PASZA

Peace AirShed Zone Association

2006 Annual Report

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1.0 Introduction

The Peace Airshed Zone Association (PASZA) is a multi-stakeholder non-profit organization consisting of industry, local government, environmental non-government organizations (ENGOs), Alberta Environment, Alberta Energy & Utilities Board, the local health authority, and members of the public. PASZA was formed in March 1999 in response to concerns over air quality in the Grande Prairie Region and because of the desire of industry, government, ENGOs and the public to work together to better understand and address these concerns.

The PASZA Mission Statement is:

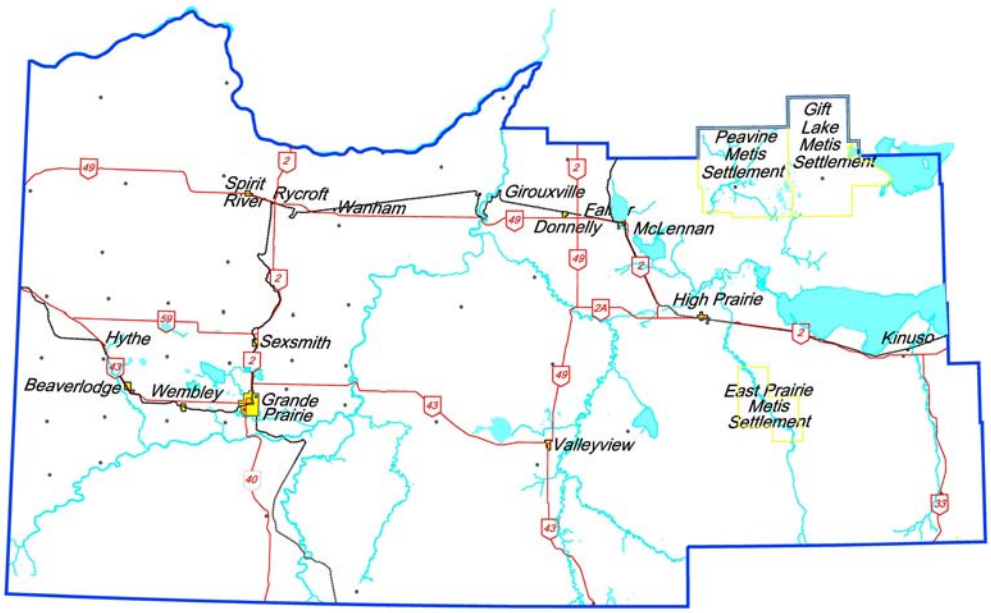
> *The Peace Airshed Zone Association will create and implement a process that provides relevant, scientifically credible information to stakeholders who will use the information to ensure continuous improvement of regional air quality, protect environmental health, and influence policy.*

PASZA was the fifth airshed management zone formed in Alberta and is a non-profit organization incorporated under the Societies Act. PASZA operates under guidelines put forth in the Clean Air Strategic Alliance's (CASA) Zone Air Quality Management Guidelines, including management by consensus, representation from affected stakeholders and public accessibility to data and information from its monitoring activities. Air Quality Management Zones are a key component in CASA's strategy for the management of air quality within Alberta.

The Peace Airshed Zone covers a 38,500 square kilometer area of northwestern Alberta, stretching from the Peace River south to the top of Township 64 and includes the area's two major population centres, Grande Prairie and High Prairie (see map below). Approximately 100,000 people live and work in this area. The zone's major industries are oil and gas processing, forestry, agriculture and tourism.

Funding of PASZA is proportioned fairly amongst its members at levels consistent with their relative impact on the zone's air quality as determined by annual emission inventories. In 2006, PASZA members' financial and in-kind contributions totaled approximately $595,200 and over 1000 hours respectively.

Map of the PASZA Airshed Zone



2.0 The Year In Review

2006 was a year of challenges and accomplishments for the Peace Airshed Zone Association.

With a $35,000 grant from Alberta Environment, PASZA completed a Feasibility Assessment; the study considered expanding the Airshed's current boundaries. The Assessment included a complete and comprehensive Emissions Inventory. A substantial part of the project included discussions with potential stakeholders and industrial operators in the proposed expansion areas. A "spin-off" of the boundary expansion project was the realization that more strategic communications and outreach programs were required. As a result, the PASZA Board committed to re-instate the Communications Committee in the 2007.

In mid-2006, PASZA signed an agreement with Kereco Energy Ltd. to take over the operations of their Valleyview air monitoring station. The addition of this station fills in a monitoring gap in the PASZA network where little or no historical data exist. In August, the station was incorporated into the PASZA network.

An additional station was added to the network in August 2006. Portable in nature, the Rover station has enhanced the network and made it more dynamic by allowing the Association to gather data at various locations across the Airshed Zone. This will help us to improve our understanding of regional issues where monitoring gaps exist.

PASZA joined other Alberta Airshed Zones to see the formation of the Alberta Airshed Council. The Council will provide a forum for all Airsheds to communicate issues and share technologies and ideas. The Council plans to hold an Airshed Conference in late October 2007. Goals and objectives for the airshed council are currently under development however, they include the following key areas:

- Communicating on a broad scale between airsheds in Alberta and with Albertans
- Facilitating information sharing between airshed zones
- Acting as a resource for forming Airsheds,
- Providing a forum for discussing issues and processes to address those issues
- Delegating airshed representatives for various CASA working groups and project teams
- Hosting an airshed workshop every two years on topics of mutual interest to airshed zones

Throughout 2006, PASZA provided a number of presentations to various audiences and stakeholder groups to inform them of our goals and objectives, accomplishments and future plans. More presentations to a wide variety of stakeholder groups, including locals schools, are planned for 2007.

At the end of 2006, PASZA acknowledged the resignation of its charter Program Manager, Kevin Warren of Amarok Consulting Ltd. Undoubtedly, Kevin's hard work and dedication contributed to the initial formation and many subsequent successes of the Peace Airshed Zone Association.

Rover Air Quality Monitoring Station—Falher

3.0 Report from the Chair

In 2006, Canadians expressed their concern for the Environment, with top priority given to *Clean Air.* To that end, PASZA and its Members have continued to make important progress in improved air quality monitoring in the Peace Region of the Province.

In 2006, PASZA initiated the expansion phase of their continuous monitoring program. To gain a better understanding of regional air quality, PASZA undertook the management and the operation of an existing industrial air monitoring station in the Valleyview district and added a Roving Station in the Falher area. The new network additions now provide air quality data in areas of the Zone that had little or no representative historical data. PASZA continues to review further expansion into areas north and south of the existing boundaries.

The success of the PASZA air-monitoring program is the collaborative effort of its Stakeholders, Member Organizations, and Contractors. On behalf of PASZA, I would like to recognize and extend our thanks to the excellent leadership provided by consultants Kevin Warren and Mike Bisaga, and the proficient operational management performed by the Focus Air Monitoring Group lead by Gary Cross and supported by Barb Johnson. I would also like to express my appreciation to Richard Harpe, past PASZA Chairman, for his tireless efforts in the very important formative years of PASZA.

As we move forward, 2007 promises to be another year marked by growth and enhancement. As the Airshed works toward a more comprehensive regional network, it also has set future priorities to raise public awareness of the value of Regional Air Quality Monitoring.

The successes of 2006 were achieved through the support of Stakeholders and Member Companies and 2007 is planned to be yet another progressive and triumphant year. Congratulations to all of you who have made PASZA a successful and worthwhile enterprise.

Mike Weeks
Chairman

4.0 Organization

In 2006 the Peace Airshed Zone Association maintained the streamlined organizational structure that had resulted from the major changes it had made in 2004.

The treasurer handles all receivables and payables and works directly with the program manager and network operator to ensure that accurate records of all financial transactions are maintained.

Responsibilities for fundraising are contracted to the Focus Corporation, who work with the program manager and board members as needed to ensure that the emissions-based funding formula is equitably applied, that sufficient funds are available to ensure that the air quality monitoring program is implemented and sustainable, and that other activities planned by the Association can be accomplished.

Communications are also managed by Focus, who work with the program manager and board members as needed, to communicate information about the association to its various stakeholders and others, both locally and outside the zone.

The technical committee maintains its responsibility for overseeing the operation of the regional air quality monitoring program. As many of the committee members are also board members, agenda items for the technical committee are on the agenda for Board of Directors meetings and dealt with at that time.

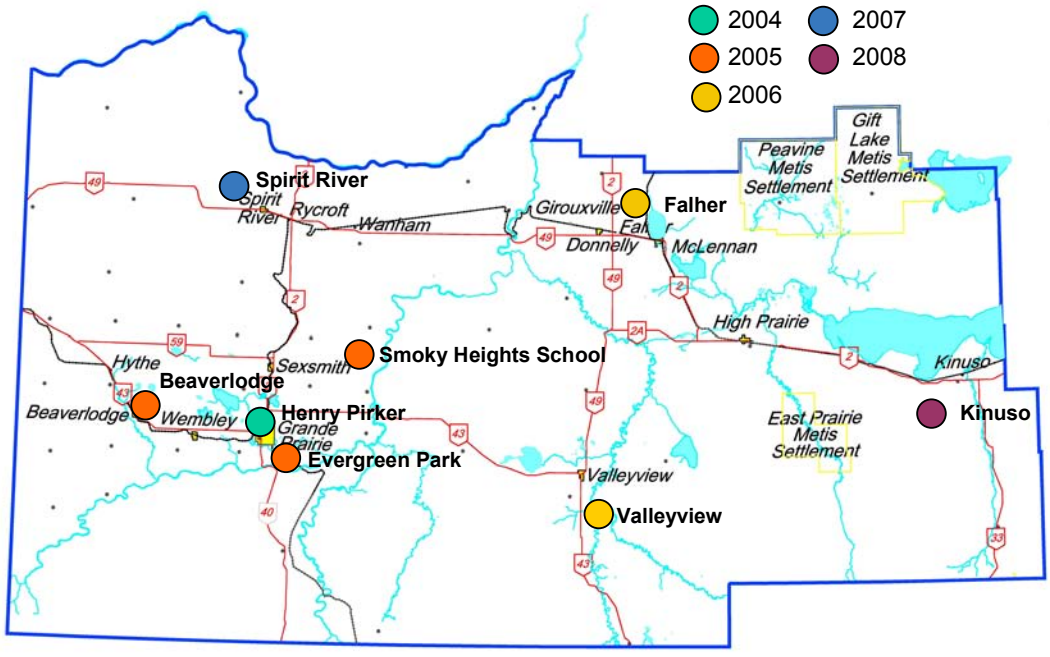
5.0 PASZA Regional Air Quality Monitoring Program

The first step in the process of developing, implementing and evaluating strategies to address the zone's air quality issues is the collection of data by a comprehensive Regional Air Quality Monitoring (AQM) Program in order to better understand the air quality within the zone's boundaries. Informed decision-making concerning air quality issues requires information that has been derived from data that are complete, comprehensive and scientifically defensible.

For 2006, The PASZA Regional AQM Program consisted of its zone-wide 43-station Passive Monitoring Network and six Continuous Air Quality Monitoring Stations including:

- the Henry Pirker Station located in northwest Grande Prairie, operational since February 2004
- the Evergreen Park Station located near the southeastern boundary of Grande Prairie, operational since March 2005
- the Smoky Heights Station located approximately 40 km northeast of Grande Prairie, operational since late March 2005
- the Beaverlodge Station located near the community of Beaverlodge at the Agriculture Canada Research Farm; the operation of this station was taken over from Alberta Environment by PASZA in April 2005.
- The Valleyview station located approximately 14 km southeast of Valleyview became operational in September 2006.
- The Rover Station, a portable trailer equipped to monitor a broad range of air quality parameters was designated as the zone's second human health "superstation". The Rover station is located in the vicinity of Falher and became operational in the fall of 2006. The Rover station is planned to be moved in the fall of 2007 to address other areas of concern in the Peace Airshed zone.

