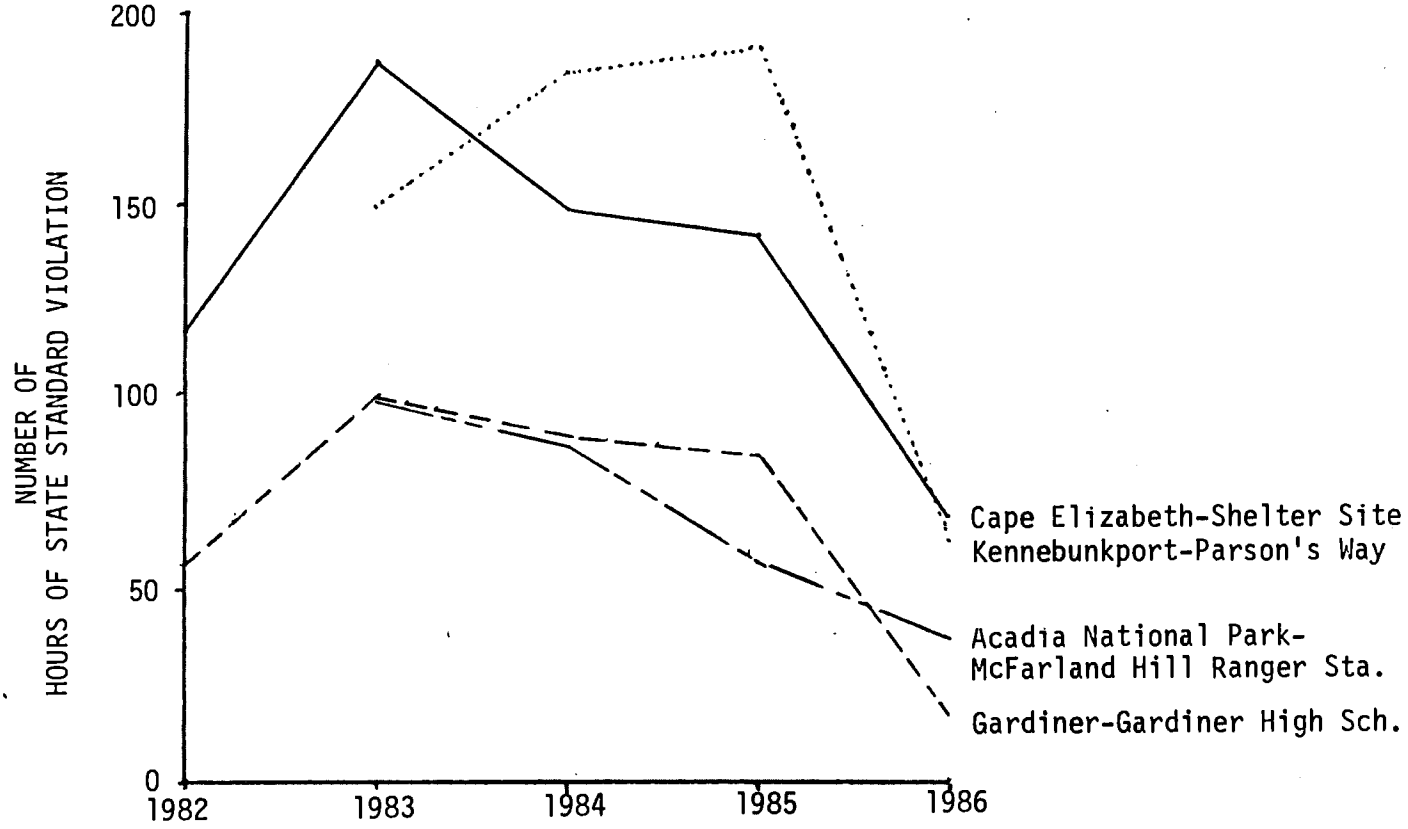


Table 1-4 presents all the monitoring sites in Maine that operated during 1986 and indicates which parameters were monitored at each site. The map in Figure 1-4 shows the Air Quality Control Regions within the State.

1.3 Document Organization

This document is divided by pollutant into chapters. Each chapter contains: 1) a description of the nature and sources of that pollutant, 2) its health and welfare effects, 3) a discussion on the standards (current and proposed) for that pollutant, 4) a discussion of the monitoring methods for that pollutant, 5) a table presenting the 1986 monitored data, 6) in the case of some pollutants, historical tables presenting 1986 data along with data for previous years to show trends, effects of control strategy, or change in emission sources.

1.3.1 Explanation of Data Summary Tables

The Data Summary Tables were designed to facilitate comparing 1986 air quality monitoring data with the standards for each pollutant. Therefore, the data are presented for each averaging time for which standards exist for a pollutant.

An annual average concentration is presented for each pollutant that has a long-term, annual standard (NO2, SO2, TSP).

For pollutants that have short-term standards, the highest short-term values are presented. Some pollutants are allowed to exceed the standard once during the year so the second highest value would be used to determine whether there was a violation or not.

All of the data collected during 1986 has been presented in the Data Summary Tables. However, in making comparisons of the data, one should be aware that a site with only a few samples will not be a valid indicator of pollutant concentrations in the area.

1.3.2 Explanation of Historical Comparison Tables

The Historical Comparison Tables present air quality data for 1986 and those years prior to 1986 when the same pollutant was monitored at the same site. The purpose of the Tables are to indicate the variations in air quality from year to year. The Tables in some cases represent maximum concentrations for specific time periods and in others the number of days in each year that the standards were violated.

1.3.3 Explanation of Trends Tables

The highest hourly concentration in a year is not the best indicator of long-term air quality trends because it is an erratic value. Therefore, special trend tables are presented for carbon

TABLE 1 - 4
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)			
Auburn (0060 005)	Lewiston-Auburn Airport Lewiston Junction Road	DEP	WS/WD
Auburn (0060 008)	Lepage Bakery 60 Second Street	DEP	TSP,Pb
Augusta (0080 005)	Hartford Fire House Hartford Square	DEP	TSP,FP
Augusta (0080 008)	Governor's Hangar State Airport	DEP	WS/WD
Farmington(DISC) (0380 001)	Farmington Fairgrounds	UMF	TSP,FP
Gardiner (0460 001)	Gardiner High School West Hill Road	DEP	Ozone(s)
Jay (0530 001)	Weather Level I Lagoon Hill	International Paper	WS/WD,Temperature,Solar Radiation, Precipitation,TSP
Jay (0530 003)	Crash Road Gilbert Jewell Property	International Paper	TSP
Jay (0530 004)	Jay Hill	International Paper	TSP,FP
Jay(NEW) (0530 008)	Burnham Site	International Paper	TSP
Port Clyde(NEW) (0595 002)	Port Clyde Ozone	DEP	Ozone(s)

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Isle Au Haut (0595 003)	Isle Au Haut Fire Station	UM/DEP	Ozone(s)
Lewiston (0620 011)	Country Kitchen Parking Lot Canal Street	DEP	SO2
Mexico (0760 003)	Mexico Treatment Plant Route #2	Boise Cascade	TSP,Sulfate,Nitrate
Mexico (0760 008)	Labonville's Route #2	Boise Cascade	TSP
Mexico (0760 010)	Carver's Residence Fourth Street	Boise Cascade	TSP,SO2
Mexico (0760 011)	Hunt's Property Route #2	Boise Cascade	SO2
South Paris (0885 004)	Reilly Property Gary Street	Wilner Wood	TSP
South Paris(NEW) (0885 008)	Alpine Street	Wilner Wood/DEP	TSP
Rumford (1020 002)	Boise Cascade Weather II Swift River Pump House	Boise Cascade	WS/WD
Rumford (1020 005)	Taylor Mountain I	Boise Cascade	TSP,SO2
Rumford (1020 006)	Taylor Mountain II	Boise Cascade	TSP,SO2
Rumford (1020 007)	Village Green Site Route #108	DEP/Boise Cascade	TSP,SO2

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Skowhegan (1100 001)	Hinckley Hinckley Farm School	S. D. Warren	TSP
Skowhegan (1100 002)	Eaton Ridge	S. D. Warren	TSP
Thomaston (1150 001)	Mitchell Property 2 Dexter Avenue	Dragon Products	TSP,SO2(d)
Thomaston (1150 003)	Sanders Property Old County Road	Dragon Products	TSP
Thomaston (1150 004)	Pease Heirs Property Buttermilk Lane	Dragon Products	TSP
Thomaston (1150 005)	Dragon Cement Weather Route #1	Dragon Products	WS/WD
Thomaston (1150 007)	Marsh Road	Dragon Products	TSP,SO2
Searsport (1183 006)	DOT Route #1	DEP	SO2,WS/WD
Stockton Springs(DISC) (1183 007)	Cape Jellison	DEP	SO2
Waterville (1220 003)	Stern's Department Store Main Street	DEP	TSP
Winslow (1280 003)	Gulley Hill Road	Scott Paper Company	TSP,FP(n)

AROOSTOOK AIR QUALITY CONTROL REGION (108)

