

Air Quality in Alberta April to June, 1998

Alberta Environmental Protection continuously monitors air quality in Edmonton (3 stations), Calgary (3 stations), Fort Saskatchewan, Fort MacKay and Beaverlodge (35 km west-northwest of Grande Prairie). Air quality parameters monitored at Alberta Environmental Protection stations include carbon monoxide, dust and smoke (the coefficient of haze), oxides of nitrogen, ozone, total hydrocarbons, hydrogen sulphide, sulphur dioxide, carbon dioxide, ammonia and particulates (PM₁₀ and PM_{2.5}). Monitoring for PM_{2.5} at the Edmonton Northwest station and PM₁₀ at the Edmonton East station was added in April 1998. The Index of the Quality of the Air (IQUA) is calculated at the Edmonton, Calgary and Fort Saskatchewan stations. The IQUA converts air parameter concentrations into *Good*, *Fair*, *Poor* and *Very Poor* air quality ratings.

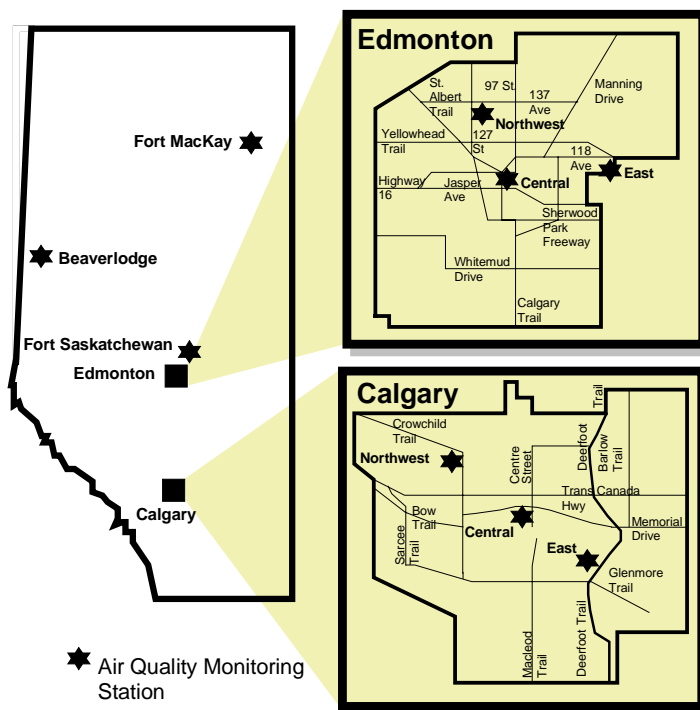
Highlights

Good air quality was close to the 10-year average (1988 to 1997) at most monitoring stations in the second quarter of 1998. The frequency of *Good* air quality was within 2 percent of the 10-year average at the Edmonton Central, Calgary Central, Calgary East and Fort Saskatchewan stations. However, *Good* air quality was from 3 to 10 percent less frequent than the average over the last 10 years at the Edmonton Northwest, Edmonton East and Calgary Northwest stations. A corresponding increase in *Fair* air quality was also recorded at these stations. *Fair* air quality at these stations was primarily due to ground-level ozone generated because of the warm, dry spring experienced over most of the province. The vast majority of this ozone originates from natural processes such as: (1) the chemical reaction involving organic compounds (from vegetation) and naturally occurring oxides of nitrogen in the presence of sunlight, and (2) transport of ozone from the upper atmosphere. Both of these processes are enhanced by warm, sunny weather. Emissions of organic compounds and oxides of nitrogen from vehicles and industries in Edmonton and Calgary may also have a minor contribution to elevated ozone levels.

For current air quality conditions call **427-7273** in Edmonton and **250-2099** in Calgary.

Poor and Very Poor air quality did not occur at any monitoring stations in April, May or June of 1998.