Location of the PASZA Monitoring Stations



Note: Coloured circles represent the location of continuous monitoring stations and small dots represent the location of passive monitoring stations.

5.1 Continuous Air Quality Monitoring

Continuous monitoring involves drawing air through a commercial analyzer calibrated to produce an output that is proportional to the ambient concentration of the compound being monitored. This methodology provides the greatest resolution but is also the most costly.

The continuous stations utilized by the PASZA air quality monitoring program are configured for monitoring a number of parameters from a wide range of natural, industrial, non-industrial and mobile emission sources. The air quality and meteorological parameters monitored are consistent with those in other Airsheds within Alberta and the Alberta Ambient Air Quality Monitoring System (AAAQMS) Network. These currently include: sulphur dioxide (SO_2), total reduced sulphur compounds (TRS), hydrogen sulphide (H_2S) various oxides of nitrogen (NO_2, NO and NO_X), ozone (O_3), carbon monoxide (CO), total hydrocarbons (THC), and fine or respirable particulate matter 2.5 microns in diameter and smaller ($PM_{2.5}$).

The analyzers used in the program are capable of detecting extremely low level concentrations of compounds. The intensive Quality Assurance and Quality Control (QA/QC) program associated with the monitoring and the data management make it possible to detect subtle changes and trends in data. This allows for assessment of the impacts of various emission-producing operations within the zone.

The configurations of each air quality monitoring station is detailed below in Table 1. The stations' operation efficiency in 2006 are detailed in Table 2.

Parameter	Henry Pirker	Evergreen Park	Smoky Heights	Beaverlodge	Rover (Falher)	Valleyview
Sulphur Dioxide						
Total Reduced Sulphurs						
Nitrogen Dioxide						
Ozone						
Carbon Monoxide						
Total Hydrocarbons						
Fine Particulate						
Hydrogen Sulphide						

Table 1. PASZA Continuous AQM Station Configuration

Parameter	Henry Pirker	Evergreen Park	Smoky Heights	Beaverlodge	Rover (Falher)	Valleyview
Sulphur Dioxide	99.2	93.8	93.0	99.4	94.1	98.8
Total Reduced Sulphurs	99.2	98.0	97.6		94.1	
Nitrogen Dioxide	99.1			98.9		
Ozone	91.9			99.3	94.1	
Carbon Monoxide	99.0					
Total Hydrocarbons	99.4					
Fine Particulate	98.4	97.4	92.1	97.8		
Hydrogen Sulphide						100.0

Table 2. PASZA Continuous AQM Station Operating Efficiency

		ppb	2004	2005	2006
CO	1-hr avg	13,000	0	0	0
	8-hr avg	8,000	0	0	0
H_2S	1-hr avg	10	0	3*	7**
	24-hr avg	3	0	0	1
NO_2	1-hr avg	212	0	0	0
	24-hr avg	106	0	0	0
	annual avg	32	0	0	0
O_3	1-hr avg	82	0	0	0
SO_2	1-hr avg	172	0	0	0
	24-hr avg	57	0	0	0
	annual avg	11	0	0	0

Table 3. PASZA AAAQO Exceedences
* = 3 exceedences based on TRS
** = 3 exceedences based on TRS and 4 exceedences based on H_2S

5.2 Passive Air Quality Monitoring

The PASZA AQM Program uses an extensive network of passive monitors to collect air quality data over a large region (38,500 sq. km.). The resulting database is suitable for the identification of long term air quality trends and assessing spatial variability, a typical approach in making regional-scale air quality assessments. The advantages of the passive samplers used by PASZA are their accuracy, low detectable limits, simple design, ease of use and cost effectiveness.

Passive samplers rely on the principles of permeation and diffusion to physically uptake the specific compound being sampled. This method is an alternative to active sampling or continuous monitoring where an air sample is drawn or forced mechanically into or through a collection device or past a detector.

For 2006, the PASZA Passive Monitoring Network consisted of forty-three permanent stations configured to monitor SO_2, NO_2 and O_3. Passive monitoring is conducted year-round on a 30-day interval. Because of the large area over which the stations are located the sample change-out typically occurs over a two-day period.

Quality assurance procedures include the rotation of duplicate samples through 10% of the sites and the additional analysis of 10% field blanks.

PASZA Site 19 (Wanham) Passive Monitoring Station

5.3 Air Quality Index

The Air Quality Index (AQI) is a system developed to provide the public with a meaningful measure of outdoor air quality that is simple and easy to understand. From the AQI, we can effectively rate air quality Good, Fair, Poor or Very Poor.

The AQI converts concentrations of five major air pollutants to a single numerical value and matching description. A rating of 0-25 indicates Good air quality, 26-50 is Fair, 51-100 is Poor, and more than 100 is Very Poor.

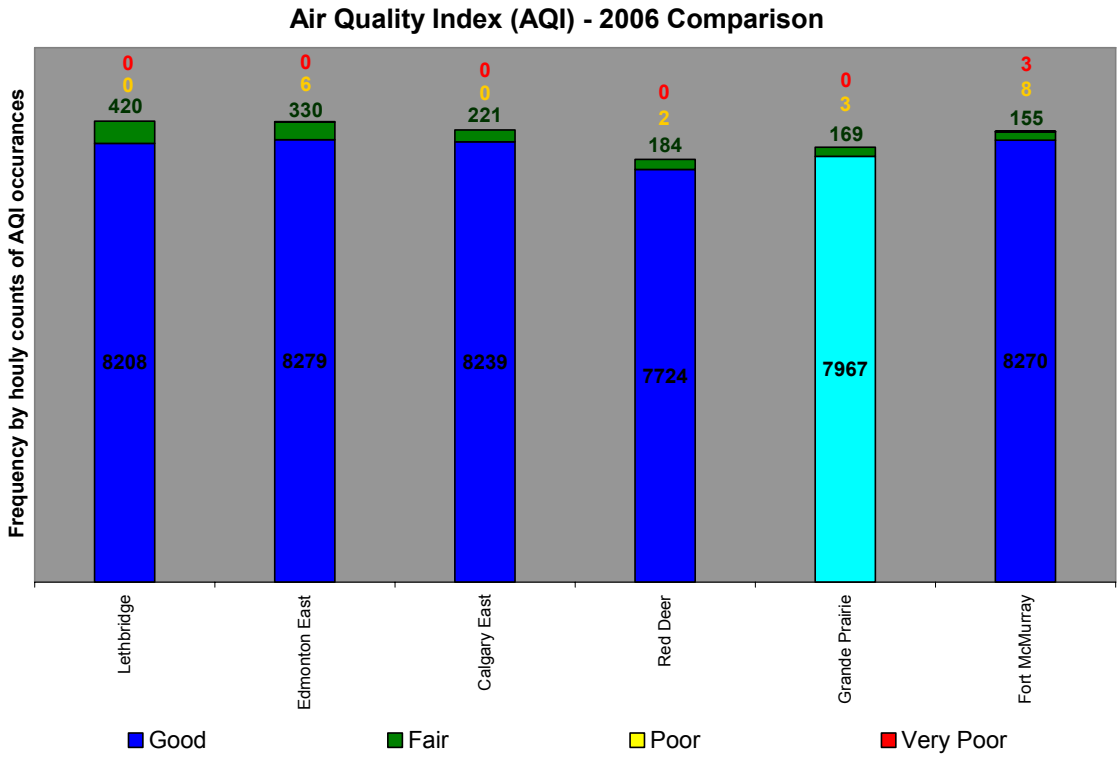
The AQI is based on outdoor concentrations of carbon monoxide, fine particulate matter ($PM_{2.5}$), nitrogen dioxide, ozone and sulphur dioxide. A minimum of four of the above listed pollutants is required to calculate the AQI.

The summary of the 2006 AQI Information for Grande Prairie and other stations located in cities within the province are summarized in the graph below. The Grande Prairie AQI was calculated from data collected at the Henry Pirker Monitoring Station. The station was operational for all of 2006 and the data in the graph is based on a total of 7967 hours where data for four or more pollutants were available.

For 2006, the reported AQI for Grande Prairie was Good 97.9% of the time and Fair 2.1 % of the time. There were no instances of very poor AQIs in 2006, however there were three instances of poor readings. The readings were noted to have occurred during the celebration of the New Year where the use of fireworks triggered elevated particulate matter readings, one of the pollutants used in the calculation of the AQI.

Data collected from the Beaverlodge station is also used to calculate an AQI. In 2006, the AQI was Good 95.9% of the time and Fair 4.1% of the time. The current AQI for both the Henry Pirker and Beaverlodge stations can be viewed on the PASZA website.

With the exception of Red Deer, the percentage of hours with a good AQI in Grande Prairie was slightly less than in other Alberta cities. The difference within the cities is primarily the higher ozone levels observed in Grande Prairie (discussed further in Section 5.5).



5.4 Nitrogen Oxides

Oxides of nitrogen (NO_X), mostly in the form of nitric oxide (NO) and nitrogen dioxide (NO_2), are products of all types of combustion, but are primarily produced by combustion at higher temperatures. For the purposes of air quality monitoring, oxides of nitrogen are considered to be the sum of nitric oxide and nitrogen dioxide. Most oxides of nitrogen are emitted in the form of nitric oxide. Nitric oxide reacts rapidly in the atmosphere through various mechanisms to form nitrogen dioxide. Nitrogen dioxide is a reddish-brown gas with a pungent irritating odour.

Oxides of nitrogen emissions are produced by transportation sources (automobiles, trucks, trains), industrial sources (oil and gas industries) and power generation plants. Other sources of oxides of nitrogen include natural gas combustion (e.g. home heating), heating fuel combustion and forest fires. The largest urban source of oxides of nitrogen is emissions from motor vehicles.

At higher concentrations, nitrogen dioxide is an irritating gas that may constrict the airways of asthmatics and increase the susceptibility to infection in the general population. It is a major component of atmospheric photochemical reactions that lead to smog formation, acid rain and ground level ozone formation and destruction. Exposure of vegetation to high concentrations of oxides of nitrogen results in observable effects such as leaf colouring and impairment of leaf function.

Alberta Environment's Alberta Ambient Air Quality Objective (AAAQO) for nitrogen dioxide, the major nitrogen oxides component of concern in the ambient atmosphere, are:

- 212 ppb averaged over a one-hour period
- 106 ppb averaged over a twenty-four hour period
- 32 ppb as an annual arithmetic mean

No exceedences of the annual average AAAQO (32 ppb) for nitrogen dioxide were observed in Alberta during 2006.

As indicated earlier, within the PASZA air quality monitoring network nitrogen dioxide is monitored continuously at the Henry Pirker and Beaverlodge stations only.