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Fort Fairfield(NEW) (0400 001)	Peterson's	Fairfield Energy Venture	TSP
Madawaska (0720 003)	Madawaska High School 7th Avenue	Fraser Paper	SO2
Madawaska (0720 006)	Fraser Paper Company Bridge Street	Fraser Paper	WS/WD,Temperature
Madawaska (0720 009)	Albert Street	Fraser Paper	SO2
Madawaska (0720 011)	St. Jarre's 11th Avenue	DEP	TSP,Sulfate,Nitrate
Madawaska (0720 012)	U. S. Post Office 430 E. Main Street	Fraser Paper	SO2,WS/WD
Madawaska (0720 013)	Big Daddy's Restaurant 395 E. Main Street	DEP	FP
Presque Isle (0980 005)	Northeastland Hotel 436 Main Street	DEP	TSP,Pb,FP
Presque Isle (0980 008)	Regional Office 528 Central Drive	DEP	WS/WD
Presque Isle(DISC) (0980 009)	City Dry Cleaners 636 Main Street	DEP	FP
DOWNEAST AIR QUALITY CONTROL REGION (109)			
Acadia National Park (0010 003)	McFarland Hill Ranger Station Route #233	NPS/DEP	Ozone,TSP,Sulfate,Nitrate,FP,Acid Precipitation

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Bangor (0100 001)	Regional Office 31 Central Street	DEP	TSP,Sulfate,Nitrate
Bangor (0100 002)	Kenduskeag Pump Station Washington Street	DEP	TSP,Pb,FP,SO2(n)
Bangor (0100 009)	BIA-Building #487 Air National Guard	DEP	WS/WD
Brewer (0180 002)	Brewer Junior High School 5 Somerset Street	DEP	TSP
Bucksport(NEW) (0205 003)	Bucks Mill Road	Champion International	TSP,WS/WD
Bucksport(NEW) (0205 004)	Public Landing	Champion International	TSP,WS/WD
Calais(NEW) (0220 003)	WQDY Tower	Georgia Pacific Corporation	WS/WD
East Millinocket (0315 002)	Katahdin School School Street	Great Northern Paper Company	TSP,SO2(i)
Dedham (0495 003)	Bald Mountain	DEP	Ozone(s),WS/WD(s)
Lincoln (0640 002)	Vocational Education Building West Broadway	Lincoln Pulp & Paper Company	TSP
Lincoln (0640 003)	Lincoln Post Office Building 50 Fleming Street	Lincoln Pulp & Paper Company	TSP
Lincoln (0640 007)	Thomas Motel Trailer Park 39 West Broadway	Lincoln Pulp & Paper Company	TSP,SO2,FP

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Lincoln (0640 008)	Fish Hill Base	Lincoln Pulp & Paper Company	SO2
Lincoln (0640 009)	Fish Hill Peak	Lincoln Pulp & Paper Company	SO2
Lincoln (0640 010)	Lincoln Airport	Lincoln Pulp & Paper Company	WS/WD
Millinocket (0780 006)	Wastewater Treatment Plant Great Northern Paper Company	Great Northern Paper Company	SO2
Millinocket (0780 009)	York Street	Great Northern Paper Company	TSP,SO2
Millinocket (0780 011)	Great Northern Paper Co. Office	Great Northern Paper Company	WS/WD
Old Town (0840 003)	Marsh Island Apartments 100 South Main Street	DEP	TSP
Old Town (0840 005)	Penobscot Shoe Company 450 North Main Street	DEP	TSP
Newburgh (0907 005)	Newburgh School Route #9	DEP	TSP
Milford (0907 007)	Shumway Field Route #178	James River Corporation	TSP
Woodland (1205 007)	Secondary Treatment Pipeline	Georgia Pacific Corporation	TSP,SO2
Woodland (1205 008)	Woodland High School	Georgia Pacific Corporation	TSP,FP

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Woodland(NEW) (1205 017)	Woodyard Woodland Mill	Georgia Pacific Corporation	WS/WD,Temperature
Woodland(NEW) (1205 018)	Background	Georgia Pacific Corporation	TSP
Eastport(DISC) (1205 014)	Pleasant Street	DEP	WS/WD

METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)

Berwick(NEW) (0150 001)	Berwick Fire Station Berwick	DEP	TSP
Biddeford (0160 002)	Biddeford Treatment Plant Water Street	DEP	TSP
Bridgton (0190 002)	Upper Ridge Road	DEP	Acid Precipitation,TSP,Sulfate,Nitrate,FP
Cape Elizabeth (0250 003)	Shelter Site Two Lights State Park	DEP	Ozone(s),WS/WD
Kittery(DISC) (0580 001)	Greenfield Drive	NH/DEP	TSP,SO2
Kittery(DISC) (0580 002)	Wentworth Dennet School Government Street	NH/DEP	TSP
Kittery(DISC) (0580 003)	Masonic Temple Wallingford Square	NH/DEP	SO2
Portland (0960 010)	Chevrus High School Ocean Avenue	DEP	WS/WD

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED
Portland (0960 014)	Shelter Site (P.E.O.P.L.) Elm Street	DEP	TSP,Pb,SO2,FP
Portland(DISC) (0960 018)	529 Congress Street	DEP	CO
South Portland (1140 002)	SMVTI Vocational Drive	DEP	TSP,Sulfate,Nitrate
Westbrook (1260 002)	N. E. T.& T. Company Ash Street	S. D. Warren	TSP
Westbrook (1260 008)	Research Building S. D. Warren	S. D. Warren	TSP
Westbrook (1260 009)	S. D. Warren Company Wind S. D. Warren Property	S. D. Warren	WS/WD
Westbrook (1260 012)	S. D. Warren Warehouse #5 Main Street	S. D. Warren	TSP,FP
Cape Neddick(NEW) (1315 001)	Cape Neddick Light Station	DEP	Ozone(s)
Kennebunkport (1325 002)	Parson's Way	DEP	Ozone(s)

NORTHWEST MAINE AIR QUALITY CONTROL REGION (111)

T4R2 BKP WKR(NEW) (0445 001)	Sugarloaf Mountain	UM/DEP	Ozone(s)
Greenville (0935 001)	Squaw Brook Greenville	DEP	Acid Precipitation

TABLE 1 - 4 (continued)
1986 AMBIENT AIR QUALITY MONITORING SITE DIRECTORY

SITE	ADDRESS	OPERATOR	PARAMETERS MEASURED

NEW - Site established in 1986
DISC - Site discontinued in 1986

TSP - Total Suspended Particulates
SO2 - Sulfur Dioxide
NO - Nitric Oxide
NOX - Oxides of Nitrogen
CO - Carbon Monoxide
Pb - Lead
WS/WD - Wind Speed and Direction
FP - Fine Particulate
NMHC - Nonmethane Hydrocarbons

n - Instrument installed during 1986
d - Instrument removed during 1986
s - Instrument operated seasonally during 1986
i - Instrument operated intermittently during 1986

