

Air Quality in Alberta July to September, 1998

Alberta Environmental Protection continuously monitors air quality in Edmonton (three stations), Calgary (three stations), Fort Saskatchewan 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}). 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

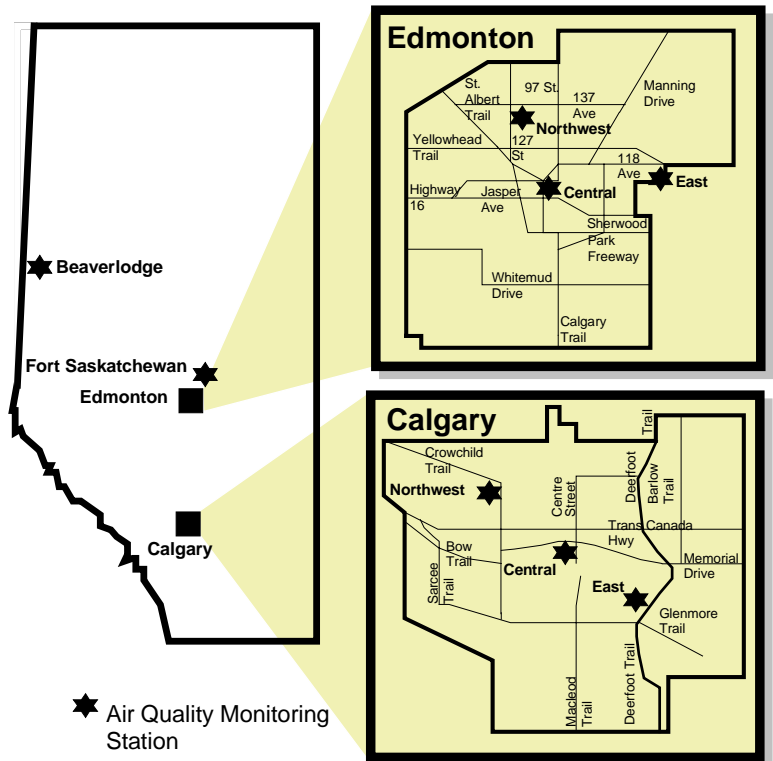
The frequency of Good air quality was close to the ten-year average (average from 1988 to 1997) at most monitoring stations in the third quarter of 1998. Good air quality was reported over 98% of the time at the Edmonton Central, Calgary Central and Calgary East monitoring stations. However, Good air quality in the third quarter of 1998 was about 3% less frequent than the ten-year average at the Edmonton Northwest, Calgary Northwest and Edmonton East stations. The lower frequency of Good air quality at these stations was caused by higher natural ozone levels due to relatively warm weather conditions. Ozone concentrations will generally be higher at warmer temperatures.

Poor air quality was reported for a total of six hours at Alberta monitoring stations in July of 1998. These Poor air quality episodes were caused by elevated ground-level ozone levels during hot, summer weather conditions. Two hours of Poor air quality were reported at each of the Edmonton Northwest and Fort Saskatchewan stations in the late afternoon (between 4 to 6 p.m.) on July 9. One hour of Poor air quality was measured at each of the Edmonton Central and Calgary Northwest stations in the early afternoon (1 to 2 p.m.) on July 27. Elevated ozone levels at

these times were caused by ozone generated from natural processes with the incremental contribution of ozone precursors (oxides of nitrogen and organic compounds) emitted by automobiles and industries in the Edmonton and Calgary area.

Very Poor air quality did not occur at any monitoring stations in the third quarter of 1998.

Carbon monoxide concentrations in the third quarter of 1998 were lower at most monitoring stations than the average over the past ten years. The most significant decreases in carbon monoxide were measured in Edmonton where average concentrations in the third quarter of 1998 were at least 25% lower than the average over the previous ten years. Dust and smoke levels were also from between 15 and 20% lower in the third quarter than the ten-year average at Edmonton stations. The primary sources of carbon monoxide and dust and smoke at urban locations is vehicle exhaust emissions and traffic movement.



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

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

☞ **Air quality guidelines for nitrogen dioxide and dust and smoke were not exceeded in July, August or September of 1998.** However, the eight-hour guideline for carbon monoxide was exceeded one time in the evening (4 p.m. to 12 a.m.) on September 1 at the Calgary Central monitoring station. This exceedance was caused by vehicle exhaust emissions during stable weather conditions.

