Air Quality in Alberta
July to September, 1999

Alberta Environment 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 Environment stations include carbon monoxide, dust and smoke, oxides of nitrogen, ozone, total hydrocarbons, hydrogen sulphide, sulphur dioxide, carbon dioxide, ammonia and particulates (PM_{10} 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.

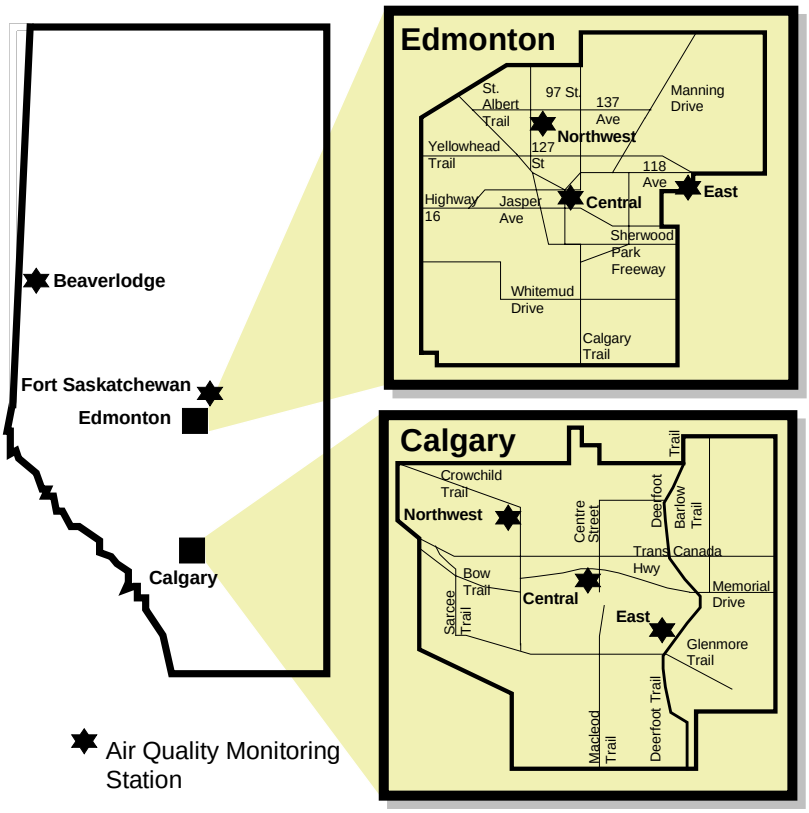
Highlights

☞ **The frequency of *Good* air quality topped the 10-year average (1989 to 1998) at all monitoring stations in the third quarter of 1999.** ***Good*** air quality was reported 100 per cent of the time at the Calgary Central station, and more than 99 per cent of the time at the Calgary East, Edmonton Central and Edmonton Northwest stations. No station reported ***Good*** air quality less than 97 per cent of the time. ***Fair*** air quality was less frequent than the 10-year average at all stations. The 10-year average pollutant levels are based on data collected during the third quarter from 1989 to 1998.

☞ ***Poor* air quality was reported for a total of six hours at the Edmonton East and Fort Saskatchewan stations in August 1999.** ***Poor*** air quality occurred in the afternoon of August 4 at the Edmonton East station (2 hours), and in the afternoons of August 20 (3 hours) and 21 (1 hour) at the Fort Saskatchewan station. These episodes were caused by elevated ozone levels that occurred during hot weather conditions (temperatures higher than 28 ^{o}C). Winds were primarily from the south (August 4 and 20) or southwest (August 21) during these episodes. High ozone values at these stations were primarily caused by ozone produced from natural processes. However, ozone generated from pollutants emitted by automobiles and industries in the Edmonton area may have also contributed to these elevated values.