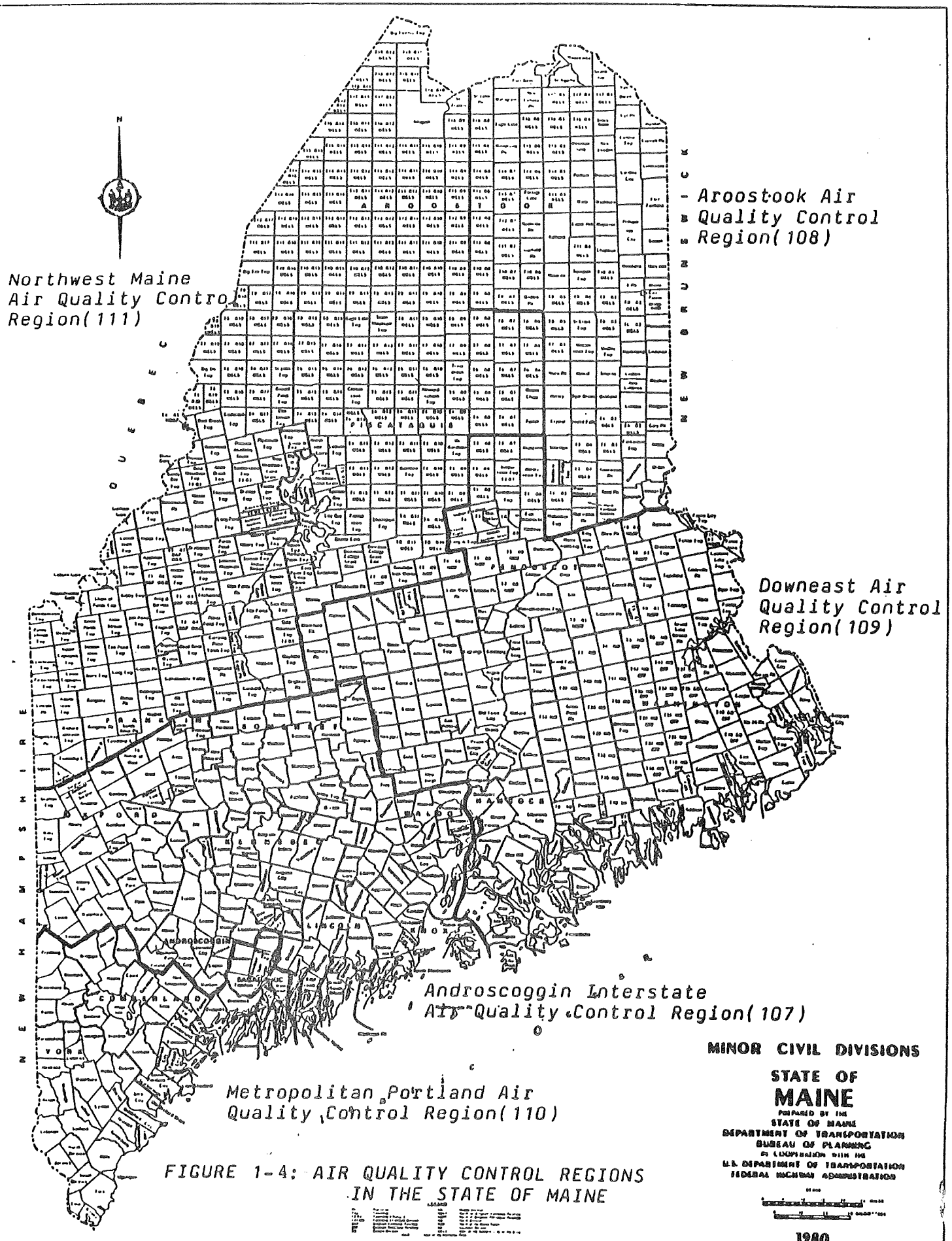


FIGURE 1-4: AIR QUALITY CONTROL REGIONS IN THE STATE OF MAINE

monoxide and ozone. The trend tables present the 10th, 50th, and 90th percentile values to represent the bulk of the air quality data for each year. Percentiles indicate the fraction, or percent, of the value that are below a particular level. For example, if the 90th percentile value for some set of CO observations is 5.0 ppm, it means that 90% of the time the concentrations of CO are less than 5.0 ppm. Conversely, it also means that 10% of the time the concentrations are above 5.0 ppm. Thus the existence or lack of long-term trends in overall air quality for CO and O3 can be more reliably determined using the Trends Tables, than by looking at just the Historical Comparison Tables.

2. CARBON MONOXIDE (CO)

2.1 Description and Sources

Carbon monoxide is colorless, odorless and tasteless gas. Therefore you do not even know you are breathing it until you feel its detrimental effects. It consititutes the largest single fraction of the pollutants found in urban atmospheres. It is produced primarily by the incomplete combustion of organic materials used as fuels for transportation and in the heating of buildings; it also results from industrial processes, refuse burning, and agricultural burning. Several natural sources of CO of both biological and non-biological origin have also been identified, but their contributions to urban atmospheric concentrations are thought to be small. Background levels of CO (resulting from natural and technological sources) found in relatively nonpolluted air range from 0.025 to 1.0 ppm. Urban carbon monoxide is produced primarily by motor vehicles.

Because motor vehicle traffic is the major source of CO, daily concentration peaks coincide with morning and evening rush hours. The worst carbon monoxide problems are found where large numbers of slow moving cars congregate. These problems are further aggravated when they occur in a "street canyon" situation. When there are large amounts of slow moving traffic in a street canyon situation, with the wind blowing perpendicular to the street, carbon monoxide can be trapped in the canyon and build up to unhealthful levels.

CO problems are usually worse in winter because: 1) cold weather makes motor vehicles run dirtier and requires more combustion for space heating; and 2) on winter nights a strong inversion layer develops in the atmosphere, that traps pollution near the ground, preventing it from mixing with cleaner air above.

2.2 Health and Welfare Effects

Carbon monoxide affects the central nervous system by depriving the body of the oxygen it needs. Tests of automobile drivers show exposure to carbon monoxide can impair driver's judgement and ability to respond rapidly in traffic. It can also impair vision and produce headaches.

Carbon monoxide enters the bloodstream by combining with hemoglobin, the substance that carries oxygen to the cells. Hemoglobin that is bound up with CO is called carboxyhemoglobin. This combination occurs 200 times more readily with CO than with oxygen, so the amount of oxygen being distributed throughout the body by the bloodstream is reduced in CO's presence. Blood laden with CO can weaken heart contractions, lowering the volume of blood distributed to various parts of the body. It can also significantly reduce a healthy person's ability to perform manual tasks, such as working, jogging and walking. A life-threatening situation exists in patients with heart disease, who can't compensate for the oxygen loss. The 4.2

million people in the U.S. suffering from angina pectoris (a heart disease characterized by brief spasmodic attacks of chest pain due to insufficient oxygen levels in the heart muscles) are especially susceptible. Carbon monoxide is also harmful to persons who have lung disease, anemia or cerebral-vascular disease. Others sensitive to carbon monoxide include the human fetus, and people exposed to long-term concentrations, such as traffic officers.

People who sit in idling cars over sustained periods risk harmful CO exposure, as do cigarette smokers. Since about two percent of cigarette smoke is carbon monoxide, if you or someone else smokes while driving in heavy traffic, you may both experience the harmful effects of CO from the cigarette smoke and the engine exhaust accumulated in streets. Even three or four hours after you're exposed, half the excess CO still remains in your bloodstream. Because it takes time for CO to build up in the bloodstream, the severity of health effects depends both on the concentration being breathed and the length of time the person is exposed.

2.3 Standards

The existing standards for carbon monoxide are currently set at 9 parts CO per million parts air (ppm), averaged over a period of 8 hours, and 35 ppm averaged over 1 hour, not to be exceeded more than once per year. As a result of a review and revision of the health criteria, EPA proposes to retain the existing primary 8-hour standard at 9 ppm and to lower the primary 1-hour standard to 25 ppm. The change in the 1-hour standard is being proposed because of the more rapid accumulation of blood carboxyhemoglobin in moderately exercising sensitive persons compared to resting individuals. The impact of exercise, which is greater for short-duration exposures, was not considered in the original standard.

2.4 Monitoring

Carbon monoxide was monitored at one site in Maine during 1986 using continuous monitoring equipment utilizing the non-dispersive infrared technique.

Table 2-1 is the 1986 Data Summary for CO. Tables 2-2 and 2-3 have been included for historical comparisons and trend analysis although there is little significance because of the small amount of data collected in 1984.

TABLE 2 - 1
1986 CARBON MONOXIDE DATA SUMMARY
(Parts Per Million)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	1-HOUR CONCENTRATIONS HIGHEST	1-HOUR CONCENTRATIONS SECOND HIGHEST	8-HOUR CONCENTRATIONS HIGHEST	8-HOUR CONCENTRATIONS SECOND HIGHEST	ANNUAL ARITH. MEAN
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Portland	529 Congress Street	6874	9.4	8.3	6.6	5.1	1.3

TABLE 2 - 2
CARBON MONOXIDE HISTORICAL COMPARISONS

PORTLAND
Portland-529 Congress Street

YEAR	SECOND HIGH*	NUMBER OF VIOLATIONS
1984	6.9	0
1985	5.9	0
1986	5.1	0

* Eight hour concentrations in ppm.

TABLE 2 - 3
CARBON MONOXIDE TRENDS

PORTLAND
Portland-529 Congress Street

YEAR	Percentiles* 10%	50%	90%
1984	0.2	1.0	2.9
1985	0.4	1.1	2.9
1986	0.3	1.1	2.7

* Percentiles are one hour concentrations in ppm.

3. OZONE (O3)

3.1 Description and Sources

Ozone is a highly reactive form of oxygen which, at very high concentrations, is a blue unstable gas that has a characteristic pungent odor most commonly identified around an arcing electric motor, lightning storms, or other electrical discharges. However, at normal ambient concentrations, ozone is colorless and odorless. Ozone is the major component of photochemical "smog", but the haziness and odors of smog are primarily caused by other components.

Natural ground level ozone occurs in low concentrations (less than .05 ppm) due to natural physical and chemical phenomena. Occasionally, unique meteorological conditions can result in natural levels between .05 and .10 ppm.

Ozone is not emitted directly from a source as are other pollutants. It forms as secondary pollutant. Its precursors are hydrocarbons and nitrogen oxides, which chemically react in sunlight to form ozone. The hydrocarbons are emitted in automobile exhaust, from gasoline and oil storage and transfer, and from industrial use of paint solvents, degreasing agents, cleaning fluids, ink solvents, incompletely burned coal or wood and many other sources. Plants also give off hydrocarbons such as terpenes from pine trees. Nitrogen oxides are emitted by all combustion sources.

The highest ozone levels generally occur during summer afternoons when the high temperatures and strong sunlight promote photochemical reactions. Stagnant weather may cause smog to remain in an area for several days. The winds may also transport ozone many miles outside of the urban environment. For example, it is estimated that the majority of the ozone in the State of Maine is transported into the State from sources located outside the State. In addition a much smaller amount of the ozone is naturally occurring background concentrations, part of which is also transported into the State. The remaining ozone is assumed to be due to local sources within the State. Because of long-range transport, local control of emissions by itself may not solve the ozone problem. An effective national program may be necessary to achieve national compliance.