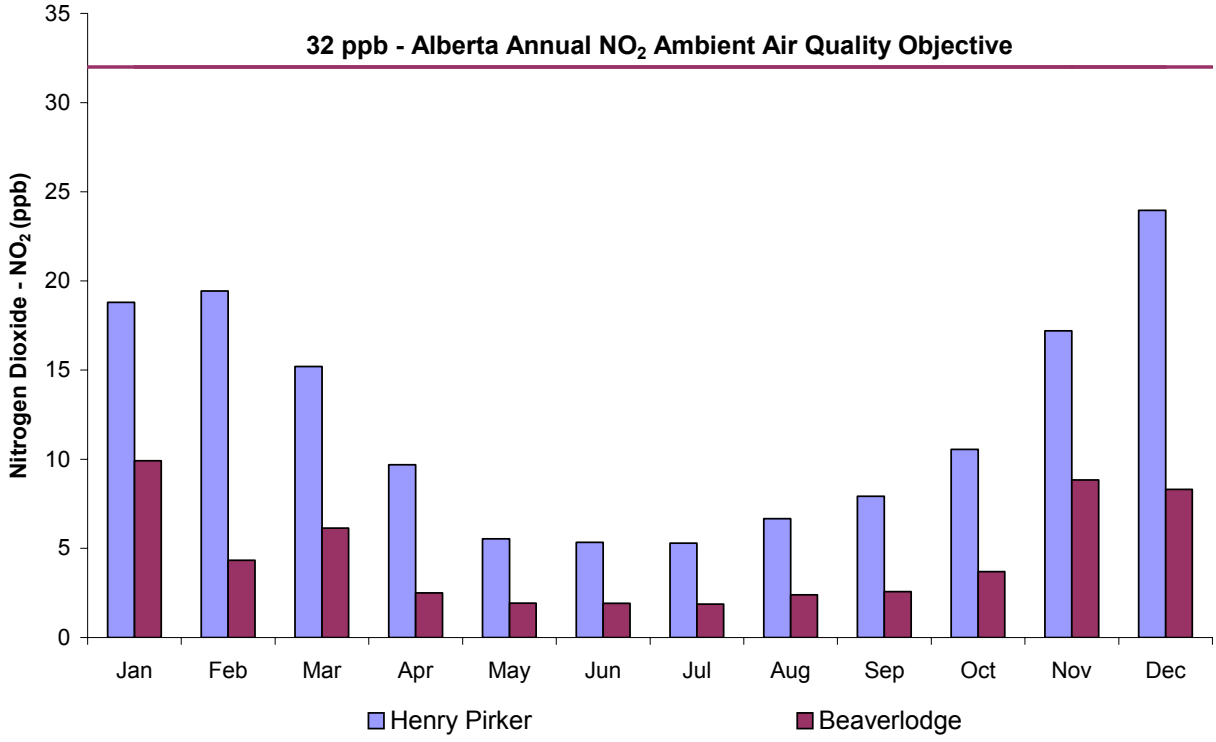
The annual average nitrogen dioxide concentration observed at Grand Prairie's Henry Pirker Station in 2006 was 12.1 ppb. This result is consistent with the size of the population of the City of Grande Prairie when compared with levels in other cities in the province. It is lower than the averages of 21, and 15 ppb observed in the larger cities of Calgary and Edmonton, respectively. The annual average at the Henry Pirker station is higher than the averages of 10, 8 and 6 ppb observed in the cities of Fort McMurray, Medicine Hat and Lethbridge respectively. When compared to these last three stations, the higher annual average observed at the Henry Pirker Station is likely more a function of its proximity to a major roadway (Highway 43) and the associated motor vehicle traffic.

The annual average nitrogen dioxide concentration observed at the Beaverlodge Station in 2006 was 4 ppb. This result is consistent with the station's rural location and its distance away from major motor vehicle traffic.

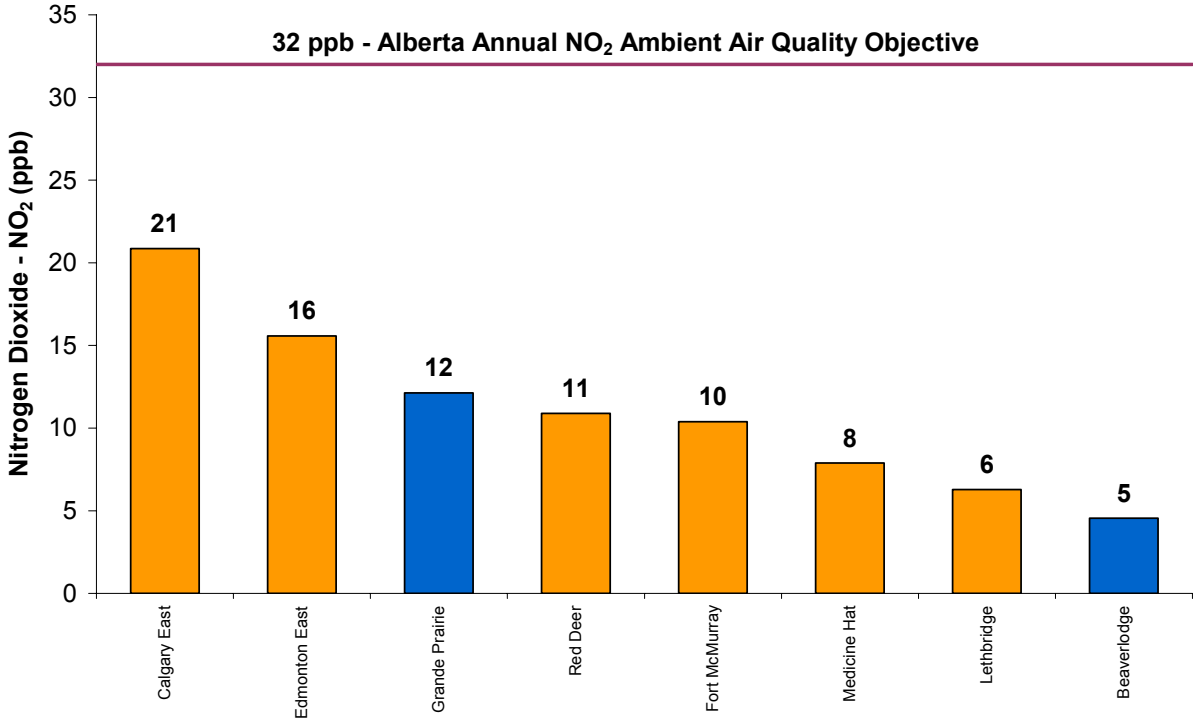
No exceedences of the one-hour average AAAQO for nitrogen dioxide (212 ppb) were observed at the Henry Pirker and Beaverlodge Stations in 2006. The maximum one-hour average nitrogen dioxide concentrations observed at the Henry Pirker Station (58 ppb) and the Beaverlodge Station (28 ppb) were 27% and 13% of the one-hour average AAAQO respectively. These results are both consistent with the two stations' proximities to motor vehicle traffic and occurred when the winds were from directions associated with motor vehicle traffic.

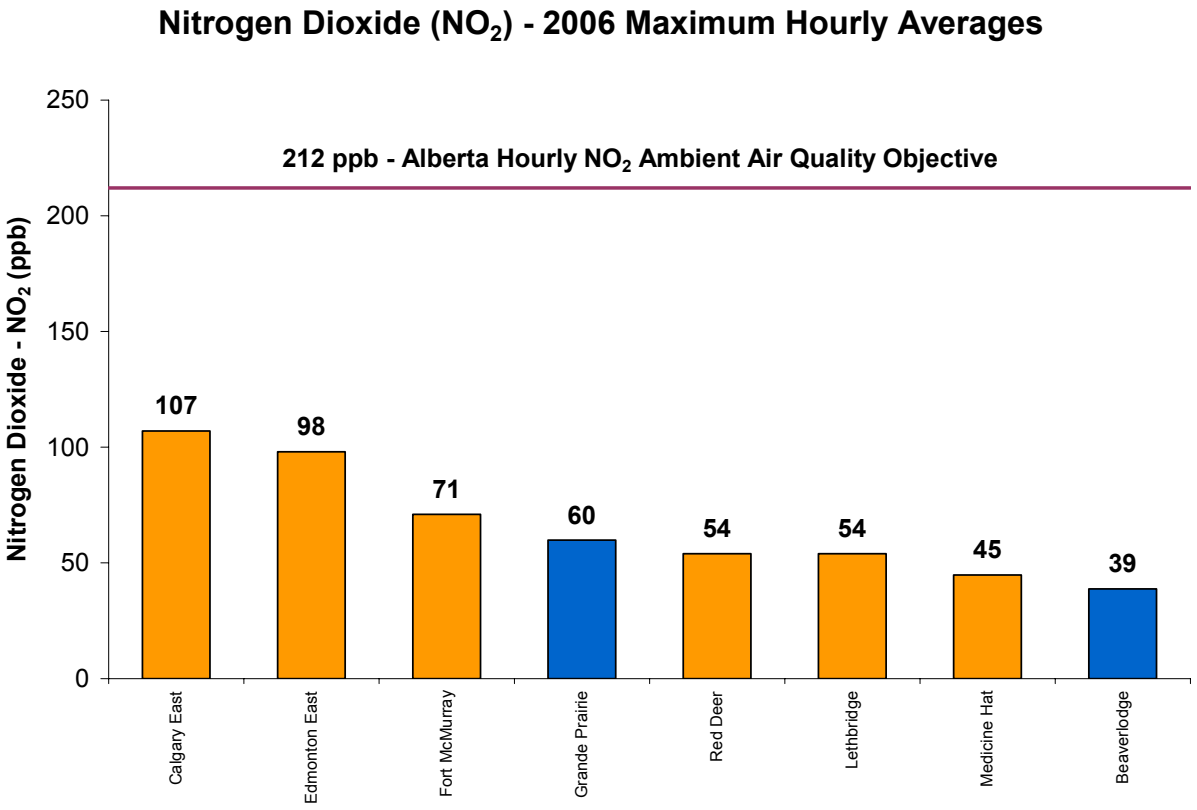
Again, when compared to other stations in Alberta cities, the maximum hourly average results are similar to the annual averages ranking with Grande Prairie near the middle and Beaverlodge the lowest.

PASZA - 2006 Monthly Average Nitrogen Dioxide (NO_2)



Nitrogen Dioxide (NO_2) - 2006 Annual Averages





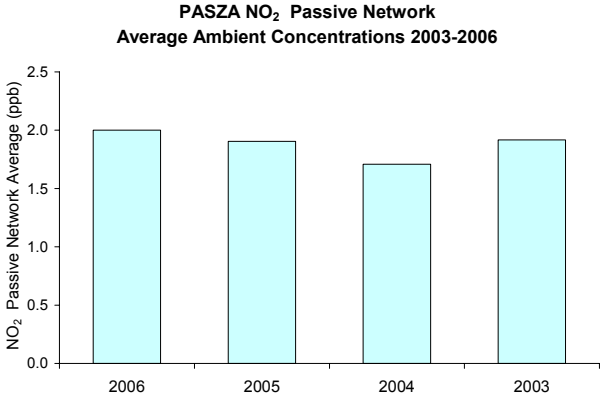
5.4.1 Nitrogen Dioxide (Passives)

The average Nitrogen Dioxide (NO_2) concentration for the entire passive monitoring network for 2006 was 2.0 ppb, which was slightly above the 2005 average of 1.9 ppb. These levels are both significantly below the Alberta Air Quality Annual Average Objective of 32 ppb which is based on the prevention of human health effects.

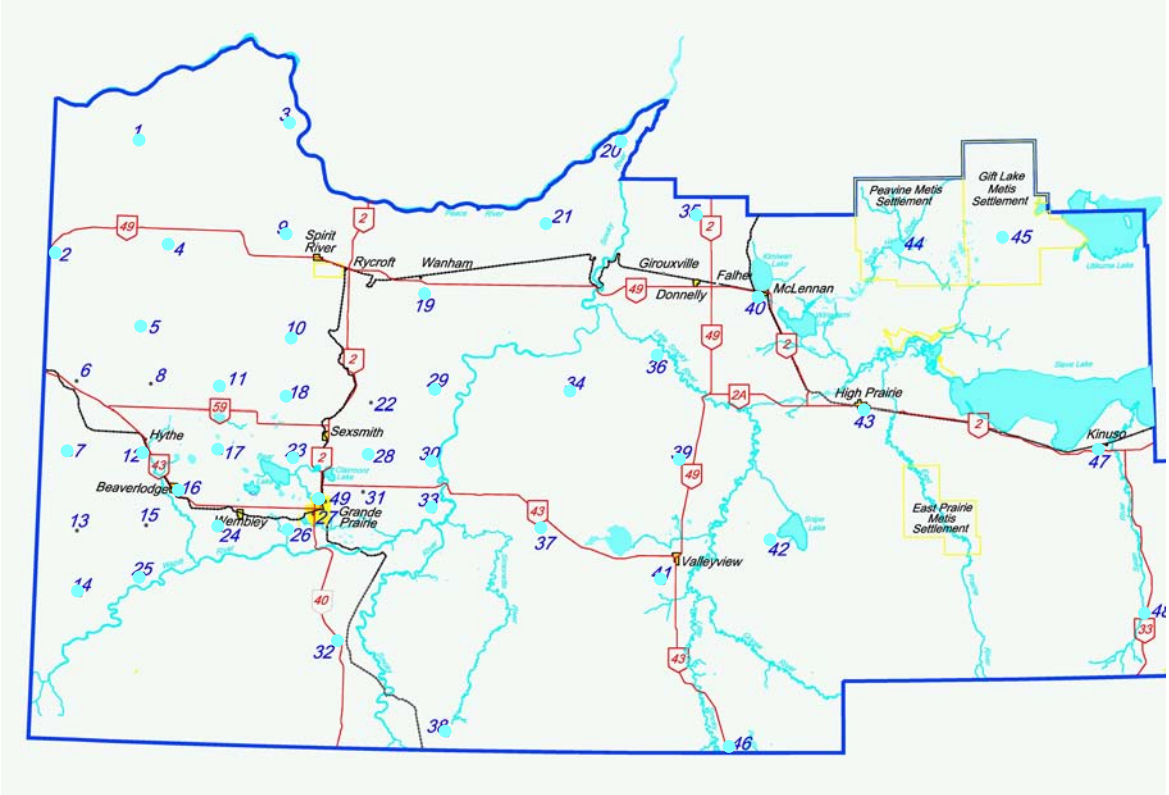
Over the last three years, the monthly average network results have indicated a slight increasing trend reflective of the region's population and industrial growth and the associated increase in the number of motor vehicles.