☞ ***Very Poor* air quality was not reported at any monitoring stations from July to September 1999.**

☞ **Carbon monoxide and nitrogen dioxide concentrations were lower than the 10-year average at all urban monitoring stations in the third quarter of 1999.** Average carbon monoxide concentrations in Edmonton and Calgary were from 15 to 30 per cent lower than the 10-year average while average nitrogen dioxide levels were from 10 to 17 per cent lower than the 10-year average. The major sources of carbon monoxide and nitrogen dioxide at urban locations are vehicle exhaust emissions. Lower



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

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concentrations of these pollutants were due to lower emissions from more efficient automobiles.

☞ **Air quality guidelines for carbon monoxide, nitrogen dioxide and sulphur dioxide were not exceeded at any monitoring stations in the third quarter of 1999.** The maximum one-hour concentrations for carbon monoxide and nitrogen dioxide were 5.9 and 0.076 ppm (parts per million), respectively. These values are 45 and 36 per cent of the respective one-hour guidelines for carbon monoxide (13 ppm) and nitrogen dioxide (0.210 ppm). The maximum one-hour sulphur dioxide concentration, 0.036 ppm, was recorded at the Edmonton East station. This value is 21 per cent of the one-hour guideline for sulphur dioxide of 0.170 ppm.

☞ **The one-hour guideline for hydrogen sulphide was exceeded six times at the Edmonton East and Calgary East monitoring stations.** This guideline was exceeded on August 2 (11 p.m. and midnight), September 15 (11 p.m. and midnight), September 16 (3 a.m.) and September 30 (7 a.m.) at the Edmonton East station. At the Calgary East station, the hydrogen sulphide guideline was exceeded on July 10 (midnight), July 13 (9 p.m.), August 30 (1 a.m.), September 15 (10 p.m.), September 16 (9 p.m.) and September 21 (10 p.m.). The maximum hydrogen sulphide concentration at both stations was 0.015 ppm. The one-hour guideline for hydrogen sulphide is 0.010 ppm. High hydrogen sulphide values in east Edmonton were due to small leaks from petroleum storage tanks and transport vehicles. The sewage treatment facility is the major source of hydrogen sulphide in east Calgary.

☞ **The daily guideline for ground-level ozone was exceeded at all Alberta monitoring stations.** This guideline is normally exceeded because of naturally high ozone levels. Ozone is present naturally in the atmosphere due to: (1) chemical reactions that occur in the presence of sunlight involving organic chemicals and oxides of nitrogen emitted by natural and human sources; and: (2) transport from the ozone-rich upper atmosphere to ground level through normal atmospheric mixing. The daily guideline was most frequently exceeded (37 days) at the Beaverlodge station. Lower ozone concentrations are recorded in city cores because ozone is destroyed by nitric oxide emitted by vehicles. The daily guideline for ozone is currently under review by a federal-provincial committee.

Number of Times Air Quality Guidelines were Exceeded - July to September, 1999

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	5	n/a	n/a
Edmonton Northwest	0	0	0	n/a	n/a	0	0	0	4	n/a	n/a
Edmonton East	0	0	0	6	0	0	0	0	23	0	0
Calgary Central	0	0	0	n/a	n/a	0	0	0	2	n/a	n/a
Calgary Northwest	0	0	0	n/a	n/a	0	0	0	23	n/a	n/a
Calgary East	0	0	0	6	0	0	0	0	5	0	0
Fort Saskatchewan	0	0	0	0	0	0	0	4	20	0	0
Beaverlodge	n/a	n/a	n/a	n/a	n/a	0	0	0	37	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

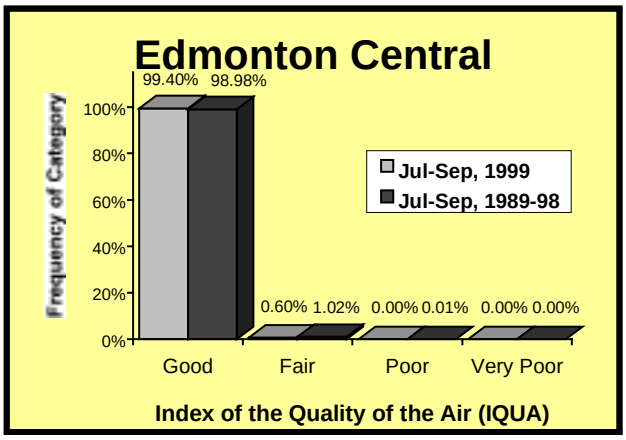
n/a Parameter not monitored or data not available.