Ground-level ozone, discussed above, should not be confused with the stratospheric ozone layer, located about seven miles high in the atmosphere, which shields the earth from cancer-causing ultraviolet rays. Concentrations of ozone in this layer may reach as high as 10 ppm. Concern over potential reduction of the necessary levels of ozone in the stratosphere by reactions with fluorocarbons from aerosol cans has resulted in the removal of most of these propellants from the market. However, ozone at ground level, where it is breathed, is a pollutant.

3.2 Health and Welfare Effects

Ozone at low concentrations causes eye irritations and at higher concentrations difficulty in breathing for people with respiratory problems, the elderly, and children. Many plants, such as white pine, soybeans and alfalfa, are extremely sensitive to ozone, and ozone is known to weaken materials such as rubber and fabrics.

3.3 Standards

The existing National Ambient Air Quality Standard (NAAQS) for ozone is 0.12 ppm and will be attained when "the expected number of days per calender year with maximum hourly average concentrations above 0.12 ppm is equal to or less than one". This standard is new as of February 8, 1979 and replaces a more restrictive 0.08 ppm standard that was established April 10, 1971. The change was the result of a required assessment of existing NAAQS to include a review of new health effects data that have become available since 1970. As a result of this review and national public comments, the standard was changed to a level that is considered to be sufficient to protect the public health and welfare. Since then additional research has concluded that there is in fact damage being caused by ozone levels less than the existing Federal standard. Based on recent studies there appears to be significant vegetation damage at levels considerably below the Federal standard and some "adverse" health effects at the current Federal standard. As of the date this report was compiled no proposals have been made for changing the Federal standard. The current State Standard is .081 ppm. It was established at the same time the original Federal Standard was established and has not been changed. In the past the state standard was interpreted to be .080 ppm but a conversion of the actual 160 ug/m3 standard to ppm yields .081. Therefore, only hourly averages in excess of .081 ppm are considered exceedances of the state standard.

3.4 Monitoring

Ozone was monitored at nine sites in Maine during 1986 using continuous monitoring equipment of two kinds, either chemiluminescence or ultra-violet absorption analyzers. Maine's ozone monitoring season is limited to April through October due to the weather conditions which are not conducive to ozone formation at other times of the year.

Table 3-1 is the 1986 Data Summary for Ozone. Table 3-2 presents the Ozone Historical Comparisons and Table 3-3 presents the Ozone Trends.

TABLES 3 - 1
1986 OZONE DATA SUMMARY
(Parts Per Million)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST CONCENTRATION	SECOND HIGHEST CONCENTRATION	NUMBER OF VIOLATIONS STATE*	FEDERAL**
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)						
Gardiner	Gardiner High School	4298	.111	.110	17	0
Port Clyde	Port Clyde Ozone	1962	.093	.093	12	0
Isle Au Haut	Isle Au Haut Fire Station	2241	.126	.107	26	1
DOWNEAST AIR QUALITY CONTROL REGION (109)						
Acadia National Park	McFarland Hill Ranger Station	7861	.109	.108	37	0
Dedham	Bald Mountain	3555	.107	.106	34	0
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)						
Cape Elizabeth	Shelter Site	4954	.131	.128	70	1
Kennebunkport	Parson's Way	4089	.142	.138	62	2
Cape Neddick	Cape Neddick Light Station	1352	.115	.104	11	0
NORTHWEST MAINE AIR QUALITY CONTROL REGION (111)						
T4R2 BKP WKR	Sugarloaf Mountain	2317	.081	.081	0	0

* Total number of hours minus one greater than .081 ppm.
** Number of days in violation.

TABLE 3 - 2
OZONE HISTORICAL COMPARISONS
(1-Hour Concentrations)

CAPE ELIZABETH
Shelter Site

YEAR	SECOND HIGH	# OF STATE VIOLATIONS
1978	.160 PPM	202
1979	.155 PPM	116
1980	.178 PPM	141
1981	.122 PPM	98
1982	.140 PPM	117
1983	.163 PPM	187
1984	.146 PPM	148
1985	.165 PPM	141
1986	.128 PPM	68

KENNEBUNKPORT
Parson's Way

YEAR	SECOND HIGH	# OF STATE VIOLATIONS
1982	.120 PPM	42
1983	.148 PPM	149
1984	.147 PPM	184
1985	.168 PPM	190
1986	.138 PPM	62

GARDINER
Gardiner High School

YEAR	SECOND HIGH	# OF STATE VIOLATIONS
1980	.117 PPM	54
1981	.122 PPM	31
1982	.120 PPM	56
1983	.140 PPM	99
1984	.112 PPM	89
1985	.133 PPM	84
1986	.110 PPM	17

ACADIA
McFarland Hill Ranger Station

YEAR	SECOND HIGH	# OF STATE VIOLATIONS
1982*	.055 PPM	0
1983	.135 PPM	98
1984	.130 PPM	86
1985	.117 PPM	57
1986	.108 PPM	37

* Not a complete year.

TABLE 3 - 3
OZONE TRENDS
(1-Hour Concentrations)

CAPE ELIZABETH
Shelter Site

Year	PERCENTILES 10%	50%	90%
1978	.015	.035	.065
1979	.018	.036	.070
1980	.019	.035	.065
1981	.015	.032	.056
1982	.018	.036	.058
1983	.018	.034	.061
1984	.019	.040	.064
1985	.022	.038	.062
1986	.016	.033	.055

KENNEBUNKPORT
Parson's Way

Year	PERCENTILES 10%	50%	90%
1983	.008	.027	.058
1984	.012	.032	.064
1985*	.015	.037	.072
1986	.013	.033	.053

* Percentiles calculated using 70% of the data.

GARDINER
Gardiner High School

YEAR	PERCENTILES 10%	50%	90%
1980	.008	.031	.056
1981	.009	.029	.050
1982	.009	.030	.053
1983	.009	.031	.056
1984	.007	.031	.055
1985	.012	.034	.057
1986	.009	.029	.047

ACADIA
McFarland Hill Ranger Station

YEAR	PERCENTILES 10%	50%	90%
1982*	.005	.020	.030
1983	.019	.032	.053
1984	.020	.032	.050
1985	.022	.032	.048
1986	.019	.032	.047

* Not a complete year.

4. NITROGEN DIOXIDE (NO2)

4.1 Description and Sources

In its pure state, nitrogen dioxide is a reddish-orange-brown gas with a characteristic pungent odor. It is corrosive and a strong oxidizing agent. Nitrogen dioxide comprises about 10% of the oxides of nitrogen (NOX) that are formed when nitrogen in the air combines with oxygen during high temperature combustion. Most of the rest of the NOX emitted by combustion sources is nitric oxide (NO). However, during the day most of the NO is photochemically transformed into NO2. Thus, essentially all the NOX emitted can be assumed to eventually become NO2.

4.2 Health and Welfare Effects

Exposure to NO2 affects the delicate structure of lung tissue. High levels cause lung irritation and potential lung damage. Lower levels have been associated with increased respiratory disease. Oxides of nitrogen can cause serious injury to vegetation, including bleaching or death of plant tissue, loss of leaves, and reduced growth rate. NOX also deteriorates fabrics and fades fabric dyes. Nitrate salts formed from nitrogen oxides have been associated with the corrosion of metals. Nitrogen oxides can also reduce visibility.

4.3 Standards

The current standard for NO2 is an annual arithmetic mean (average) value not to exceed .05 ppm. NO2 is the only gaseous pollutant for which only a long-term (annual average) standard has been established.

4.4 Monitoring

Nitrogen Dioxide was not monitored in Maine during 1986.

5. SULFUR DIOXIDE (SO2)

5.1 Description and Sources

Sulfur dioxide is a colorless irritating gas having the same pungent odor as a struck match. Most people can detect its taste at a level of about 0.3 to 1 part per million. SO2 is highly soluble in water, forming sulfurous acid. On a worldwide basis, SO2 is considered to be one of the major pollution problems. It is emitted mainly from stationary sources that utilize fossil fuels (coal, oil) such as power plants, ore smelters, and refineries.

5.2 Health and Welfare Effects

The health effects of sulfur dioxide appear to be always associated with high levels of particulates or other pollutants. The world's major recorded air pollution disasters have been associated with high levels of sulfur dioxide and particulates. The excess deaths attributed to these pollutants were due to respiratory failures and occurred predominantly, but not exclusively, in the elderly and infirm. Atmospheres containing high levels of sulfur dioxide are associated with elevated concentrations of other sulfur compounds such as sulfates and sulfuric acid mists, which are corrosive and potentially carcinogenic.

The corrosiveness of SO2 and its derivatives also causes crop and material damage. Its transport and transformation into sulfurous and sulfuric acids contribute to acid precipitation, causing soils and lakes to become seriously acidified.

5.3 Standards

There are two existing Primary National Ambient Air Quality Standards for sulfur dioxide. The first is a long-term one year arithmetic average of 0.03 parts per million (ppm). The second is a short-term 24-hour average standard where concentrations are not to exceed 0.14 ppm more than once per year. The current Secondary NAAQS for SO2 is a 3-hour average concentration of 0.5 ppm not to be exceeded more than once per year.

In addition there are three state standards for sulfur dioxide. The first is a long-term one-year arithmetic average of .022 parts per million. The second is a short-term 24-hour average standard of .088 ppm not to be exceeded. The third is a short-term 3-hour average concentration of .439 ppm not to be exceeded.