☞ **Air quality guidelines for sulphur dioxide were not exceeded at Alberta Environmental Protection stations in the third quarter of 1998.** However, the one-hour guideline for hydrogen sulphide was exceeded seven times at the Calgary East station. These exceedances were recorded on August 6 (3 a.m.), August 11 (10 p.m. and 11 p.m.), September 1 (7 p.m. and 8 p.m.), September 14 (8 p.m.) and September 15 (9 p.m.). The 24-hour guideline for hydrogen sulphide was also exceeded on September 1 at the Calgary East monitoring station. Elevated hydrogen sulphide values at the Calgary East station were due to emissions from the near-by sewage treatment plant.

☞ **Elevated particulate levels, due to forest fire smoke, were measured in Edmonton and Calgary on August 10 and 11.** High particulate concentrations were recorded in the afternoon of August 10 (noon to

6 p.m.) in Edmonton. Maximum hourly PM₁₀ and PM_{2.5} values measured during this period were 731 and 430 µg/m³, respectively. Elevated particulate levels were also measured in Calgary on August 10 and 11 (10 p.m. to 10 a.m.). The maximum one-hour PM₁₀ and PM_{2.5} concentrations recorded in downtown Calgary during this time period were 597 and 450 µg/m³, respectively. Normal PM₁₀ and PM_{2.5} concentrations in Edmonton and Calgary are about 25 and 15 µg/m³, respectively. Alberta does not have one-hour guidelines for particulates. However, 24-hour air quality guidelines for PM_{2.5} and PM₁₀ are currently being developed at the federal level.

☞ **Because of natural ozone generating processes, the 24-hour guideline for ozone was exceeded at all stations in the third quarter of 1998.** The 24-hour guideline for ozone is normally exceeded at rural locations in the spring and summer 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 atmosphere 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 - July to September, 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	1	13	n/a	n/a
Edmonton Northwest	0	0	0	n/a	n/a	0	0	2	43	n/a	n/a
Edmonton East	0	0	0	0	0	0	0	0	39	0	0
Calgary Central	0	1	0	n/a	n/a	0	0	0	9	n/a	n/a
Calgary Northwest	0	0	0	n/a	n/a	0	0	1	54	n/a	n/a
Calgary East	0	0	0	7	1	0	0	0	11	0	0
Fort Saskatchewan	0	0	0	0	0	0	0	2	37	0	0
Beaverlodge	n/a	n/a	n/a	n/a	n/a	0	0	0	62	n/a	n/a
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