In 2006, NO_2 levels were generally higher in or around larger population centers and near major highways. Site 49 (Grande Prairie 2) had the highest annual average concentration, measuring 9.6 ppb. The site with the lowest annual average concentration was Site 44 (Peavine) measuring 0.6 ppb. This site is located close to the zone's northeastern boundary, in the Peavine Metis Settlement, a location far away from any major population centre or transportation corridors.

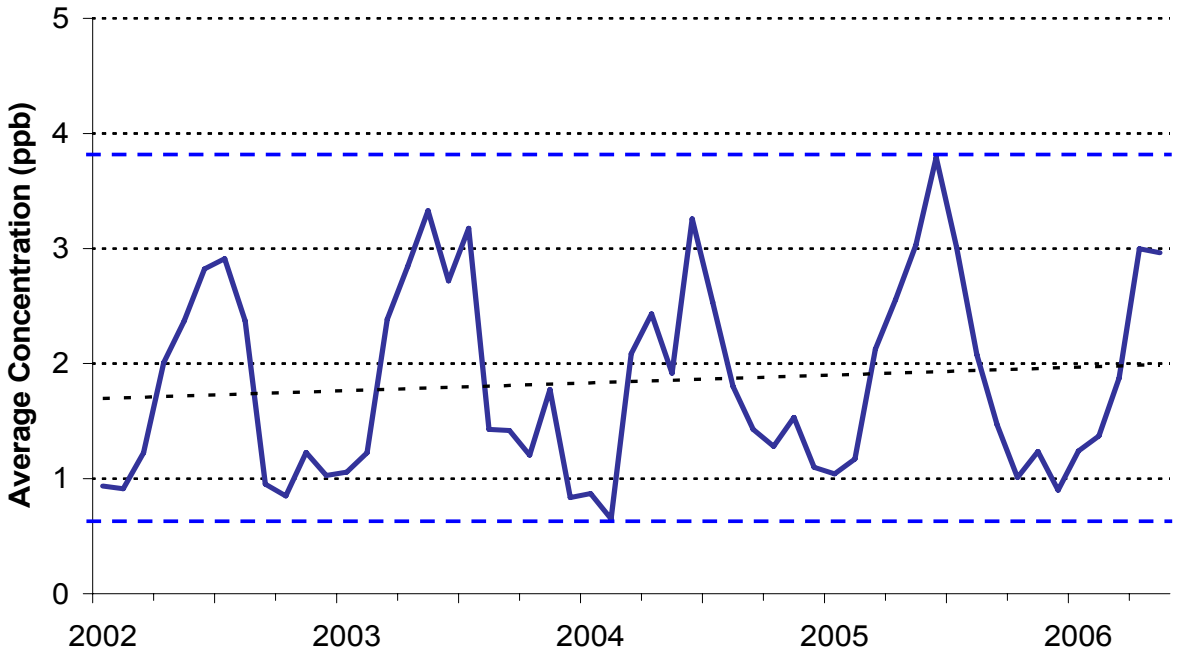
The highest monthly average for the passive NO_2 network was observed during January, one of the colder months during the year, and a time when the amount of thermally-induced mixing of emissions in the atmosphere would be at a minimum. The lowest monthly average was observed in July when there would have been much higher dispersion of NO_2 emissions due to the greater amount of thermal mixing brought about by higher solar radiation levels.

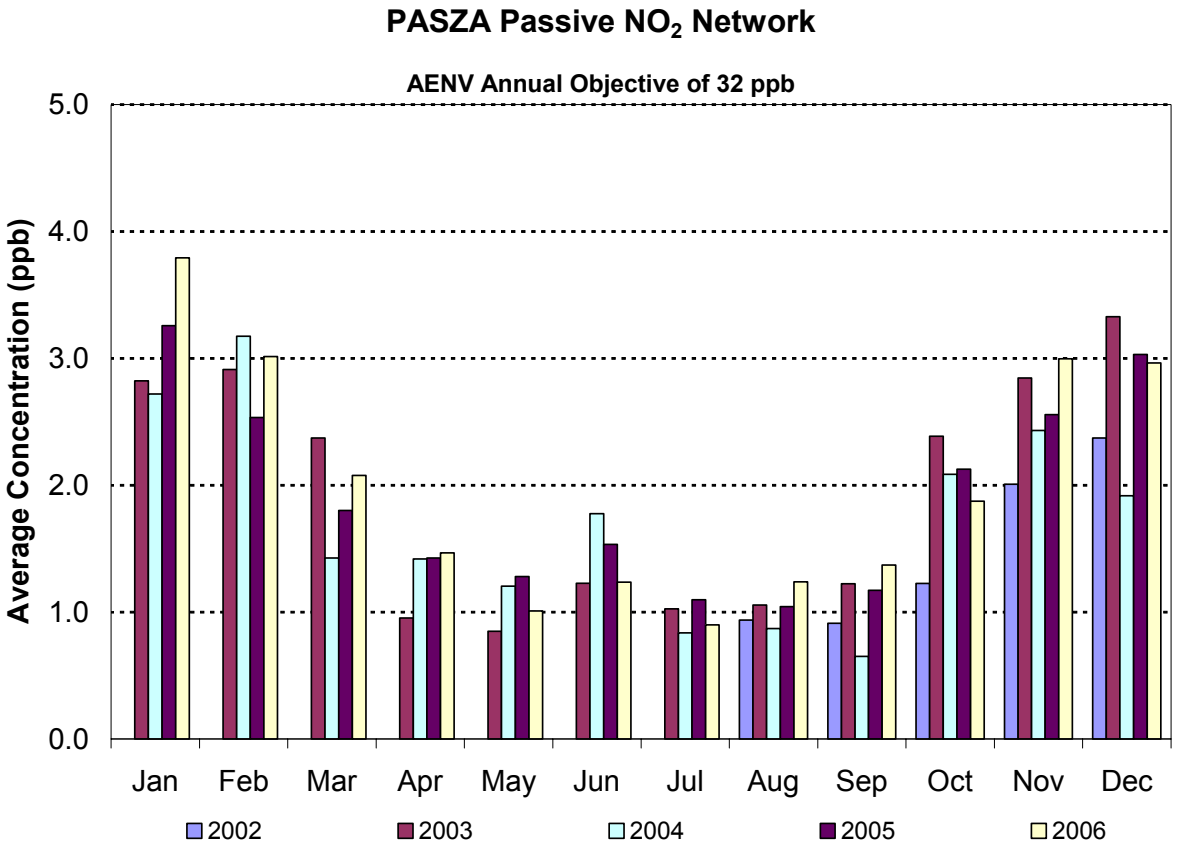


PASZA Passive NO_2 Network
2006 Annual Average Concentrations (ppb)



PASZA Passive NO_2 Network





5.5 Ozone

Ozone (O_3) is a colorless gas that at normal outdoor concentrations is odourless. However, ozone does have a distinctive sharp odour when found at higher concentrations, such as those associated with electrical discharges from lightning storms or photocopiers.

At higher concentrations, ozone's health effects can include reduced lung function; aggravated existing respiratory illness; and irritated eyes, nose, and throat as it is a strong oxidizer. High concentrations can reduce crop yields. Chronic exposure can cause permanent damage to the alveoli of the lungs.

The ozone layer in the upper atmosphere (stratosphere) absorbs UV radiation and creates a warm layer of air in the stratosphere. The ozone layer is, therefore, responsible for the thermal structure of the stratosphere. Stratospheric ozone shields the Earth against harmful rays from the sun, particularly ultraviolet B radiation. Ozone that is present at ground level (troposphere) is a pollutant, as it is involved with oxides of nitrogen in the photochemical production of many of the constituents of air pollution. It is also a primary constituent of smog.

Globally, ground-level ozone is mostly anthropogenic. However ozone is different from other pollutants in that it is not emitted directly into the air. It is a "secondary" pollutant because it is produced when two "primary" precursor pollutants, nitrogen oxides and volatile organic compounds (VOCs), react in the presence of heat and sunlight under stagnant meteorological conditions. VOCs are emitted from a variety of sources, including motor vehicles, chemical plants, refineries, factories, consumer and commercial products, other industrial sources and forests. Ozone and the precursor pollutants that cause ozone can also be transported into an area from pollution sources, such as urban centers and industrial complexes, that are located hundreds of kilometers upwind. A major source of VOCs in rural areas is natural emissions from trees and vegetation.

Ozone can be destroyed through reactions with nitric oxide. In Alberta, ozone concentrations are generally lower at urban locations than at rural locations, most likely because of the destruction of ozone by nitric oxide emitted by motor vehicles. In Alberta, maximum

ozone values are generally recorded during the late spring and early summer when ozone production in the lower atmosphere is at a maximum due to a peak in incoming sunlight. At other times of the year, high daily average ozone values may be influenced by various dynamic atmospheric processes such as tropopause folding and episodes of stratospheric ozone intrusion.

A Canada Wide Standard for ozone has been issued. It is 65 ppb based on an 8-hour running average. Achievement of the standard will be based on averaging the annual 4th highest daily 8-hour average ozone value over 3 consecutive years. The AAAQO for ozone based on the prevention of adverse effects to human health and vegetation is:

- 82 ppb averaged over a one-hour period

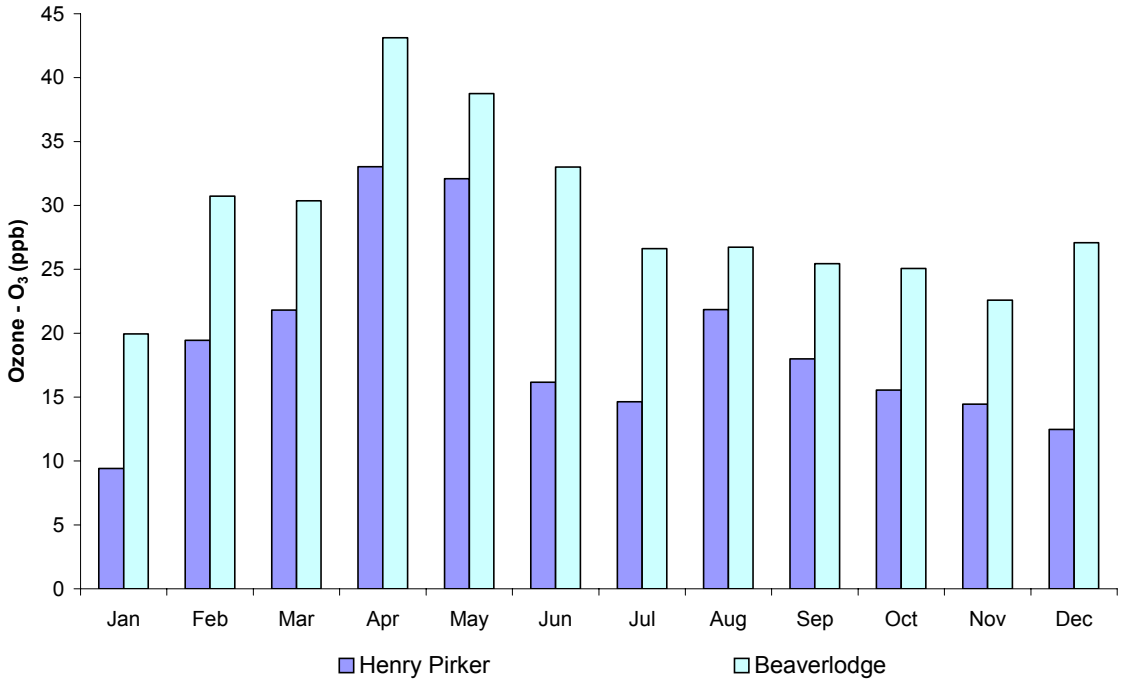
In the PASZA air quality monitoring network, ozone is monitored continuously at the Henry Pirker, Beaverlodge, and Rover station. The Rover station was commissioned in August of 2006 and began data collection in September. The annual averages for the Falher Rover station therefore do not entirely reflect the seasonal relationships observed with this parameter throughout a full 12 month year. However, the readings observed at this site are reflective of the rural nature of the location and trends well with rural historical data in this regard.