5.4 Monitoring

Sulfur dioxide was monitored at twenty-four sites in Maine during 1986 using continuous monitoring equipment utilizing either the pulsed fluorescent or coulometric methods.

Table 5-1 is the 1986 Data Summary for SO2. Tables 5-2 and 5-3 present the SO2 Historical Comparison Data.

TABLE 5 - 1
1986 SULFUR DIOXIDE DATA SUMMARY
(Parts Per Million)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 3-HOUR AVERAGE	SECOND HIGHEST 3-HOUR AVERAGE	HIGHEST 24-HOUR AVERAGE	SECOND HIGHEST 24-HOUR AVERAGE	ANNUAL ARITH. MEAN
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Lewiston	Country Kitchen Parking Lot	7940	.102	.086	.047	.039	.007
Mexico	Carver's Residence	7452	.109	.095	.043	.036	.008
Mexico	Hunt's Property	8259	.132	.124	.068	.063	.009
Rumford	Taylor Mountain I	8333	.198	.162	.086	.066	.013
Rumford	Taylor Mountain II	8341	.203	.153	.067	.064	.008
Rumford	Village Green Site	8245	.125	.106	.059	.035	.008
Thomaston	Mitchell Property	205	.017	.016	.013	.008	.004*
Thomaston	Marsh Road	205	.019	.018	.013	.007	.005*
Searsport	Searsport DOT	6976	.301	.137	.050	.046	.005
Stockton Springs	Cape Jellison	1765	.168	.073	.041	.029	.006*
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Madawaska	Madawaska High School	8267	.138	.089	.046	.032	.005
Madawaska	Albert Street	8271	.199	.181	.080	.079	.011
Madawaska	U. S. Post Office	8278	.173	.152	.068	.065	.012
DOWNEAST AIR QUALITY CONTROL REGION (109)							
Bangor	Kenduskeag Pump Station	672	.067	.038	.032	.025	.011*
East Millinocket	Katahdin School	531	.094	.069	.027	.024	.006*
Lincoln	Thomas Motel Trailer Park	8154	.078	.063	.037	.032	.004
Lincoln	Fish Hill Base	8317	.051	.044	.012	.012	.002
Lincoln	Fish Hill Peak	8271	.107	.094	.030	.022	.002
Millinocket	Wastewater Treatment Plant	8136	.141	.107	.071	.059	.008
Millinocket	York Street	8230	.094	.093	.061	.047	.006
Woodland	Secondary Treatment Pipeline	5951	.106	.091	.037	.022	.002*
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Kittery	Greenfield Drive	4078	.081	.066	.040	.028	.003*
Kittery	Masonic Temple	3794	.110	.107	.044	.036	.009*
Portland	Shelter Site	8128	.093	.083	.062	.038	.011

* Insufficient data collected for valid annual arithmetic mean.

TABLE 5 - 2
SULFUR DIOXIDE HISTORICAL COMPARISONS
(Maximum 24-Hour Concentrations of Sulfur Dioxide)

SITE	ADDRESS	MAXIMUM 24-HOUR CONCENTRATION (PPM) 1981	1982	1983	1984	1985	1986
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Lewiston	Country Kitchen Parking Lot	.035	.056	.044	.060	.043	.047
Mexico	Carver's Residence	--	.042	.045	.040	.044	.043
Mexico	Hunt's Property	--	--	.061	.071	.070	.068
Rumford	Taylor Mountain I	--	.075	.077	.096	.066	.086
Rumford	Taylor Mountain II	--	--	.072	.071	.050	.067
Rumford	Village Green Site	--	--	.054	.049	.031	.059
Thomaston	Mitchell Property	.026	.030	.016	.050	.018	.013
Thomaston	Marsh Road	.010	.016	.011	.017	.013	.013
Searsport	Searsport DOT	--	--	--	--	.019	.050
Stockton Springs	Cape Jellison	--	--	--	--	.029	.041
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Madawaska	Madawaska High School	.125	.139	.049	.066	.037	.046
Madawaska	Albert Street	.135	.152	.130	.078	.058	.080
Madawaska	U. S. Post Office	--	--	--	--	.061	.068
DOWNEAST AIR QUALITY CONTROL REGION (109)							
East Millinocket	Katahdin School	.077	.072	.054	.025	.026	.027
Lincoln	Thomas Motel Trailer Park	--	.062	.052	.076	.051	.037
Lincoln	Fish Hill Base	--	--	.023	.016	.023	.012
Lincoln	Fish Hill Peak	--	--	.025	.025	.044	.030
Millinocket	Wastewater Treatment Plant	.084	.078	.077	.062	.076	.071
Millinocket	York Street	.092	.063	.065	.044	.046	.061
Woodland	Secondary Treatment Pipeline	.103	.022	.058	.059	.027	.037
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Kittery	Greenfield Drive	--	.006	.043	.027	.034	.040
Kittery	Masonic Temple	--	--	.043	.046	.055	.044
Portland	Shelter Site	--	--	.056	.062	.050	.062

TABLE 5 - 3
SULFUR DIOXIDE HISTORICAL COMPARISONS
(Sites with violations in past six years)

SITES	ADDRESS	TOTAL NUMBER OF VIOLATIONS* 1981	1982	1983	1984	1985	1986
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Rumford	Taylor Mountain I	-	0	0	1	0	0
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Madawaska	Madawaska High School	1	1	0	0	0	0
Madawaska	Albert Street	7	7	2	0	0	0
DOWNEAST AIR QUALITY CONTROL REGION (109)							
Millinocket	York Street	1	0	0	0	0	0
Woodland	Secondary Treatment Pipeline	1	0	0	0	0	0

* Includes 3-Hour and 24-Hour Violations.

6. PARTICULATES (TSP)

6.1 Description and Sources

Particulates is the term given to the tiny particles of solid or semi-solid material found in the atmosphere. It is this "dirt" in the air that is visible as a "Brown Cloud", haze or smog. The sources of particulates are many: wind-blown dust and sand from roadways, fields, and construction; coal dust, fly ash, and carbon black from various combustion sources; and automobile exhaust, to name a few. Particulates that range in size from less than 0.1 micrometer up to approximately 45 micrometers are called "total suspended particulates". Particles larger than that range tend to settle out of the air and not remain suspended, except in high winds.

6.2 Health and Welfare Effects

The human nose filters out 99 percent of the large and medium-sized particles. The rest enter the windpipe and lungs, where some, known as inhalable particulates, cling to protective mucous and are removed. Some of the smallest, called respirable particulates, are deposited in the lungs' tiny air sacs (alveoli).

In the lungs particulates slow down the exchange of oxygen with carbon dioxide in the blood, causing shortness of breath. The heart may be strained because it must work harder to compensate for oxygen loss. Usually the people most sensitive to these conditions have respiratory diseases like emphysema, bronchitis, asthma, or heart problems. The elderly and children are also sensitive.

Particles themselves may be poisonous if inhaled or absorbed, damaging remote organs like the kidneys or liver. Swallowed mucous that is laden with poisionous particulate matter may damage the stomach.

In addition, particulates may be carriers of poisonous liquid or gaseous substances. Sulfur dioxide, a major air pollutant in its own right, is frequently absorbed by particulates and can react with them to form sulfates. Sulfates react with moisture in the air or in the respiratory tract to form a corrosive liquid (sulfuric acid) that irritates delicate membranes and slows down the cleansing action of mucous. This effect can reduce the body's ability to remove harmful bacteria, increasing the possibility of infection.

Adverse health effects from particulate matter aren't always seen immediately. Particulates can accumulate in the lungs after repeated, long-term exposure, causing respiratory distress and other health problems that may be manifested later.

Particles in the air block out and scatter sunlight, reducing visibility. Particulates soil and corrode metals, masonry, and textiles. Irritating odors are often associated with particulates,

also.

6.3 Standards

Primary:

The current primary particulate standards are for total suspended particulates (TSP), independent of particle size or chemical composition. The long-term standard is an annual geometric mean not to exceed 75 micrograms of particulates per cubic meter of air (ug/m3). The short-term standard is a 24-hour average of 260 ug/m3 not to be exceeded more than once per year.

EPA has proposed revised particulate standards to account for the deeper inhalability of smaller particles. The new standards, rather than applying to TSP, would apply to inhalable or fine particulates. A particle size of 10 micrometers is being considered as the upper size limit with a 24-hour concentration in the range of 150-250 ug/m3 and an annual standard in the range of 50 to 65 ug/m3.

Secondary:

The current secondary TSP standard is a 24-hour average of 150 ug/m3 not to be exceeded more than once per year, designed to protect from soiling, corrosion, etc.

EPA is also considering replacing the current 24-hour secondary TSP standard with an annual TSP standard to be selected from a range of 70 to 90 ug/m3, expected annual arithmetric mean.

State Standards:

The current State Standards include an annual geometric mean of 60 micrograms per cubic meter and a 24-hour standard of 150 micrograms per cubic meter not to be exceeded.

6.4 Monitoring

Particulates were monitored at 55 sites in Maine during 1986 using High-Volume Particulate Air Samplers (Hi-Vols).