Air quality guidelines for carbon monoxide, dust and smoke and nitrogen dioxide were not exceeded in the second quarter of 1998. Concentrations of carbon monoxide were lower than the 10-year average (1988 to 1997) at most monitoring stations in Edmonton and Calgary. The average carbon monoxide value at the Edmonton and Calgary Central stations were 32 and 24 percent lower than the 10-year average, respectively. However, carbon monoxide values slightly higher than the 10-year average were recorded at the Calgary Northwest and Fort Saskatchewan stations. Average nitrogen dioxide concentrations in the second quarter of 1998 were close to the 10-year average at all monitoring stations. However, dust and smoke levels at the Calgary Northwest and East monitoring stations were higher than the average over the past 10 years. The major sources of carbon monoxide, oxides of nitrogen and dust and smoke in urban areas are vehicle exhaust emissions and traffic movement.



Internet:
www.gov.ab.ca/env/air.html

☞ **Air quality guidelines for sulphur dioxide were not exceeded at Alberta Environmental Protection stations in the second quarter of 1998.**

However, the one-hour guideline for hydrogen sulphide was exceeded once at the Fort Saskatchewan station. An elevated hydrogen sulphide concentration of 0.012 ppm (the one-hour guideline is 0.010 ppm) was recorded at 6 a.m. on June 22 at the Fort Saskatchewan station. Winds were from the southeast to south-southeast at about 1.7 km/h prior to and during this exceedance. The cause of this elevated hydrogen sulphide concentration is not known.

☞ **Elevated inhalable particulate levels were recorded on May 5 in Calgary and Edmonton due to smoke from a forest fire in the Swan Hills area.**

This episode lasted from 8 to 10 a.m. in Calgary and from 8 a.m. to 6 p.m. in Edmonton. Maximum PM_{2.5} (particles less than 2.5 micrometers in diameter) concentrations of 323 and 124 µg/m³ were recorded at the Calgary Central and Edmonton Northwest stations, respectively. These maximum values were recorded at 9 a.m. in both cities. Dust and smoke levels were also elevated during this forest fire episode. Normal maximum daily PM_{2.5} concentrations for the month of

May are between 20 and 40 µg/m³ in Edmonton and Calgary. Alberta does not have one-hour guideline for PM_{2.5}. However, 24-hour air quality guidelines for PM_{2.5} and PM₁₀ are currently being developed at the federal level. Particles less than 2.5 micrometers in diameter are important from a human health perspective because they are small enough to be inhaled into the lungs.

☞ **The one-hour guideline for ozone was not exceeded in April, May or June of 1998.**

However, the 24-hour guideline for ozone was exceeded frequently at all monitoring stations. The 24-hour guideline for ozone is normally exceeded at rural locations almost every day in the spring due to natural ozone generating processes. These natural processes are: (1) the reaction of naturally occurring organic compounds and oxides of nitrogen in the presence of sunlight, and (2) transport from the ozone rich upper troposphere to the ground-level due to normal atmospheric mixing. Air quality guidelines for ozone are currently under review by a federal-provincial committee.

Number of Times Air Quality Guidelines were Exceeded - April to June, 1998

Station	Carbon Monoxide		Dust and Smoke	Hydrogen Sulphide		Nitrogen Dioxide		Ozone		Sulphur Dioxide	
	1-hour	8-hour	monthly	1-hour	24-hour	1-hour	24-hour	1-hour	24-hour	1-hour	24-hour
Edmonton Central	0	0	0	n/a	n/a	0	0	0	53	n/a	n/a
Edmonton Northwest	0	0	0	n/a	n/a	0	0	0	70	n/a	n/a
Edmonton East	0	0	0	0	0	0	0	0	70	0	0
Calgary Central	0	0	0	n/a	n/a	0	0	0	26	n/a	n/a
Calgary Northwest	0	0	0	n/a	n/a	0	0	0	70	n/a	n/a
Calgary East	0	0	0	0	0	0	0	0	33	0	0
Fort Saskatchewan	0	0	0	1	0	0	0	0	74	0	0
Beaverlodge	n/a	n/a	n/a	n/a	n/a	0	0	0	74	n/a	n/a
Fort MacKay	n/a	n/a	n/a	0	0	n/a	n/a	n/a	n/a	0	0
Guideline	13 ppm	5 ppm	90% of values < 1 COH unit	0.01 ppm	0.003 ppm	0.21 ppm	0.11 ppm	0.082 ppm	0.025 ppm	0.17 ppm	0.06 ppm