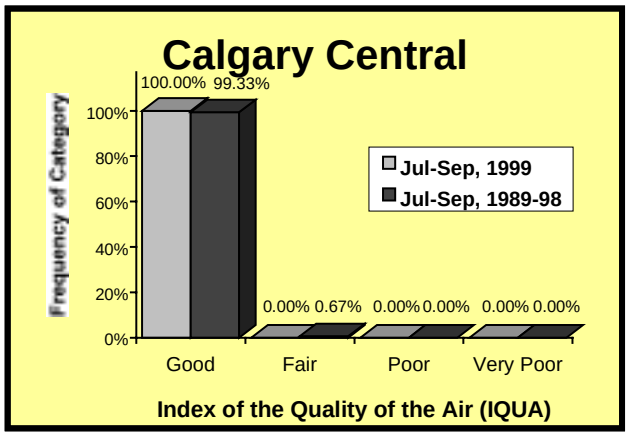
The Index of the Quality of the Air

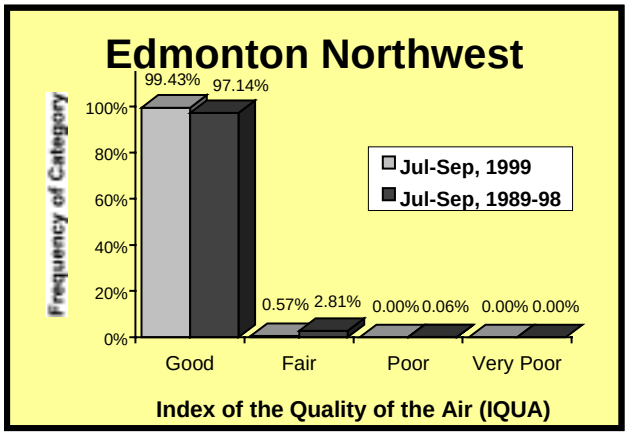
The index of the quality of the air (IQUA) provides the public with a meaningful measure of outdoor air quality. The IQUA is calculated every hour at all Edmonton, Calgary and Fort Saskatchewan monitoring stations. From this index, we can effectively rate air quality as Good, Fair, Poor or Very Poor. 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.

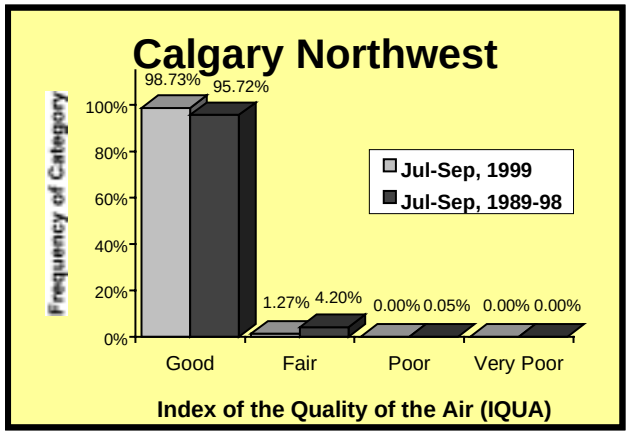
IQUA rating	Description
Good	Desirable range: no known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
Fair	Acceptable range: adequate protection against harmful effects to 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.