Hi-Vols operate on the same principle as a vacuum cleaner in that the air is drawn through a filter to "catch the dust". The difference is that a Hi-Vol draws a calibrated volume of air through a pre-weighed filter pad (rather than a bag) for a twenty-four hour period. The change in weight of the filter pad is recorded as total suspended particulate or TSP in micrograms of particulates per cubic meter of air.

Table 6-1 is a summary of the TSP data collected in Maine during 1986. Table 6-2 is a historical comparison of the TSP Annual Geometric Means at sites which have been in existence over the last two years. Table 6-3 summarizes the number of TSP violations which have occurred over the last six years and the sites at which they occurred.

Fine particulate sampling increased again during 1986. The increased sampling has been conducted to obtain data to evaluate the proposed fine particulate standards and determine those areas which are likely to have problems meeting the proposed range of standards. The sampling has been conducted with dichotomous samplers and size-selective hi-vols. The dichotomous samplers collect particles smaller than either 15 or 10 microns in two different size classes. The two classes are summed to give total fine particulate. The size-selective hi-vols collect particles 10 microns and smaller or 15 microns and smaller.

The data collected and the sites which were in operation during 1986 have been summarized in Table 6-4.

TABLE 6 - 1
1986 TOTAL SUSPENDED PARTICULATES DATA SUMMARY
(Micrograms Per Cubic Meter)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 24-HOUR	SECOND HIGHEST	THIRD HIGHEST	ANNUAL GEOMETRIC MEAN
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)						
Auburn	Lepage Bakery	77	161	156	152	46.0
Augusta	Hartford Fire House	168	183	139	137	41.0
Farmington	Farmington Fairgrounds	24	81	81	69	34.5*
Jay	Weather Level I	353	126	116	114	33.5
Jay	Crash Road	355	106	105	81	18.9
Jay	Jay Hill	351	119	84	82	24.6
Jay	Burnham	349	131	117	111	34.3
Mexico	Mexico Treatment Plant	218	134	126	102	37.1
Mexico	Labonville's	216	137	134	131	46.6
Mexico	Carver's Residence	219	124	99	82	33.8
South Paris	Reilly Property	59	213	213	191	77.6*
South Paris	Wastewater Treatment Plant	140	75	74	72	25.7*
South Paris	Alpine Street	62	79	56	50	21.0*
Rumford	Taylor Mountain I	220	126	93	87	33.0
Rumford	Taylor Mountain II	223	95	66	64	24.3
Rumford	Village Green Site	213	111	103	90	29.5
Skowhegan	Hinckley	115	65	59	44	16.6
Skowhegan	Eaton Ridge	110	69	57	52	17.1
Thomaston	Mitchell Property	208	149	127	112	22.0
Thomaston	Sander's Property	202	118	83	79	22.0
Thomaston	Pease Property	204	104	81	68	27.9
Thomaston	Marsh Road	201	135	133	89	23.5
Waterville	Stern's Department Store	75	137	126	123	42.1
Winslow	Gulley Hill Road	208	142	141	139	40.0
AROOSTOOK AIR QUALITY CONTROL REGION (108)						
Fort Fairfield	Peterson's	43	91	88	81	36.5*
Madawaska	St. Jarres	110	190	158	156	44.7
Presque Isle	Northeastland Hotel	182	469	276	225	51.6

TABLE 6 - 1 (continued)
1986 TOTAL SUSPENDED PARTICULATES DATA SUMMARY
(Micrograms Per Cubic Meter)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 24-HOUR	SECOND HIGHEST	THIRD HIGHEST	ANNUAL GEOMETRIC MEAN
DOWNEAST AIR QUALITY CONTROL REGION (109)						
Acadia National Park	McFarland Hill Ranger Station	110	72	39	38	11.8
Bangor	Regional Office	68	179	148	135	42.3
Bangor	Kenduskeag Pump Station	105	235	231	222	59.4
Brewer	Brewer Junior High School	69	127	101	100	36.5
Bucksport	Bucks Mill Road	255	58	53	52	14.6*
Bucksport	Public Landing	260	133	111	107	25.8*
East Millinocket	Katahdin School	117	107	83	76	23.9
Lincoln	Vocational Education Building	362	145	121	121	30.3
Lincoln	Lincoln Post Office Building	353	163	120	111	34.2
Lincoln	Thomas Motel Trailer Park	357	142	133	132	34.9
Millinocket	York Street	191	160	137	119	37.3
Old Town	Marsh Island Apartments	64	136	109	94	32.6
Old Town	Penobscot Shoe Company	69	123	115	103	30.9
Newburgh	Newburgh School	336	93	91	85	16.9
Milford	Shumway Field	348	98	96	95	25.4
Woodland	Secondary Treatment Pipeline	251+	230	222	124	26.5*
Woodland	Woodland High School	231+	260	176	169	27.3*
Woodland	Background	63	42	41	35	12.0*
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)						
Berwick	Berwick Fire Station	89	162	136	128	51.6*
Biddeford	Biddeford Treatment Plant	117	110	109	94	38.8
Bridgton	Upper Ridge Road	102	53	44	43	13.5
Kittery	Greenfield Drive	53	98	67	67	26.6*
Kittery	Wentworth Dennet School	41	99	85	72	33.8*
Portland	Shelter Site	117	148	127	109	49.7
South Portland	SMVTI	110	141	98	78	29.8
Westbrook	N. E. T. & T. Company	120	122	109	109	39.2
Westbrook	Research Building	186	222	185	179	67.4
Westbrook	Warehouse #5	196	157	153	142	57.4

* Insufficient data collected for valid annual geometric mean.
\+ Additional data from this site is being reviewed and may be in included at a later date.

TABLE 6 - 2
TOTAL SUSPENDED PARTICULATES HISTORICAL COMPARISON
ANNUAL GEOMETRIC MEANS (UG/M3)

SITE	ADDRESS	ANNUAL GEOMETRIC MEANS (ug/m3) 1981	1982	1983	1984	1985	1986
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Auburn	Lepage Bakery	53.5	47.4	39.3	43.5	44.8	46.0
Augusta	Hartford Fire House	--	46.9	48.1*	45.9	44.3	41.0
Jay	Weather Level I	33.3	40.0	33.0*	36.4	36.6	33.5
Jay	Crash Road	23.2	22.1	18.0*	22.1	18.7	18.9
Jay	Jay Hill	27.5	28.5	25.2*	32.6	24.5	24.6
Mexico	Mexico Treatment Plant	42.0	42.3	39.1	39.9	40.3	37.1
Mexico	Labonville's	48.3	53.5	50.6	51.6	50.7	46.6
Mexico	Carver's Residence	--	40.3	35.6	37.4	38.3	33.8
South Paris	Reilly Property	58.7	69.5	77.6*	102.3*	60.4	77.6*
South Paris	Wastewater Treatment Plant	--	--	--	--	32.2*	25.7*
South Paris	Alpine Street	--	--	--	--	19.4*	21.0*
Rumford	Taylor Mountain I	--	37.9	34.8	37.5	35.8	33.0
Rumford	Taylor Mountain II	--	--	26.0	28.2	26.7	24.3
Rumford	Village Green Site	--	--	--	34.0	31.2	29.7
Skowhegan	Hinckley	16.1	18.5	17.3	21.3	18.5	16.6
Skowhegan	Eaton Ridge	16.5	17.4	15.4	20.2	18.4	17.1
Thomaston	Mitchell Property	25.7	25.5	22.0	24.2	22.9	22.0
Thomaston	Sanders Property	24.5	23.7	21.9	25.4	22.9	22.0
Thomaston	Pease Property	37.8	34.0	28.0	31.3	28.4	27.9
Thomaston	Marsh Road	30.8	28.3	22.7	25.9	24.0	23.5
Waterville	Sterns Department Store	--	--	--	35.5*	40.8	42.1
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Madawaska	St. Jarres	--	--	--	50.7	46.9	44.7
Presque Isle	Northeastland Hotel	67.0	62.0	66.8	62.5*	59.2	51.6
DOWNEAST AIR QUALITY CONTROL REGION (109)							
Acadia National Park	McFarland Hill Ranger Station	--	--	11.6*	12.9	11.6	11.8
Bangor	Regional Office	45.3	42.7	41.7	46.5	44.8	42.3

TABLE 6 - 2 (continued)
TOTAL SUSPENDED PARTICULATES HISTORICAL COMPARISON
ANNUAL GEOMETRIC MEANS (UG/M3)