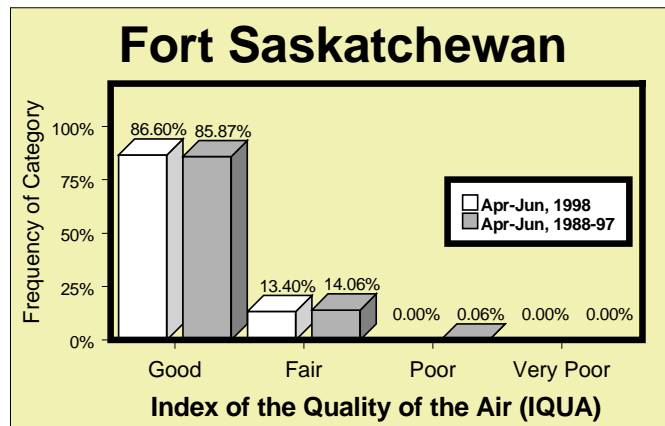
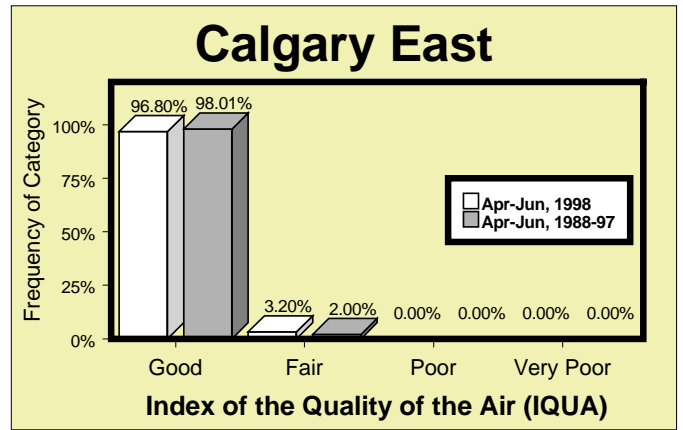
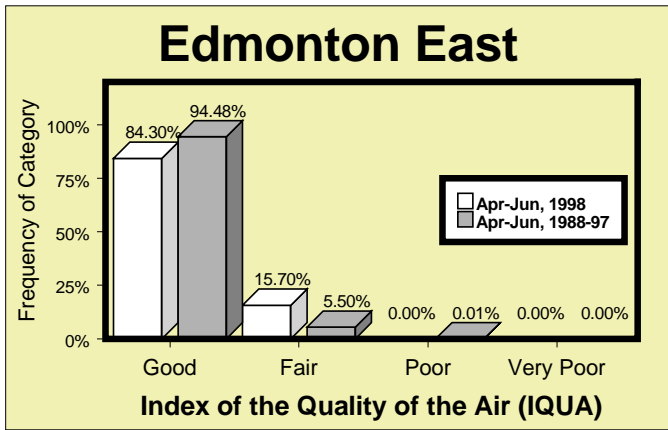
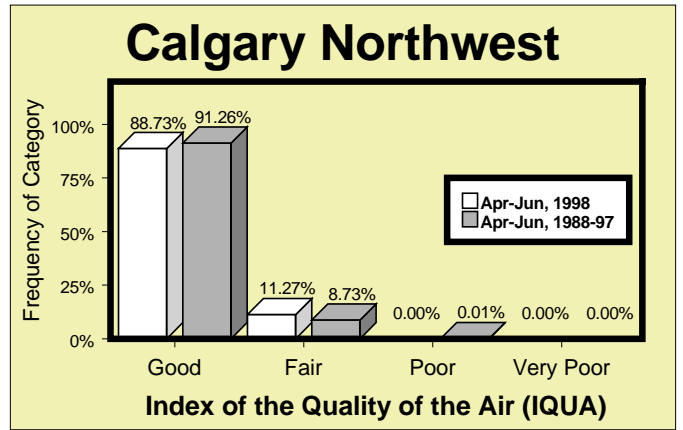