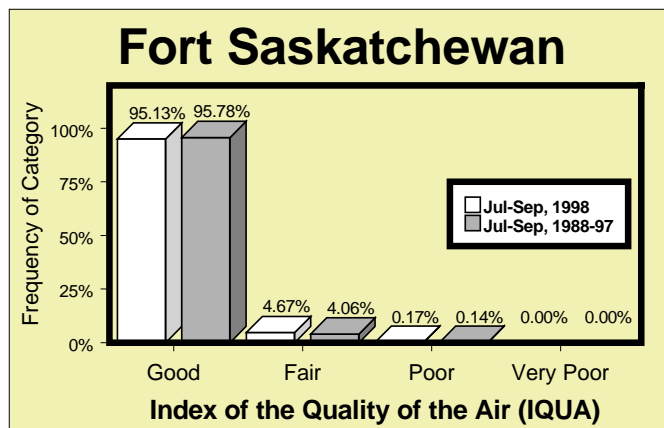
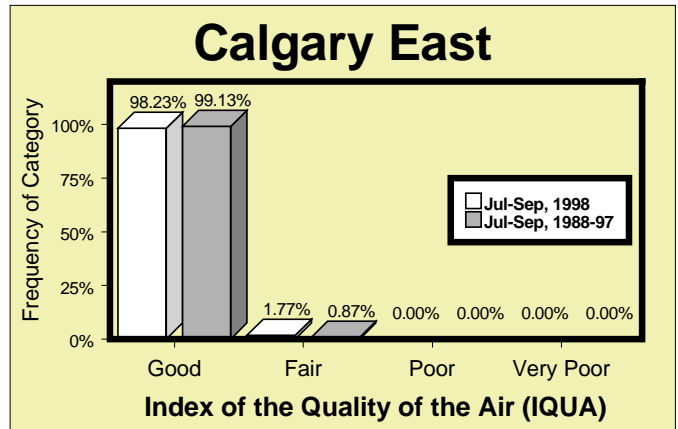
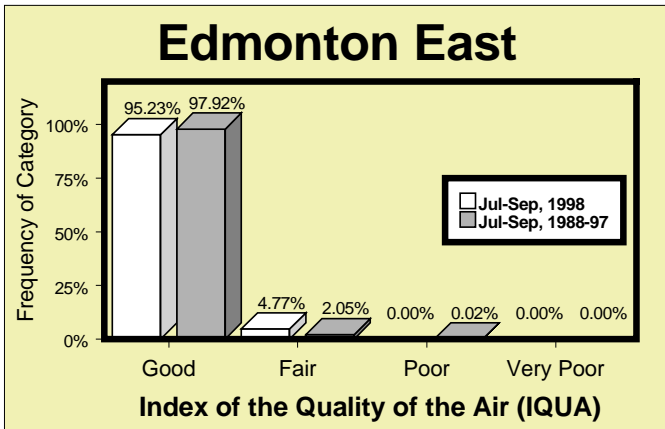
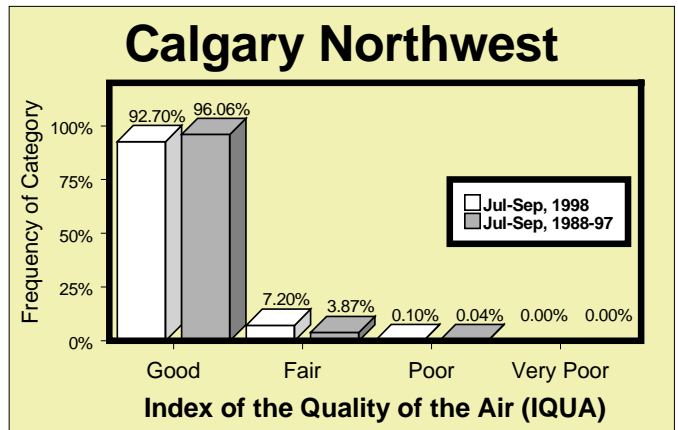
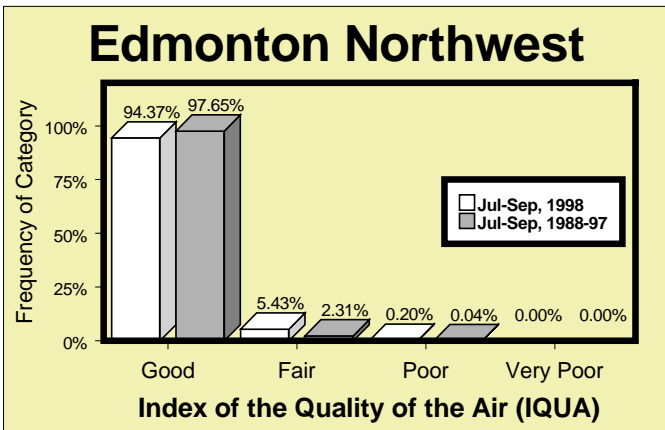
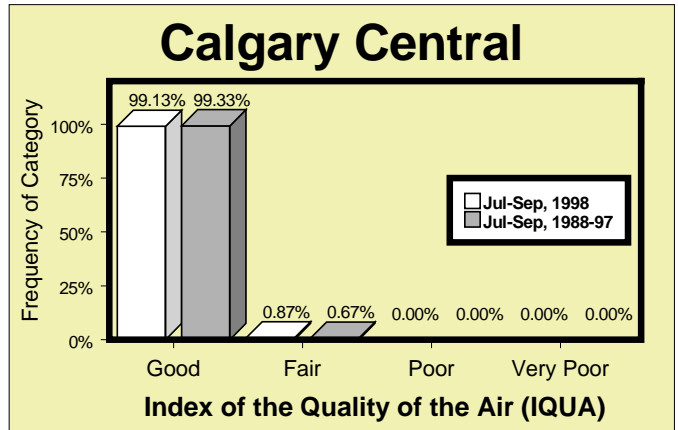
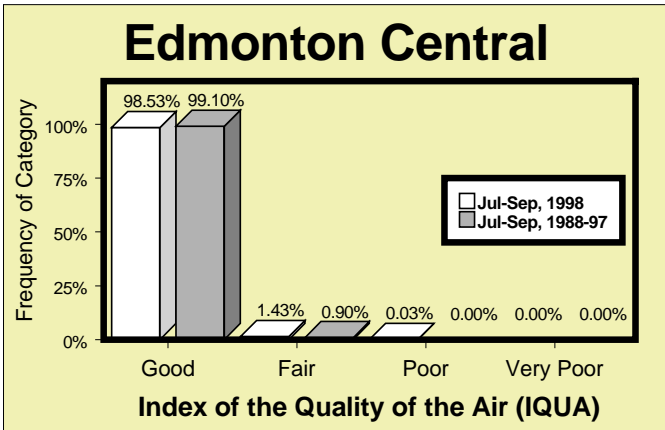
n/a Parameter not monitored or data not available.