SITE	ADDRESS	ANNUAL GEOMETRIC MEANS (ug/m3) 1981	1982	1983	1984	1985	1986
Bangor	Kenduskeag Pump Station	53.8	52.1	49.8	56.5	59.9	59.4
Brewer	Brewer Junior High School	43.6	36.4	37.0	41.5	38.1	36.5
East Millinocket	Katahdin School	26.3	30.8	27.4	25.3	26.9	23.9
Lincoln	Vocational Education Building	44.8	41.5	36.2	35.3	37.1	30.3
Lincoln	Lincoln Post Office Building	49.5	46.6	39.8	40.4	39.2	34.2
Lincoln	Thomas Motel Trailer Park	--	44.4	40.9	41.8	41.4	34.9
Millinocket	York Street	42.7	43.3	43.8	49.1	46.1	37.3
Old Town	Marsh Island Apartments	42.6	38.6	35.8	37.3	33.8	32.6
Old Town	Penobscot Shoe Company	37.1	32.1	28.0	31.8	28.1	30.9
Newburgh	Newburgh School	19.2	15.9	15.8	16.1	15.1	16.9
Milford	Shumway Field	29.1	31.6	25.7*	29.1	26.6	25.4
Woodland	Secondary Treatment Pipeline	33.0	31.6*	32.3	--	--	26.5
Woodland	Woodland High School	44.9	36.6*	35.0	--	--	27.3
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Biddeford	Biddeford Treatment Plant	47.2	43.0	37.8*	43.3*	35.8	38.8
Bridgton	Upper Ridge Road	--	--	--	17.1*	14.6	13.5
Kittery	Greenfield Drive	--	32.0	27.7	27.2	26.9	26.6*
Kittery	Wentworth Dennet School	--	--	34.5*	35.5	32.8	33.8*
Portland	Shelter Site	50.4	48.2	45.6	49.4	51.3	49.7
South Portland	SMVTI	37.2	32.5	33.5*	31.7*	30.7	29.8
Westbrook	N. E. T. & T. Company	38.8	44.0	36.5	40.8	44.7	39.2
Westbrook	Research Building	52.0	55.3	52.2	63.4	70.5	67.4
Westbrook	Warehouse #5	68.4*	59.9	51.3	60.6	62.5	57.4

* Insufficient data collected for valid annual geometric mean.

TABLE 6 - 3
TOTAL SUSPENDED PARTICULATES HISTORICAL COMPARISON
(Sites with violations in past six years)

SITE	ADDRESS	TOTAL NUMBER OF SHORT TERM VIOLATIONS 1981	1982	1983	1984	1985	1986
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Auburn	Lepage Bakery	0	4	1	0	0	3
Augusta	Hartford Fire House	-	6	6	18	0	1
Jay	Weather Level I	-	0	1	2	0	0
Jay	Crash Road	1	2	0	0	0	0
Jay	Jay Hill	1	2	0	0	0	0
Mexico	Labonville's	1	0	0	0	1	0
South Paris	Reilly Property	1	0	4	2	6	4
Rumford	Village Green	-	-	1	1	0	0
Thomaston	Dexter Avenue	1	1	0	0	0	0
Thomaston	Marsh Road	1	3	0	0	0	0
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Madawaska	St. Jarres	-	-	-	0	1	3
Presque Isle	Northeastland Hotel	10	12	11	12	11	10
DOWNEAST AIR QUALITY CONTROL REGION (109)							
Bangor	Regional Office	2	2	1	0	2	1
Bangor	Kenduskeag Pump Station	3	6	2	1	5	6
East Millinocket	Katahdin School	0	0	1	0	0	0
Lincoln	Vocational Education Building	4	4	2	0	0	0
Lincoln	Lincoln Post Office Building	7	6	7	1	1	1
Lincoln	Thomas Motel Trailer Park	-	10	4	2	3	0
Millinocket	York Street	2	2	3	4	1	1
Old Town	Marsh Island Apartments	1	1	0	2	1	0
Old Town	Penobscot Shoe Company	1	2	0	0	0	0
Woodland	Secondary Treatment Pipeline	3	0	5	1	1	2
Woodland	Woodland High School	3	0	8	11	0	4
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Biddeford	Biddeford Treatment Plant	0	1	0	0	0	0
Portland	Shelter Site	0	0	0	0	1	0
Westbrook	N. E. T. & T. Company	1	0	0	1	0	0
Westbrook	Research Building	0	4	2	2	8	15
Westbrook	Warehouse #5	0	4	0	1	0	2

TABLE 6 - 4
1986 FINE PARTICULATE DATA SUMMARY
(Micrograms Per Cubic Meter)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 24-HOUR	SECOND HIGHEST	THIRD HIGHEST	ANNUAL ARITH. MEAN	ANNUAL GEOM. MEAN
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Augusta	Hartford Fire House	145	89	73	66	24.9	21.7
Farmington	Farmington Fairgrounds(Dichot)	23	56	49	42	23.2	20.7*
Jay	Jay Hill	117	76	57	49	21.3	18.7
Winslow	Gulley Hill Road	40	64	62	53	24.8	21.4*
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Madawaska	Big Daddy's Restaurant	104	115	99	96	36.4	31.6
Presque Isle	Northeastland Hotel	234	199	121	99	31.0	26.4
Presque Isle	City Dry Cleaners	58	173	118	98	33.0	27.8*
DOWNEAST AIR QUALITY CONTROL REGION (109)							
Acadia National Park	McFarland Hill Ranger Sta.(Dichot)	94	46	34	33	11.3	9.7
Lincoln	Thomas Motel Trailer Park	169	78	77	73	30.3	27.6
Bangor	Kenduskeag Pump Station(Dichot)	4	70	51	32	42.8	37.9*
Bangor	Kenduskeag Pump Station(SA-321A)	74	100	75	69	31.9	28.4*
Woodland	Woodland High School	104	134	77	76	21.9	17.2*
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Bridgton	Upper Ridge Road	20	24	24	23	16.0	15.3*
Portland	Shelter Site(Dichot)	15	44	39	33	28.3	27.3*
Portland	Shelter Site(SA-321A)	54	54	52	49	30.5	28.8
Westbrook	Warehouse #5	77	79	56	52	23.9	19.6

* Insufficient data collected for valid annual geometric mean.

7. LEAD (Pb)

7.1 Description and Sources

Lead in the ambient air exists primarily as particulate matter in the inhalable size range. The predominant source of atmospheric lead is from motor vehicles that burn "leaded" gasoline. The lead in gasoline is in the form of tetraethyl lead, an "anti-knock" compound. Other major sources of atmospheric lead are the extraction and processing of metallic ores.

7.2 Health and Welfare Effects

When atmospheric lead is breathed in, it is absorbed into the bloodstream and distributed throughout the body along with lead from contaminated food and drinking water. Lead accumulation in the body can impair the production of hemoglobin. Clinical lead poisoning occurs when the body's accumulation of lead becomes too high. Symptoms of lead poisoning range from loss of appetite, fatigue, cramps and constipation, and pains in the ankles and wrists to loss of power in the arms and legs, anemia, kidney disease, mental retardation, blindness and death. Lead concentrations in the ambient air are not sufficient to produce lead poisoning but they do increase the risk of harm when other sources of lead are present. And, indirectly, lead fallout from automotive exhaust onto soil and street surfaces can be ingested in considerable amounts by infants and young children.

7.3 Standards

The current National Ambient Air Quality Standard for lead is a 3-month (calendar quarter) average concentration not to exceed 1.5 micrograms of lead per cubic meter of air.

The current State Standard for lead is a 24-hour average concentration of 1.5 micrograms of lead per cubic meter of air not to be exceeded more than once per year.

7.4 Monitoring

Lead was monitored at four sites in Maine during 1986 by taking samples of the Hi-Vol filters from those sites and analyzing the samples for lead content using an atomic absorption analyzer.

Tables 7-1 and 7-2 are the 1986 Data Summaries for Lead. Table 7-3 presents the Lead Historical Comparison Data.

TABLE 7 - 1
1986 LEAD DATA SUMMARY
(Micrograms Per Cubic Meter)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 24-HOUR	SECOND HIGHEST	THIRD HIGHEST	ANNUAL GEOMETRIC MEAN
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)						
Auburn	Lepage Bakery	61	.30	.23	.23	.07
AROOSTOOK AIR QUALITY CONTROL REGION (108)						
Presque Isle	Northeastland Hotel	66	.20	.19	.17	.07
DOWNEAST AIR QUALITY CONTROL REGION (109)						
Bangor	Kenduskeag Pump Station	56	.18	.15	.15	.07
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)						
Portland	Shelter Site	112	.33	.27	.26	.11

TABLE 7 - 2
1986 LEAD DATA SUMMARY BY QUARTERS
(Micrograms Per Cubic Meter)

SITE	ADDRESS	1986 QUARTERLY AVERAGES 1ST	2ND	3RD	4TH
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)					
Auburn	Lepage Bakery	.07	.05	.08	.09
AROOSTOOK AIR QUALITY CONTROL REGION (108)					
Presque Isle	Northeastland Hotel	.11	.05	.06	.08
DOWNEAST AIR QUALITY CONTROL REGION (109)					
Bangor	Kenduskeag Pump Station	.08	.06	.06	.06
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)					
Portland	Shelter Site	.12	.09	.09	.12

TABLE 7 - 3
LEAD HISTORICAL COMPARISONS
(Micrograms Per Cubic meter)

SITE	ADDRESS	MAXIMUM 24-HOUR CONCENTRATION / AAM 1981	1982	1983	1984	1985	1986
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)							
Auburn	Lepage Bakery	---------	---------	---------	0.77/0.20	0.40/0.11	0.30/0.07
AROOSTOOK AIR QUALITY CONTROL REGION (108)							
Presque Isle	Northeastland Hotel	0.93/0.22	0.89/0.24	0.93/0.19	0.54/0.13	0.62/0.14	0.20/0.07
DOWNEAST AIR QUALITY CONTROL REGION (109)							
Bangor	Kenduskeag Pump Station	0.62/0.22	0.70/0.24	0.59/0.18	0.53/0.14	0.64/0.15	0.18/0.07
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)							
Portland	Shelter Site	---------	0.91/0.29	0.56/0.20	0.71/0.23	0.53/0.19	0.33/0.11

8. SULFATES (SO4) AND NITRATES (NO3)

8.1 Description and Sources

Sulfates and Nitrates are compounds of varying harmfulness found everywhere in the atmosphere. They are produced by nature as well as man. Man-made sulfates have their origin in sulfur dioxide while nitrates have theirs in nitrogen oxides. Fine particulate compounds, including sulfates and nitrates are formed from chemical reactions between sulfur dioxide or nitrogen dioxide emitted into the air and other substances present there. These fine particulate compounds have a long atmospheric residence time, can be transported in the air for long distances, and are capable of penetrating deeply into the human respiratory tract.