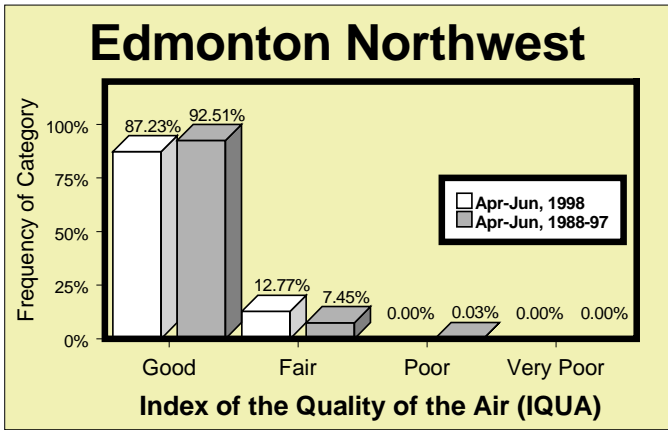
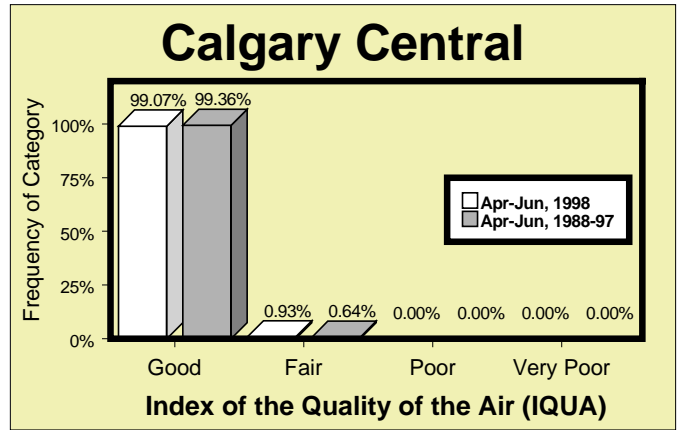
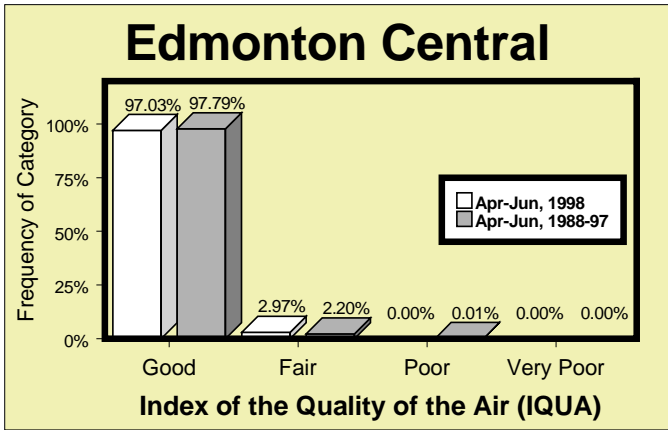
n/a Parameter not monitored or data not available.