The annual average ozone concentrations observed in Beaverlodge, Falher and Grande Prairie in 2006 were 30, 29, and 20 ppb respectively. These values are consistent with, and typical of, the values observed at other rural and urban locations where continuous ozone monitoring is conducted in Alberta. Ozone levels at Beaverlodge and Falher, rural stations, are generally higher than those observed at Henry Pirker, an urban station, as evidenced by the graph at the top of the opposite page.

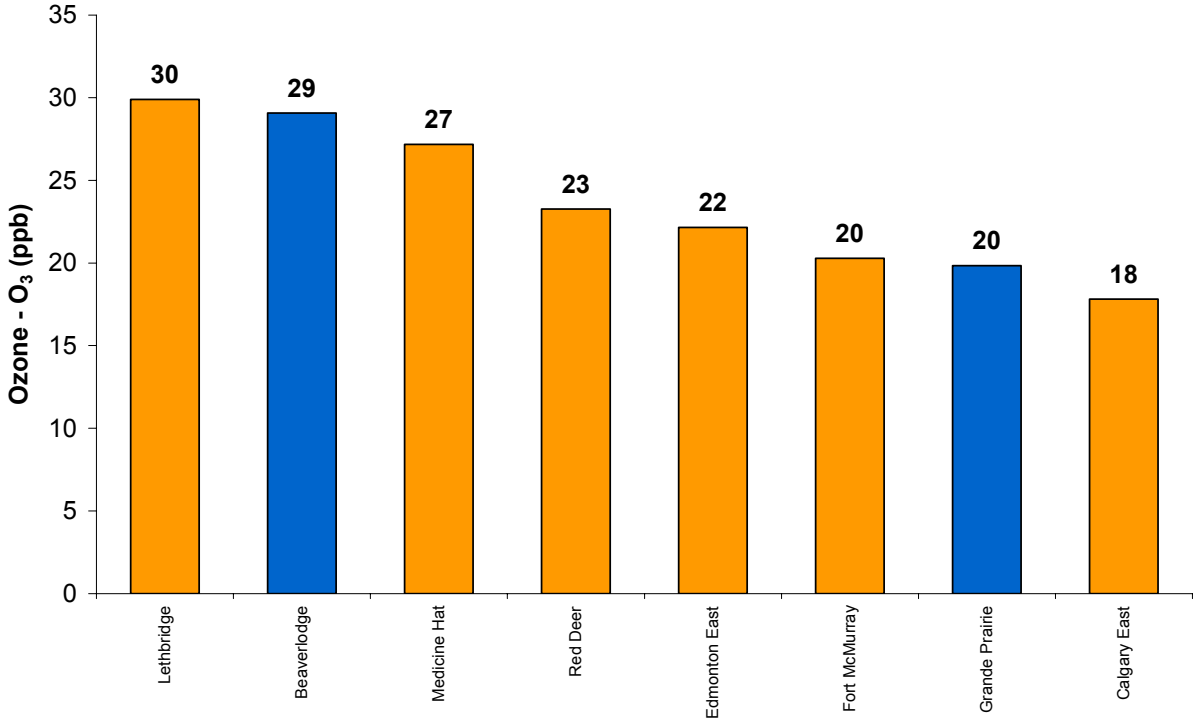
In general, the larger the city, the larger its volumes of traffic and their associated emissions of nitric oxide. Nitric oxide reacts with ozone and thus limits ozone levels. In general, the larger the city, the lower the annual average ozone level as evidenced by the graph in the middle of the opposite page.

As in 2005, there were no exceedences of the one-hour average O_3 AAAQO observed at Beaverlodge, Falher, or Grande Prairie during 2006. The maximum one-hour average ozone concentration observed at the Beaverlodge and Grande Prairie were the 66 and 59 ppb readings observed during the late afternoon of May 15 with moderate east and west winds respectively. The Falher station had a maximum one-hour average reading of 64 ppb occurring the afternoon of September 4. Weather conditions for this day were stagnant with moderate southeast winds.

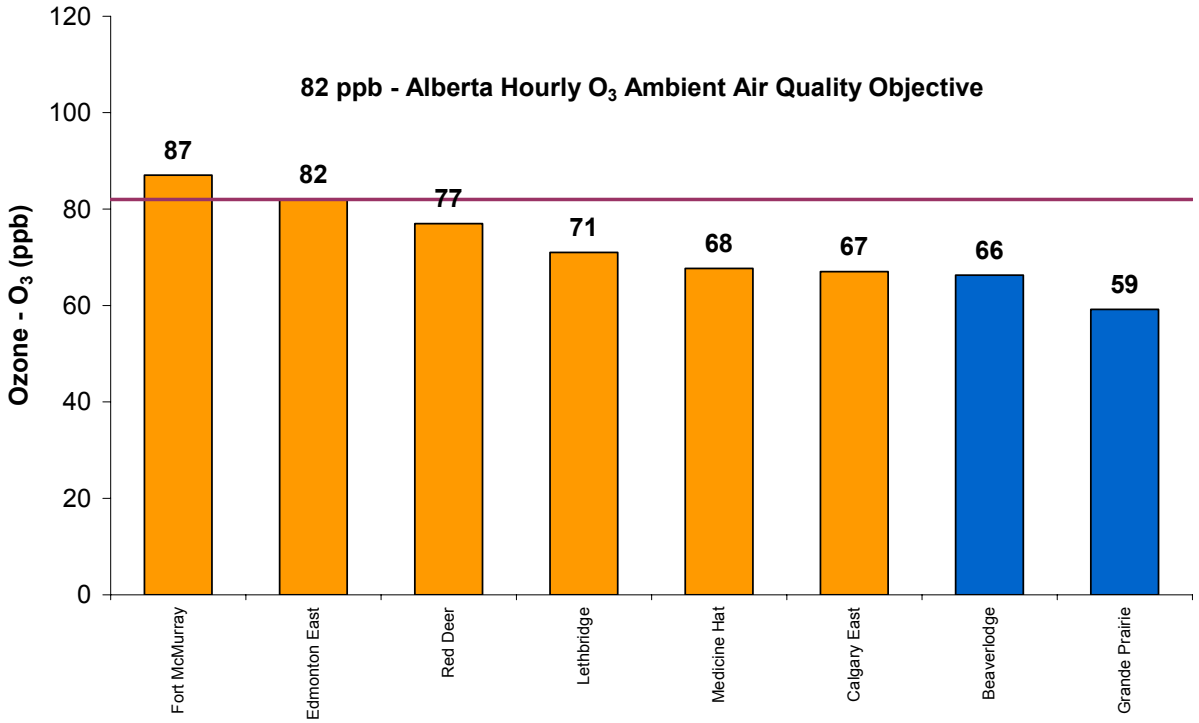
PASZA - 2006 Monthly Average Ozone (O_3)



Ozone (O_3) - 2006 Annual Averages



Ozone (O_3) - 2006 Maximum Hourly Averages

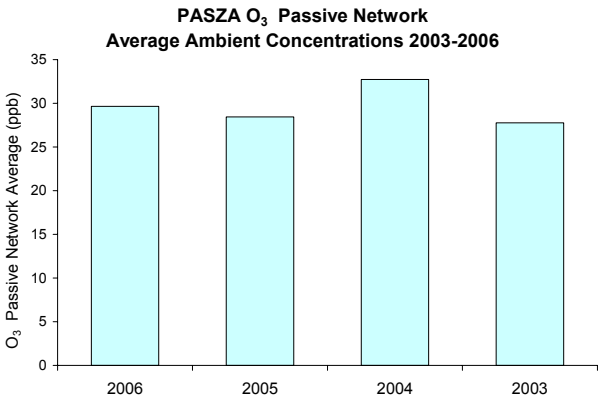


5.5.1 Ozone (Passives)

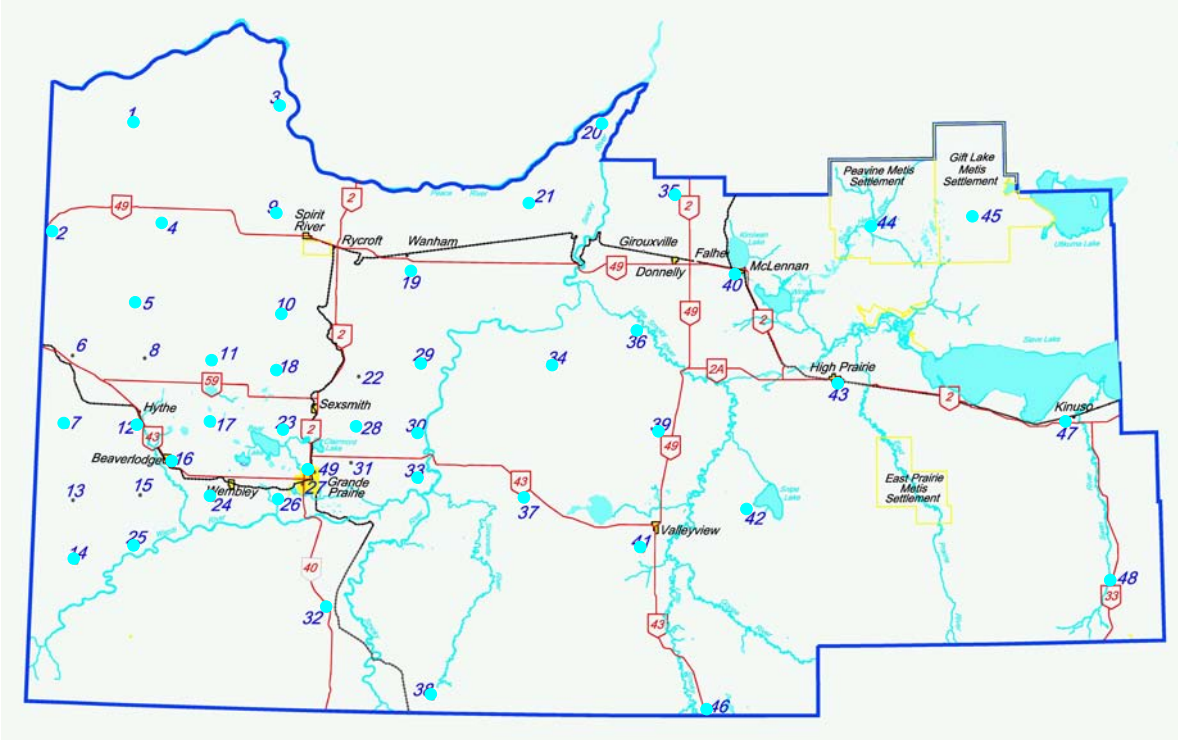
The average ozone (O_3) concentration for the entire passive monitoring network during 2006 was 29.7 ppb, 4 % higher than the 2005 average of 28.4 ppb. The higher average is because of the higher spring and summer temperatures and solar radiation levels than in the previous year. There is no Alberta Air Quality Annual Average Objective for ozone, only the hourly average objective.