8.2 Health and Welfare Effects

Epidemiological studies of populations exposed to particulate sulfates have shown that atmospheric sulfates, more than sulfur dioxide gas or total suspended particulates, are related to aggravation of asthma, aggravation of heart and lung disease in the elderly, and impairment of lung function in school children. This evidence was obtained from EPA's Community Health and Environmental Surveillance System (CHESS). From these studies, estimates of the sulfate threshold for adverse health effects have been derived, as shown in Table 8-1. However, these epidemiological studies have not been substantiated by laboratory studies.

Both sulfates and nitrates are considered to be contributors to the acid deposition problem.

8.3 Standards

There are currently no standards for levels of sulfates in ambient air. EPA is presently working on a standard and is expected to make a proposal in the future.

There are no standards for nitrates nor are there any proposed.

8.4 Monitoring

Sulfate levels were measured at six sites in Maine during 1986 by taking samples of the Hi-Vol filters from those sites and analyzing the samples for sulfates using the Automated Technicon II Methylthymol Blue Procedure. There is no standard yet and the monitoring methodology is questionable but the data is being included in this report as an aid to those interested in further information about Maine's air quality. Table 8 - 2 summarizes the sulfate data collected during 1986.

Nitrate levels were measured at six sites in Maine during 1986 by also taking samples of the Hi-Vol filters from those sites and

analyzing the samples using Method 353.1(Colorimetric, Automated, Hydrazine Reduction). This data, summarized in Table 8 - 3, is also being included in this report as an aid to those interested in further information about Maine's air quality.

TABLE 8-1

SULFATE THRESHOLDS FOR ADVERSE HEALTH EFFECTS

ADVERSE HEALTH EFFECT	THRESHOLD CONCENTRATION FOR SUSPENDED SULFATES
Aggravation of Asthma	6 to 10 Micrograms Per Cubic Meter for 24 Hours.
Aggravation of Heart and Lung Disease in the Elderly	9 Micrograms Per Cubic Meter for 24 Hours
Subtle Decreases in Childhood Lung Function	9 to 13 Micrograms Per Cubic Meter for 1 Year.
Increase in Acute Respiratory Disease in Children	13 Micrograms Per Cubic Meter for 1 Year.

TABLE 8 - 2
1986 SULFATE DATA SUMMARY
(Micrograms Per Cubic Meter)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 24-HOUR	SECOND HIGHEST	THIRD HIGHEST	ANNUAL ARITHMETRIC MEAN
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)						
Mexico	Mexico Treatment Plant	57	20.0	16.5	16.1	10.3
AROOSTOOK AIR QUALITY CONTROL REGION (108)						
Madawaska	St. Jarres	55	14.1	11.0	9.9	5.9
DOWNEAST AIR QUALITY CONTROL REGION (109)						
Acadia National Park	McFarland Hill Ranger Station	57	15.7	14.6	13.7	4.9
Bangor	Regional Office	59	20.2	13.8	13.3	7.7
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)						
Bridgton	Upper Ridge Road	97	20.1	19.4	17.4	5.8
South Portland	SMVTI	109	18.0	17.5	14.9	7.4

TABLE 8 - 3
1986 NITRATE DATA SUMMARY
(Milligrams Per Liter)

SITE	ADDRESS	NUMBER OF OBSERVATIONS	HIGHEST 24-HOUR	SECOND HIGHEST	THIRD HIGHEST	ANNUAL ARITHMETRIC MEAN
ANDROSCOGGIN INTERSTATE AIR QUALITY CONTROL REGION (107)						
Mexico	Mexico Treatment Plant	57	4.4	3.5	2.6	0.48
AROOSTOOK AIR QUALITY CONTROL REGION (108)						
Madawaska	St. Jarres	54	1.1	0.5	0.3	0.14
DOWNEAST AIR QUALITY CONTROL REGION (109)						
Acadia National Park	McFarland Hill Ranger Station	60	1.7	0.9	0.8	0.20
Bangor	Regional Office	59	3.3	1.6	1.5	0.34
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)						
Bridgton	Upper Ridge Road	98	8.4	2.8	2.7	0.38
South Portland	SMVTI	109	6.3	4.8	3.8	0.53

9. ATMOSPHERIC DEPOSITION

9.1 Description and Sources

As a result of the combustion of tremendous quantities of fossil fuels such as coal and oil, the United States annually discharges approximately 50 million metric tons of sulfur and nitrogen oxides into the atmosphere. Through a series of complex chemical reactions these pollutants can be converted into acids, which may return to earth as components of either rain or snow. This atmospheric deposition, more commonly known as acid rain, may have severe ecological impacts on widespread areas of the environment.

9.2 Health and Welfare Effects

While direct health effects from acid rain have not been documented there are numerous indirect effects which could have definite effect on mankind. Atmospheric deposition is known to leach heavy metals such as mercury from rocks causing possible contamination of water supplies. Hundreds of lakes in North America and Scandanavia have become so acidic that they can no longer support fish life. The rain falling on forests and other non-farmlands could, in time, cause extensive changes in the soil chemistry. There is not enough information yet to make it possible to say exactly what the results might be, but there is no reason to think the changes will be beneficial.

9.3 Standards

There are no standards in effect or proposed for atmospheric deposition. The only permanent solution to the acid rain problem is to keep the acid levels low. The only practical way of achieving this is by reducing emissions at their sources.

9.4 Monitoring

During 1986 there were four sites collecting data on atmospheric deposition. Those four sites included two Bureau maintained sites in Bridgton and Acadia National Park, a University of Maine maintained site in Greenville and a National Weather Service maintained site in Caribou. The samples from these four sites are normally collected every Tuesday morning at 9:00 a.m.. Consequently, the samples are not necessarily a single storm event but are more likely to be a composite of all storm events during the previous week. The samples, if there was a signficant storm, are used for field measurements of pH and conductivity and are then packaged up for shipment to the National Atmospheric Deposition Program central laboratory in Illinois. In the central laboratory they are also tested for pH and conductivity as well as additional components. Table 9-1 is a summary of the measurements taken at the central laboratory in Illinois from the DEP operated sites for the year 1986. The sulfate deposition figures were corrected for marine aerosol contribution.

TABLE 9 - 1
1986 ATMOSPHERIC DEPOSITION DATA SUMMARY

SITE	ADDRESS	pH MAXIMUM	pH MINIMUM	pH MEAN	DEPOSITION (Kg/ha) SO4	DEPOSITION (Kg/ha) NO3
DOWNEAST AIR QUALITY CONTROL REGION (109)						
Acadia National Park	McFarland Hill Ranger Station	5.3**	3.8**	4.5	21.0***	12.2
METROPOLITAN PORTLAND AIR QUALITY CONTROL REGION (110)						
Bridgton	Upper Ridge Road	5.7**	3.8**	4.4	16.0***	10.0

* Precipitation weighted mean.
** Lab measurements.
*** Corrected for marine aerosol and normalized to 52 weeks.

10. HYDROCARBONS (HC)

10.1 Description and Sources

Hydrocarbons are a class of compounds containing carbon and hydrogen in various combinations. They are found especially in petroleum, natural gas and coal. Some are gaseous, some liquid and some are solid. There are in fact over a thousand hydrocarbon compounds. Many of the polluting hydrocarbons are discharged into the air by incomplete combustion of organic materials. A major source of this kind of hydrocarbon emission is the burning of gasoline in automobiles. Other major contributors are organic solvent evaporation, industrial processes, solid waste disposal and fuel combustion in stationary sources. The control of hydrocarbon emissions are accomplished by combustion process optimization, recovery by mass transfer principles, restriction of evaporative loss and process material and fuel substitution.

10.2 Health and Welfare Effects

Hydrocarbon air pollutants enter into and promote the formation of photochemical smog (ozone) and thus contribute to the development of eye irritation and respiratory tract problems. By themselves, hydrocarbons may induce adverse health effects, although there is relatively little quantitative data to relate individual hydrocarbons to the risk of human disease.

10.3 Standards

The present State and Federal Standard for non-methane hydrocarbons is a three hour average concentration of 160 ug/m3.

10.4 Monitoring

Hydrocarbons were not monitored as part of the state's continuous air monitoring program during 1986.