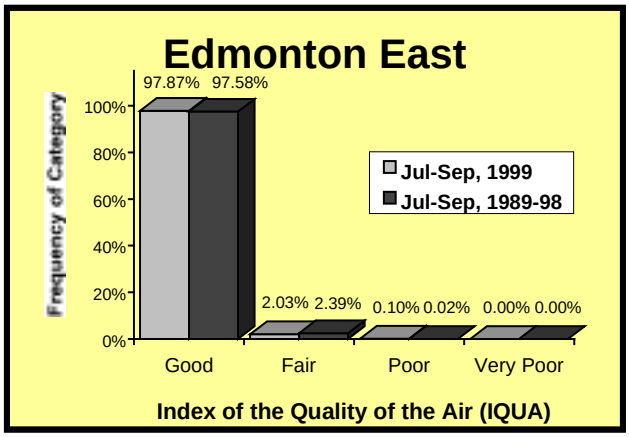
Source: Environment Canada. 1980. Guideline for a short-term air quality index. A report by the Federal-Provincial Committee on Air Pollution.

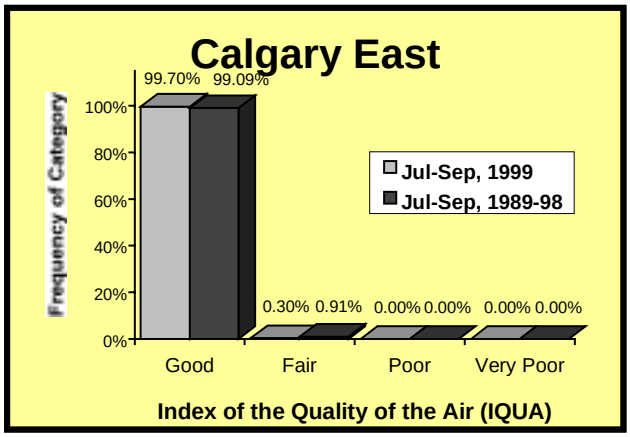

Edmonton Central
Frequency of Category
100%
80%
60%
40%
20%
0%
99.40% 98.98%
0.60% 1.02%
0.00% 0.01%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

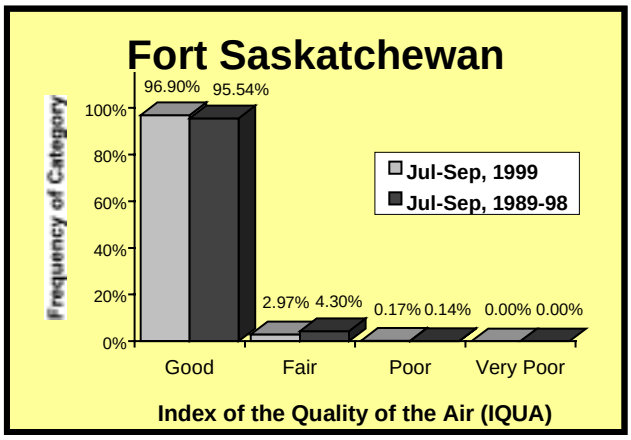

Calgary Central
Frequency of Category
100%
80%
60%
40%
20%
0%
100.00% 99.33%
0.00% 0.67%
0.00% 0.00%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Edmonton Northwest
Frequency of Category
100%
80%
60%
40%
20%
0%
99.43% 97.14%
0.57% 2.81%
0.00% 0.06%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Calgary Northwest
Frequency of Category
100%
80%
60%
40%
20%
0%
98.73% 95.72%
1.27% 4.20%
0.00% 0.05%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Edmonton East
Frequency of Category
100%
80%
60%
40%
20%
0%
97.87% 97.58%
2.03% 2.39%
0.10% 0.02%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Calgary East
Frequency of Category
100%
80%
60%
40%
20%
0%
99.70% 99.09%
0.30% 0.91%
0.00% 0.00%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Fort Saskatchewan
Frequency of Category
100%
80%
60%
40%
20%
0%
96.90% 95.54%
2.97% 4.30%
0.17% 0.14%
0.00% 0.00%
Jul-Sep, 1999
Jul-Sep, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