In general, O_3 levels were relatively homogenous throughout the rural areas of the zone and significantly lower in or around larger population centers and near major highways. The lower levels at these sites are consistent with the reaction of ozone with NO_X emissions from motor vehicle traffic. Site 42 (Sunset House) had the highest average concentration, measuring 36.7 ppb. The site with the lowest average concentration was Site 32 (Gold Creek) measuring 21.8 ppb. This site is located near the zone's southern boundary in a location downwind of Grande Prairie in the vicinity of a major highway, Highway 40.

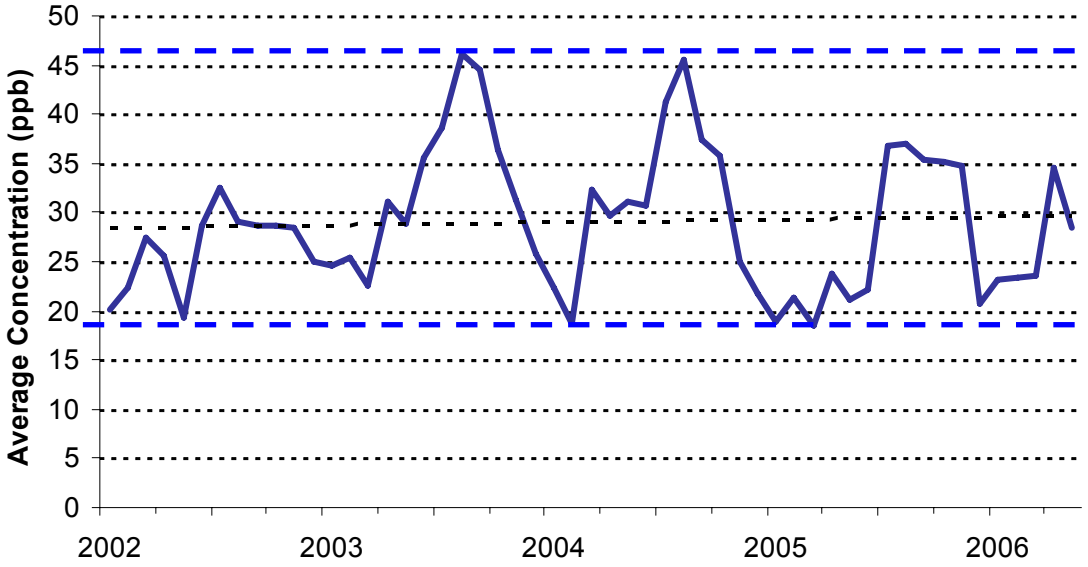
In general, ambient O_3 concentrations observed in or downwind of the more populated regions of the zone indicated seasonal variations typical of anthropogenic ozone formation, with the highest values observed in the late spring. Concentrations observed in the less-populated areas indicated levels and seasonal variations that may be more attributable to naturally-occurring meteorological phenomena.



PASZA Passive O_3 Network
2006 Annual Average Concentrations (ppb)

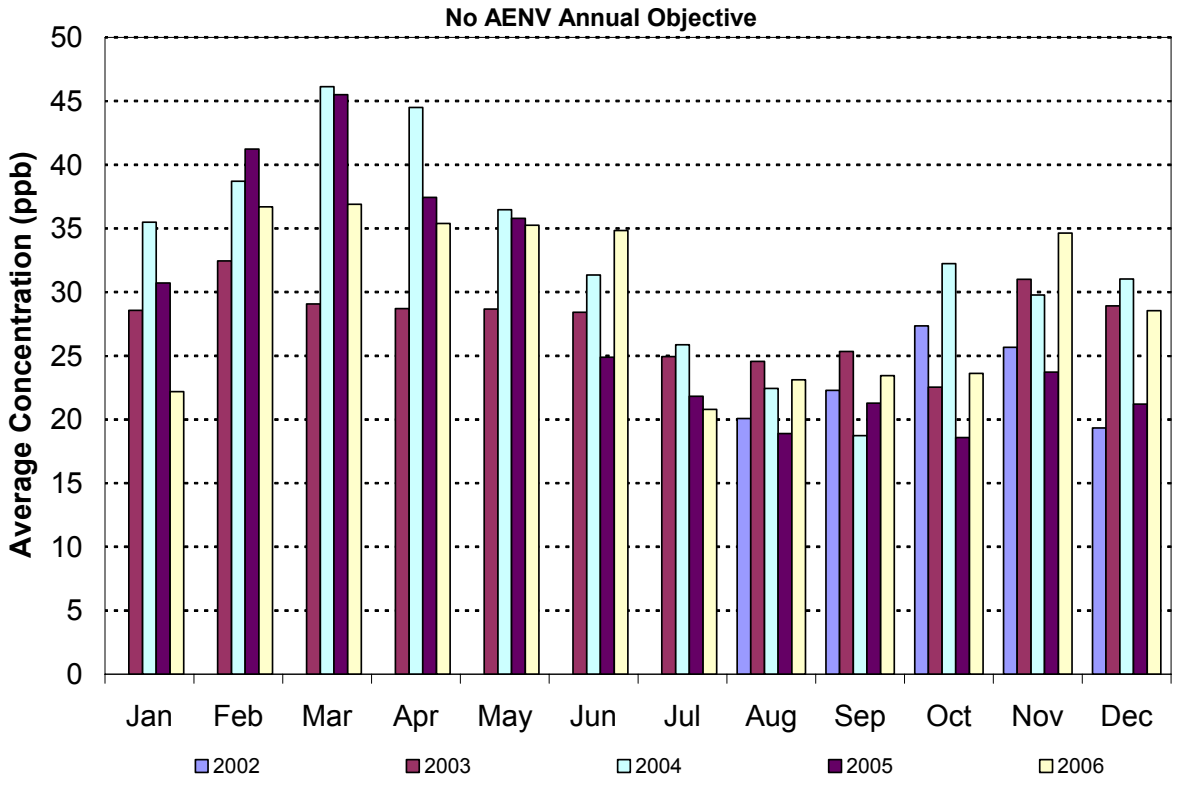


PASZA Passive O_3 Network



PASZA Passive O_3 Network

No AENV Annual Objective



5.6 Sulphur Dioxide

Sulphur dioxide (SO_2) is a colorless gas with a strong, suffocating odour. It can be detected by taste and odour at concentrations as low as 300 ppb. Short-term (acute) exposures to high concentrations of sulphur dioxide can trigger constriction of the airways, causing particular difficulties for asthmatics. Children can experience increased respiratory tract infections and healthy people may experience sore throats, coughing, and breathing difficulties. Sensitive vegetation may be injured by exposure to high concentrations of sulphur dioxide. Long-term (chronic) exposure has been associated with increased risk of mortality from respiratory or cardiovascular disease.

Sulphur dioxide is formed during the processing and combustion of fossil fuels that contain sulphur such as gasoline, natural gas, oil, coal and oil sands. Volcanic eruptions provide a natural source of sulphur dioxide in the atmosphere. The sources of sulphur dioxide in the Peace Airshed Zone are incinerator stacks at sour gas processing plants, oil and gas battery and well flares, pulp and paper mills and vehicle exhausts. Elsewhere in the province heavy oil and oil sands facilities, coal-fired power generation plants, and fertilizer plants are major sources.

Sulphur dioxide is emitted directly into the atmosphere where it can persist for days, allowing for wide distribution of the gas. In the atmosphere, some sulfur dioxide can be oxidized by ozone and hydrogen peroxide to form sulfur trioxide. Both sulfur trioxide and sulfur dioxide are soluble in water and if they are present in the atmosphere when condensation occurs, droplets of sulfuric acid (acid rain) are formed.

The Alberta Ambient Air Quality Objectives (AAAQO) for sulphur dioxide are:

- 172 ppb averaged over a one-hour period
- 57 ppb averaged over a twenty-four hour period
- 11 ppb as an annual arithmetic mean

As indicated earlier, within the PASZA air quality monitoring network sulphur dioxide is monitored continuously at the Henry Pirker, Beaverlodge, Evergreen Park, Rover Station (in Falher), Valleyview, and Smoky Heights stations.

In 2006, as in 2005, all of the annual sulphur dioxide concentrations observed by the PASZA air quality monitoring network's continuous stations were well below the annual average AAAQO of 11 ppb. The annual average concentration observed at the Evergreen Park Station was 1.5 ppb. This station is located near Grande Prairie's southeastern limits, between the city and a large local pulp mill to the southeast. It is subject to the emissions from sources associated with both. The annual average concentration observed at the Henry Pirker station located in the city's northwest and subject to emissions associated with both highway and city vehicle traffic was 0.6 ppb. Both the Beaverlodge and Smoky Heights Stations are located in regions with local oil and gas production sources and had annual average concentrations of 0.6 and 0.5 ppb, respectively. All of these annual averages are significantly below the averages observed in Calgary and Edmonton and similar to those observed in Red Deer and Lethbridge.

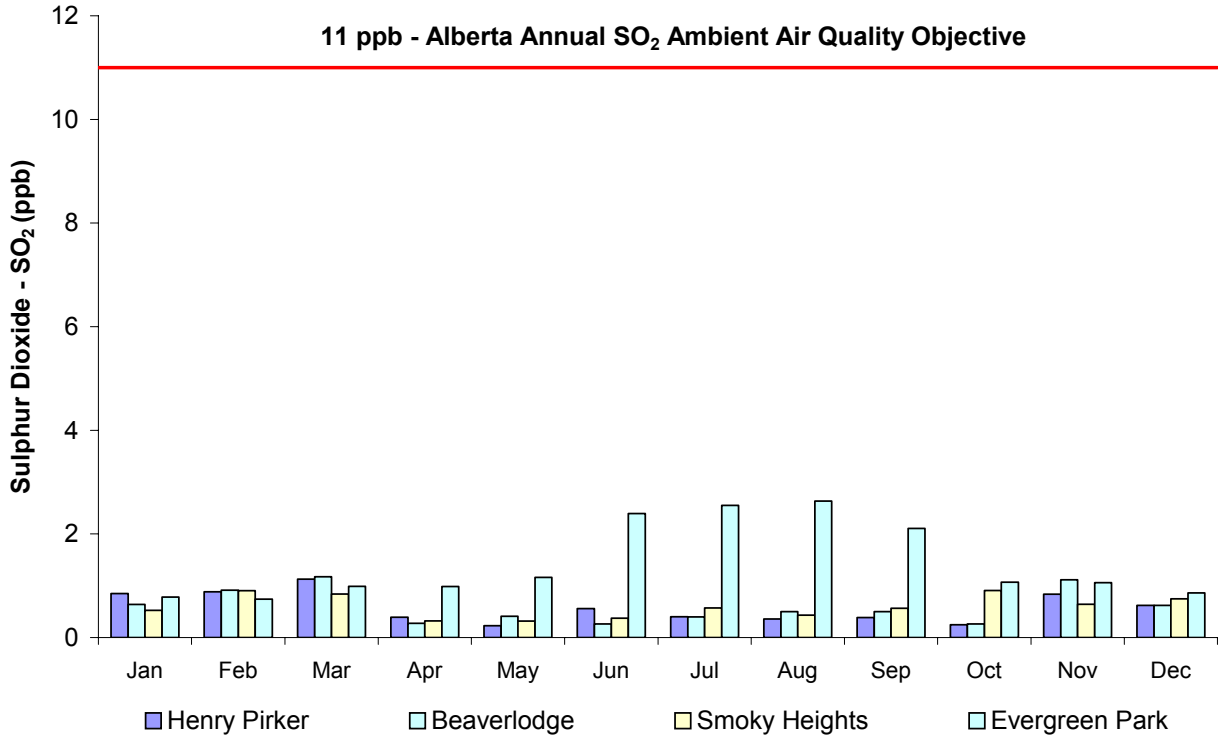
No exceedences of the one-hour average AAAQO for sulphur dioxide (172 ppb) were observed at any of the PASZA network's continuous stations in 2006. The maximum one-hour average sulphur dioxide concentrations observed at the Evergreen Park Station (106 ppb) and Beaverlodge (22 ppb) were 62% and 13% of the one-hour average AAAQO respectively. The maximum one-hour averages observed at the Henry Pirker Station (18 ppb) and the Smoky Heights Station (15 ppb) were 10% and 9% of the one-hour average AAAQO respectively.