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 - July to September, 1998 ^a

Parameter	Monitoring Period	Edmonton Stations			Calgary Stations			Fort Saskatchewan	Beaverlodge
		Central	Northwest	East	Central	Northwest	East		
Carbon Monoxide (ppm)	Jul-Sep 1998	0.63	0.41	0.31	0.81	0.56	0.70	0.47	n/a
	Jul-Sep 1988-97	0.84	0.77	0.44	0.94	0.51	0.74	0.39	n/a
Coefficient of Haze (COH unit)	Jul-Sep 1998	0.16	0.15	0.17	0.24	0.13	0.32	0.10	n/a
	Jul-Sep 1988-97	0.19	0.18	0.21	0.19	0.07	0.22	0.08	n/a
Hydrogen Sulphide (ppm)	Jul-Sep 1998	n/a	n/a	0.001	n/a	n/a	0.001	0.000	n/a
	Jul-Sep 1988-97 ^b	n/a	n/a	0.001	n/a	n/a	0.001	0.000	n/a
Nitrogen Dioxide (ppm)	Jul-Sep 1998	0.024	0.018	0.015	0.026	0.013	0.024	0.009	0.002
	Jul-Sep 1988-97	0.020	0.016	0.013	0.025	0.013	0.022	0.008	n/a
Ozone (ppm)	Jul-Sep 1998	0.019	0.025	0.024	0.017	0.027	0.018	0.024	0.028
	Jul-Sep 1988-97	0.017	0.018	0.021	0.016	0.024	0.018	0.023	n/a
Sulphur Dioxide (ppm)	Jul-Sep 1998	n/a	n/a	0.002	n/a	n/a	0.004	0.001	n/a
	Jul-Sep 1988-97	n/a	n/a	0.002	n/a	n/a	0.003	0.001	n/a
Total Hydrocarbons (ppm)	Jul-Sep 1998	2.25	2.09	2.02	2.11	2.00	2.07	1.73	n/a
	Jul-Sep 1988-97	2.02	1.98	2.16	2.05	1.92	2.01	1.91	n/a
Carbon Dioxide (ppm)	Jul-Sep 1998	n/a	n/a	n/a	385	n/a	n/a	n/a	n/a
	Jul-Sep 1992-97	n/a	n/a	n/a	374	n/a	n/a	n/a	n/a
Particulate (PM ₁₀ in µg/m ³)	Jul-Sep 1998 ^c	n/a	38.2	30.3	39.7	n/a	n/a	n/a	n/a
	Jul-Sep 1994-97 ^d	n/a	f	n/a	f	n/a	n/a	n/a	n/a
Particulate (PM _{2.5} in µg/m ³)	Jul-Sep 1998 ^e	n/a	19.4	n/a	16.7	n/a	n/a	n/a	n/a
	Jul-Sep 1997	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ammonia (ppm)	Jul-Sep 1998	n/a	n/a	n/a	n/a	n/a	n/a	0.00	n/a
	Jul-Sep 1988-97	n/a	n/a	n/a	n/a	n/a	n/a	0.00	n/a

a All average values based on data collected from July to September.

b Average hydrogen sulphide at the Edmonton East station for Jul-Sep 1991-97

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

d Average PM₁₀ at the Calgary Central station for Jul-Sep 1995-97.

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

f Historical PM₁₀ value requires adjustment due to instrument error.

n/a Parameter not monitored.