Average Concentrations - April to June, 1999 [a]

Parameter	Monitoring Period	Edmonton Stations			Calgary Stations			Fort Saskatchewan	Beaverlodge [c]
		Central	Northwest	East	Central	Northwest	East		
Carbon Monoxide	Apr-Jun 1999	0.59	0.52	0.32	0.60	0.39	0.50	0.36	n/a
(ppm)	Apr-Jun 1989-98	0.81	0.65	0.38	0.84	0.47	0.65	0.33	n/a
Dust and Smoke	Apr-Jun 1999	0.09	0.12	0.06	0.14	0.07	0.19	0.04	n/a
(COH unit)	Apr-Jun 1989-98	0.15	0.14	0.14	0.16	0.06	0.17	0.06	n/a
Hydrogen Sulphide	Apr-Jun 1999	n/a	n/a	0.000	n/a	n/a	0.001	0.000	n/a
(ppm)	Apr-Jun 1989-98 [b]	n/a	n/a	0.000	n/a	n/a	0.001	0.000	n/a
Nitrogen Dioxide	Apr-Jun 1999	0.019	0.016	0.012	0.024	0.011	0.021	0.008	0.002
(ppm)	Apr-Jun 1989-98	0.022	0.018	0.013	0.028	0.013	0.023	0.009	0.002
Ozone	Apr-Jun 1999	0.025	0.028	0.034	0.023	0.032	0.025	0.033	0.038
(ppm)	Apr-Jun 1989-98	0.024	0.027	0.030	0.021	0.031	0.023	0.033	0.035
Sulphur Dioxide	Apr-Jun 1999	n/a	n/a	0.002	n/a	n/a	0.002	0.002	0.000
(ppm)	Apr-Jun 1989-98 [d]	n/a	n/a	0.002	n/a	n/a	0.002	0.001	n/a
Total Hydrocarbons	Apr-Jun 1999	1.82	1.98	2.17	2.00	2.00	2.19	1.76	n/a
(ppm)	Apr-Jun 1989-98	2.10	1.91	2.11	2.05	1.89	1.99	1.87	n/a
Carbon Dioxide	Apr-Jun 1999	n/a	n/a	n/a	395	n/a	n/a	n/a	n/a
(ppm)	Apr-Jun 1992-98	n/a	n/a	n/a	381	n/a	n/a	n/a	n/a
Particulate	Apr-Jun 1999	n/a	20.5	18.3	20.0	n/a	n/a	n/a	n/a
(PM_{10} in $\mu g/m^3$)	Apr-Jun 1994-98 [e, f]	n/a	24.6	n/a	28.3	n/a	n/a	n/a	n/a
Particulate	Apr-Jun 1999	n/a	12.3	n/a	8.4	n/a	n/a	n/a	n/a
($PM_{2.5}$ in $\mu g/m^3$)	Apr-Jun 1998 [g]	n/a	n/a	n/a	12.7	n/a	n/a	n/a	n/a
Ammonia	Apr-Jun 1999	n/a	n/a	n/a	n/a	n/a	n/a	0.004	n/a
(ppm)	Apr-Jun 1989-98	n/a	n/a	n/a	n/a	n/a	n/a	0.005	n/a

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

b Average hydrogen sulphide at the Edmonton East station for April to June 1991-1998.

c Average nitrogen dioxide and ozone for the Beaverlodge station is for April to June 1998.

d Sulphur dioxide monitoring began in February 1999 at the Beaverlodge station.

e Average PM_{10} at the Calgary Central station for April to June 1996-1998 and average PM_{10} at the Edmonton Northwest station for April to June 1994-1998.

f PM_{10} monitoring began in April 1998 at the Edmonton East station.

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

n/a Parameter not monitored.