The hourly maximum average concentration of 106 ppb observed at the Evergreen Park Station occurred during the afternoon of September 23 with strong southwesterly winds. The hourly maximum of 22 ppb observed at the Beaverlodge Station occurred during the morning of August 12 with light west winds. The hourly maximum of 18 ppb observed at the Henry Pirker Station occurred during the morning of June 25 with light southwest winds. The hourly maximum of 15 ppb observed at the Smoky Heights Station occurred during the evening of March 7 with moderate west winds.

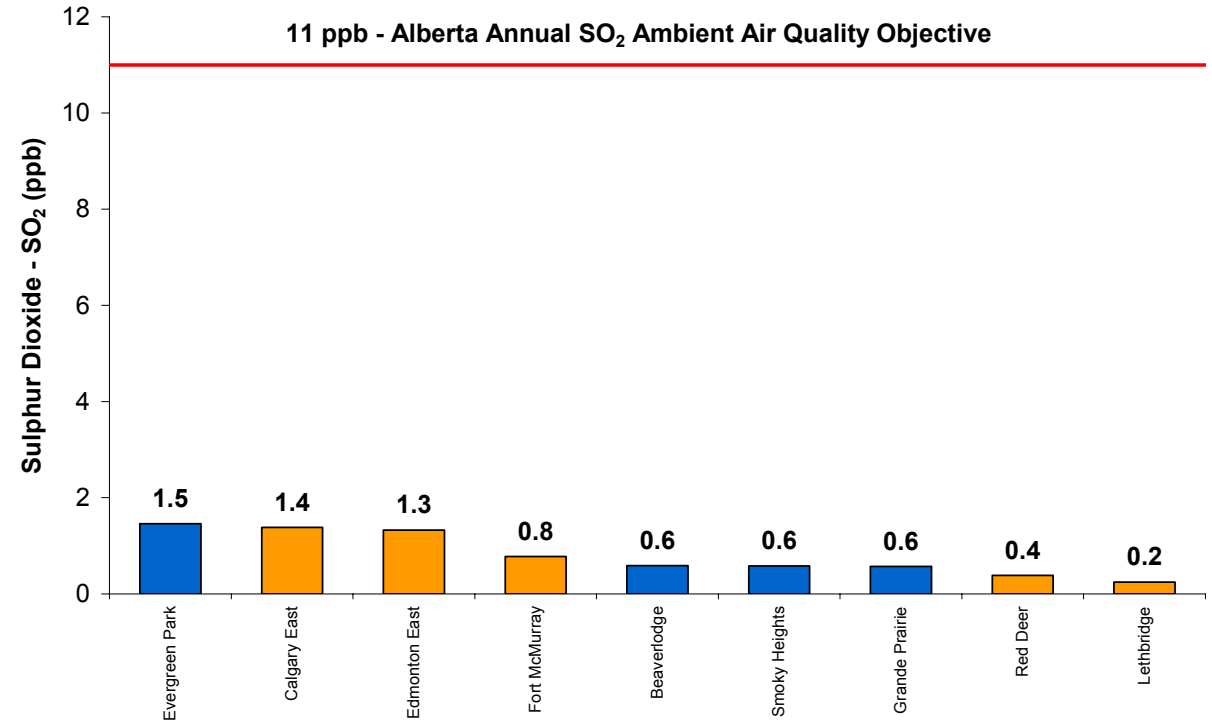
The Valleyview Station was commissioned in September, therefore only 3 months of ambient data are available for 2006. The 3-month average was 0 ppb for the Valleyview Station. The maximum 1-hour concentration of 20 was observed on October 1st in the early morning with moderate wind speeds; the predominant wind direction from the north northwest.

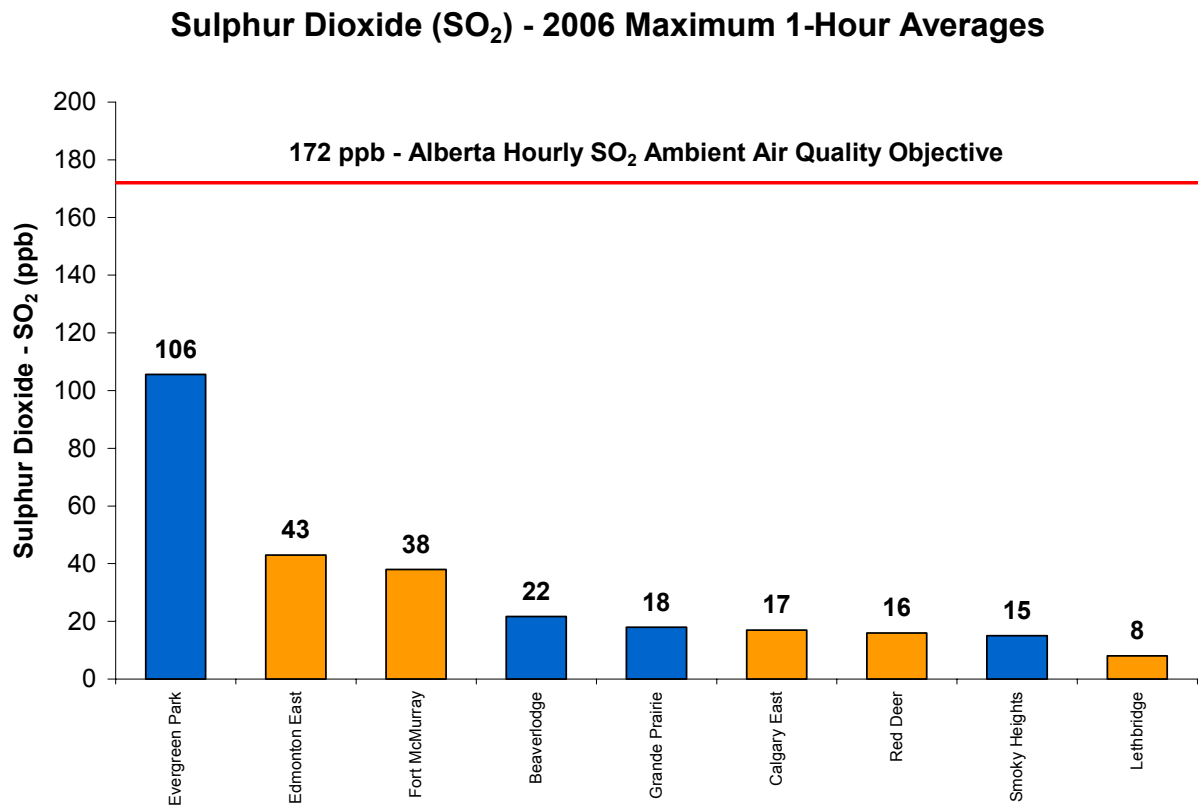
Similarly, the Rover Station (in Falher) was commissioned in August and therefore only 4 months of ambient data are available for that station for 2006. The 4-month average was 0 ppb. The maximum 1-hour concentration of 4 ppb was observed on September 4th in the afternoon with moderate wind speeds from the southeast.

PASZA - 2006 Monthly Average Sulphur Dioxide (SO_2)



Sulphur Dioxide (SO_2) - 2006 Annual Averages



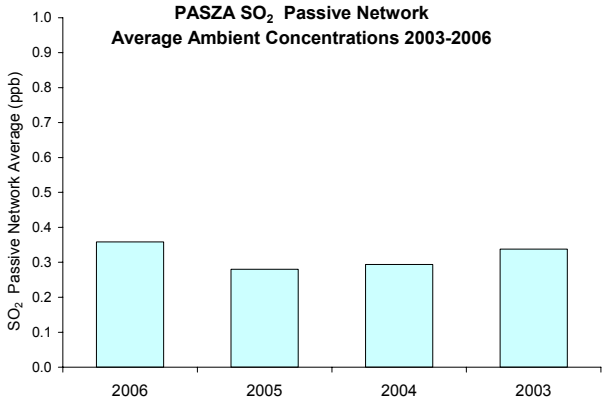


5.6.1 Sulphur Dioxide (Passives)

The average Sulphur Dioxide (SO_2) concentration for the passive monitoring network for 2006 was 0.4 ppb, slightly higher than the 2005 average of 0.3 ppb. Both these levels are significantly below the AAAQO of 11 ppb which is based on the prevention of effects to vegetation.

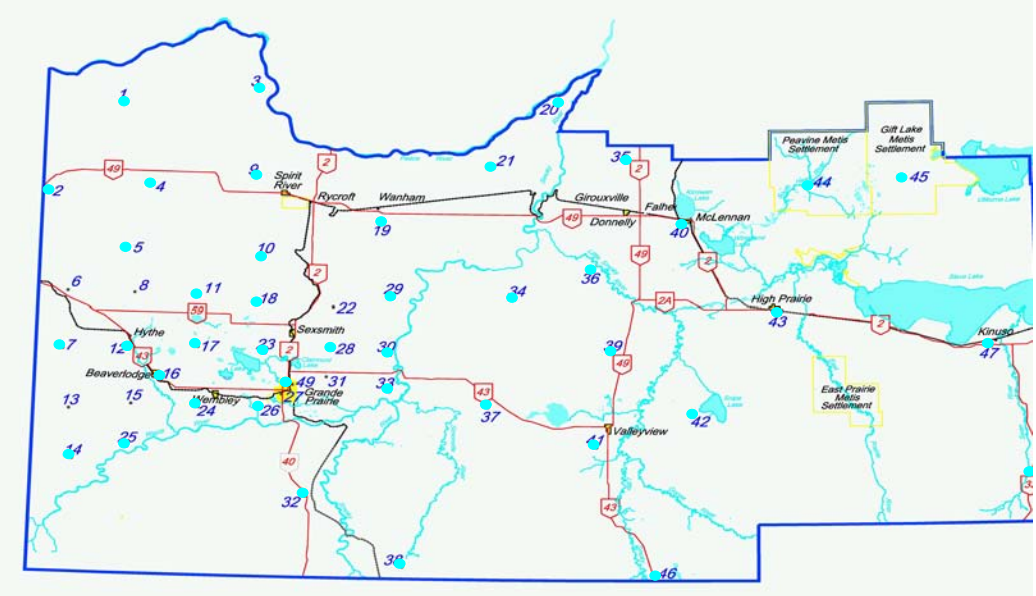
In the last three years, prior to 2006, the monthly average network results have indicated a slight decreasing trend which may be reflective of flaring volume reductions achieved in the region during the same period. Regionally, oil and gas activity has been increasing which may explain the slight increase in the 2006 year. It is important to note that the increase is very slight, however, and well below the Alberta Air Quality Annual Average Objective of 11 ppb.

In general, SO_2 levels were higher in or near areas with sour gas or pulp and paper production facilities as was the case for Site 41 (Valleyview) which had the highest annual average concentration for the period, measuring 0.55 ppb. This trend was expected and is consistent with that observed in other Alberta Airsheds. The site with the lowest annual average concentration was Site 45 (Gift Lake) measuring 0.18 ppb. This site is situated in the northeastern portion of zone in a location removed from the influences of the majority of sour gas or pulp and paper production facilities.