The Index of the Quality of the Air

The index of the quality of the air (IQUA) provides the public with a meaningful measure of outdoor air quality. The IQUA is calculated every hour at all Edmonton, Calgary and Fort Saskatchewan monitoring stations. From this index, we know whether the air quality is Good, Fair, Poor or Very Poor. The air pollutants used to calculate the IQUA are carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide. Good, Fair, Poor and Very Poor air quality categories are directly related to guidelines under Alberta's Environmental Protection and Enhancement Act, and National Air Quality Objectives.

IQUA rating	Description
Good	Desirable range: no known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
Fair	Acceptable range: adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health.
Poor	Tolerable range: not all aspects of the environment are adequately protected from possible adverse effects. Long-term control action may be necessary, depending on the frequency, duration and circumstances of the readings.
Very Poor	Intolerable range: in this range, continued high readings could pose a risk to public health.

Source: Environment Canada. 1980. Guideline for a short-term air quality index. A report by the Federal-Provincial Committee on Air Pollution.



Average Concentrations - April to June, 1998 ^a

Parameter	Monitoring Period	Edmonton Stations			Calgary Stations			Fort Saskatchewan	Beaverlodge	Fort MacKay
		Central	Northwest	East	Central	Northwest	East			
Carbon Monoxide (ppm)	Apr-Jun 1998	0.59	0.58	0.37	0.67	0.51	0.50	0.39	n/a	n/a
	Apr-Jun 1988-97	0.86	0.68	0.38	0.88	0.46	0.69	0.34	n/a	n/a
Coefficient of Haze (COH unit)	Apr-Jun 1998	0.13	0.15	0.12	0.18	0.12	0.26	0.08	n/a	n/a
	Apr-Jun 1988-97	0.16	0.14	0.14	0.16	0.05	0.16	0.06	n/a	n/a
Hydrogen Sulphide (ppm)	Apr-Jun 1998	n/a	n/a	0.001	n/a	n/a	0.001	0.000	n/a	0.000
	Apr-Jun 1988-97 b	n/a	n/a	0.000	n/a	n/a	0.001	0.000	n/a	0.000
Nitrogen Dioxide (ppm)	Apr-Jun 1998	0.021	0.020	0.013	0.027	0.013	0.024	0.009	0.002	n/a
	Apr-Jun 1988-97	0.023	0.018	0.013	0.028	0.013	0.022	0.009	n/a	n/a
Ozone (ppm)	Apr-Jun 1998	0.025	0.031	0.034	0.021	0.031	0.023	0.032	0.035	n/a
	Apr-Jun 1988-97	0.024	0.027	0.030	0.021	0.031	0.024	0.033	n/a	n/a
Sulphur Dioxide (ppm)	Apr-Jun 1998	n/a	n/a	0.002	n/a	n/a	0.003	0.001	n/a	0.002
	Apr-Jun 1988-97	n/a	n/a	0.002	n/a	n/a	0.002	0.001	n/a	0.003
Total Hydrocarbons (ppm)	Apr-Jun 1998	2.15	1.85	2.15	2.04	1.96	2.03	1.94	n/a	2.13
	Apr-Jun 1988-97	2.08	1.92	2.09	2.03	1.88	1.97	1.88	n/a	1.72
Carbon Dioxide (ppm)	Apr-Jun 1998	n/a	n/a	n/a	384	n/a	n/a	n/a	n/a	n/a
	Apr-Jun 1992-97	n/a	n/a	n/a	380	n/a	n/a	n/a	n/a	n/a
Particulate (PM ₁₀ in µg/m ³)	Apr-Jun 1998 c	n/a	16.6	34.0	18.5	n/a	n/a	n/a	n/a	n/a
	Apr-Jun 1994-97 d	n/a	18.9	n/a	13.2	n/a	n/a	n/a	n/a	n/a
Particulate (PM _{2.5} in µg/m ³)	Apr-Jun 1998 e	n/a	11.8	n/a	12.6	n/a	n/a	n/a	n/a	n/a
	Apr-Jun 1997	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ammonia (ppm)	Apr-Jun 1998	n/a	n/a	n/a	n/a	n/a	n/a	0.01	n/a	n/a
	Apr-Jun 1988-97	n/a	n/a	n/a	n/a	n/a	n/a	0.01	n/a	n/a

a All average values based on data collected from April to June.

b Average hydrogen sulphide at the Edmonton East station for Apr-Jun 1991-97

c PM₁₀ monitoring began in April 1998 at the Edmonton East station.

d Average PM₁₀ at the Calgary Central station for Apr-Jun 1996-97.

e PM_{2.5} monitoring began in November 1997 at the Calgary Central station and in April 1998 at the Edmonton Northwest station.

n/a Parameter not monitored.