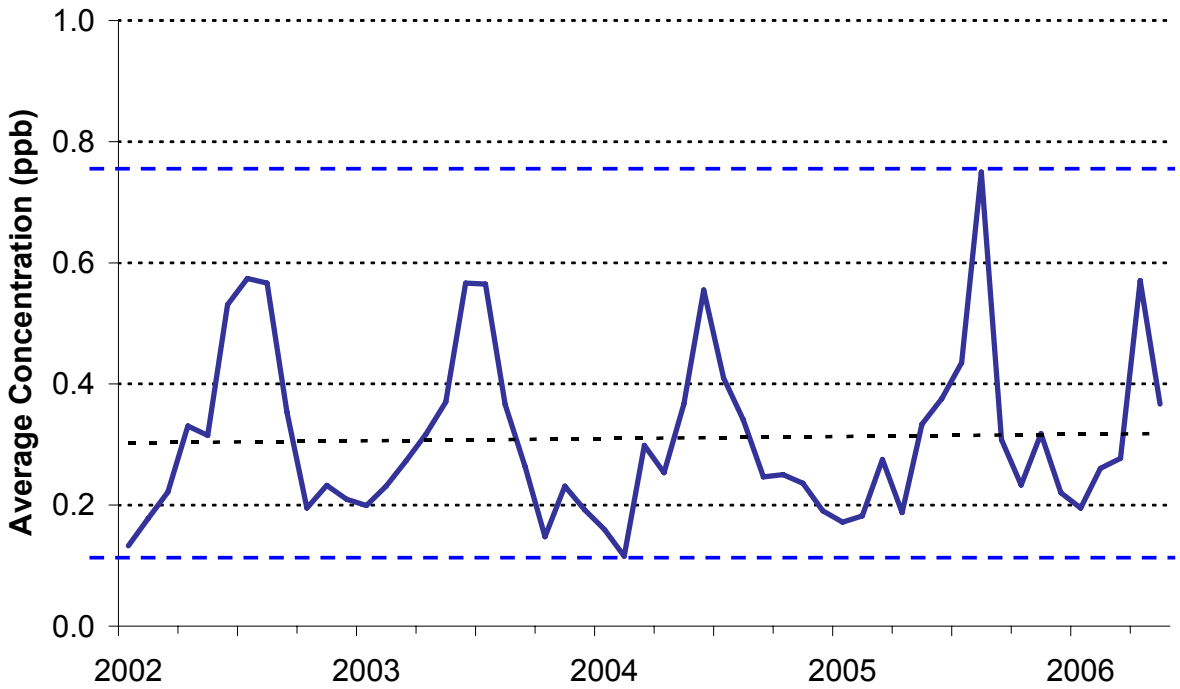


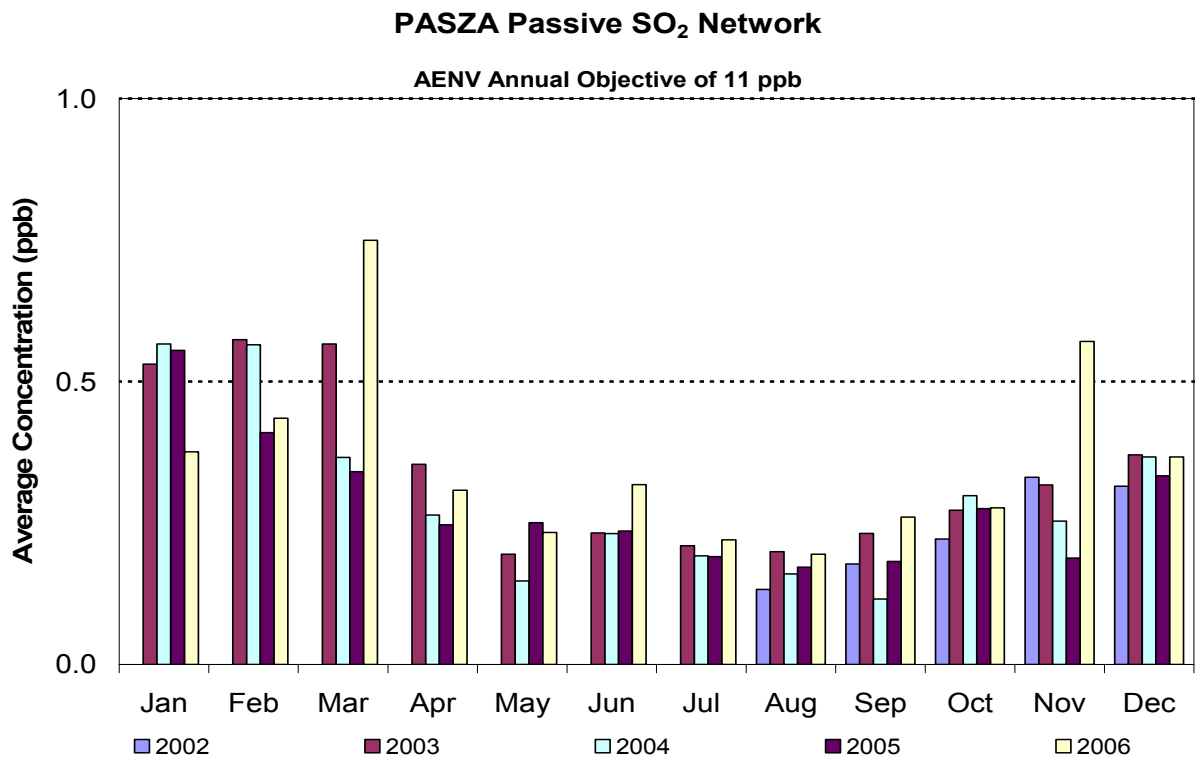
Ambient SO_2 concentrations observed throughout the zone displayed predictable seasonal variations similar to the NO_2 results and for the same reasons. The highest monthly average for the passive SO_2 network was observed during the colder months of 2006 while the lowest monthly average was observed in August, similar to the trend observed for the NO_2 passives.

PASZA Passive SO_2 Network
2006 Annual Average Concentrations (ppb)



PASZA Passive SO_2 Network





5.7 Total Reduced Sulphurs

The term "total reduced sulphur compounds" (TRS) is used to describe hydrogen sulphide, mercaptans and other reduced sulphur compounds such as carbonyl sulphide (COS) and carbon disulphide (CS_2). All of these compounds have characteristic unpleasant odours that are detectable by people at very low concentrations.

A major component of the TRS observed by the PASZA continuous monitors is hydrogen sulphide. The decomposition of organic matter by bacteria under anaerobic conditions (no oxygen) produces hydrogen sulphide. Natural sources of hydrogen sulphide include sulphur hot springs, sloughs, swamps, muskegs and lakes. Hydrogen sulphide is also produced by chemical reactions within the deeply buried sedimentary rocks found in the foothills of the Canadian Rockies. "Sour" gas is natural gas containing hydrogen sulphide. Industrial sources of hydrogen sulphide include fugitive emissions from sour gas processing plants, sulphur pouring and re-melting operations, flaring, petroleum refineries, tank farms, oil sands facilities, sewage and manure treatment facilities, pulp and paper plants which use the kraft pulping process and various intensive livestock operations.

Hydrogen sulphide (H_2S) is a colourless gas with a rotten egg odour. While most people can smell hydrogen sulphide at approximately 10 ppb, there are some sensitive individuals who can detect it at concentrations as low as 0.5 ppb. Hydrogen sulphide is heavier than air and is generally emitted at lower temperatures, so it does not disperse rapidly when stagnant meteorological conditions are present and may linger in low-lying areas such as valleys.

At concentrations of 1,000-5,000 ppb, H_2S causes a moderate to strong offensive odour and people may experience nausea, tearing of the eyes, headaches or loss of sleep following prolonged exposure. By 10,000 ppb, the symptoms may increase or persist with lung irritation and damage to eyes occurring at levels of 20,000 ppb. The maximum hourly ambient concentrations of total reduced sulphur (including hydrogen sulphide) observed in the PASZA air quality monitoring network in 2005 (30 ppb) was far below these levels.

The sources of the other reduced sulphur compounds are treatment lagoons associated with kraft paper mills, incomplete combustion in sour gas flares and fugitive emissions from pipelines (mercaptans are used as an odorant in natural gas).
While there are currently no AAAQO for TRS in general, there are guidelines for H_2S specifically and these are being used by PASZA for reporting TRS. The AAAQO for hydrogen sulphide is based on an odour threshold of 10 ppb. The guidelines for hydrogen sulphide are:

- 10 ppb averaged over a one-hour period
- 3 ppb average over a twenty-four hour period

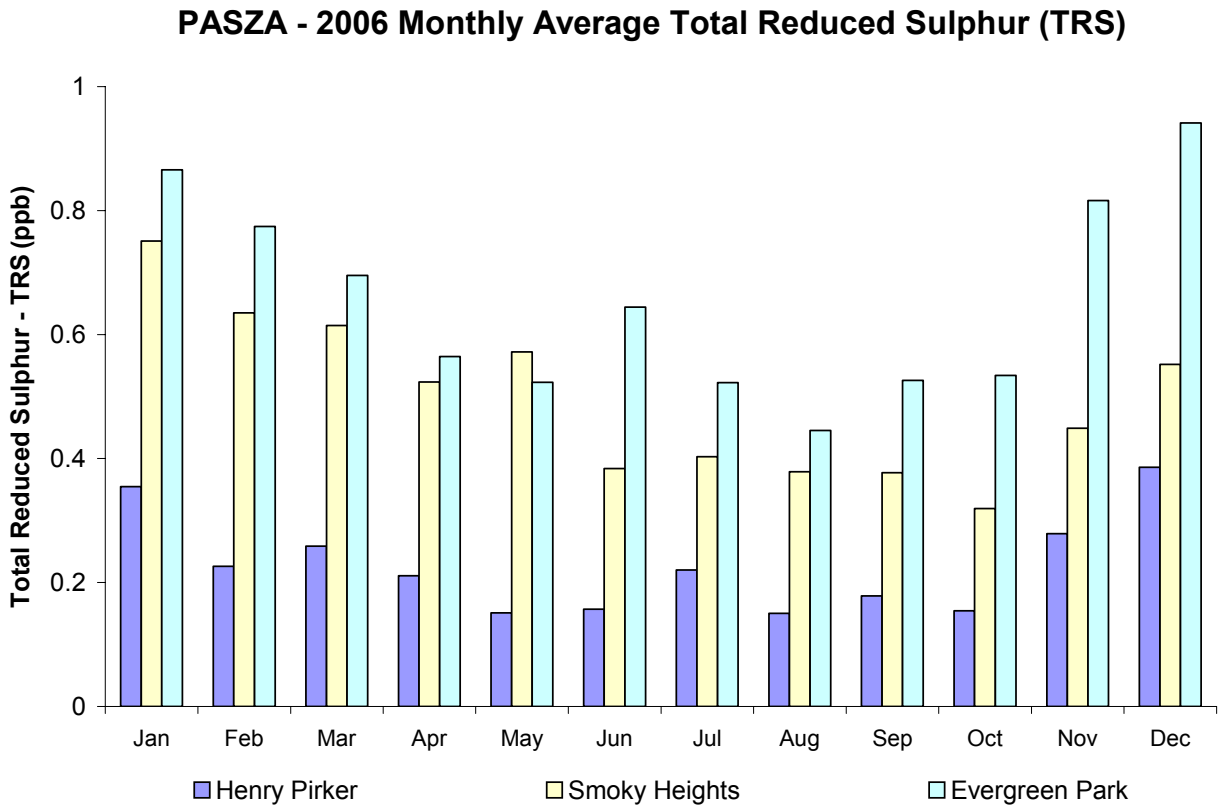
As indicated earlier, within the PASZA air quality monitoring network total reduced sulphur compounds are monitored continuously at the Henry Pirker, Evergreen Park and Smoky Heights stations.

During 2006 there were a total of three exceedences of the AAAQO (based on measurements of TRS) observed by the PASZA air quality monitoring network. All three of the exceedences were recorded at the Portable Falher Station. Early on the morning of October 13, hourly average concentrations of 25, 13 and 16 ppb were recorded with moderate northeast and east winds respectively. An investigation into the source of the three exceedences was conducted; however no immediate source could be determined.

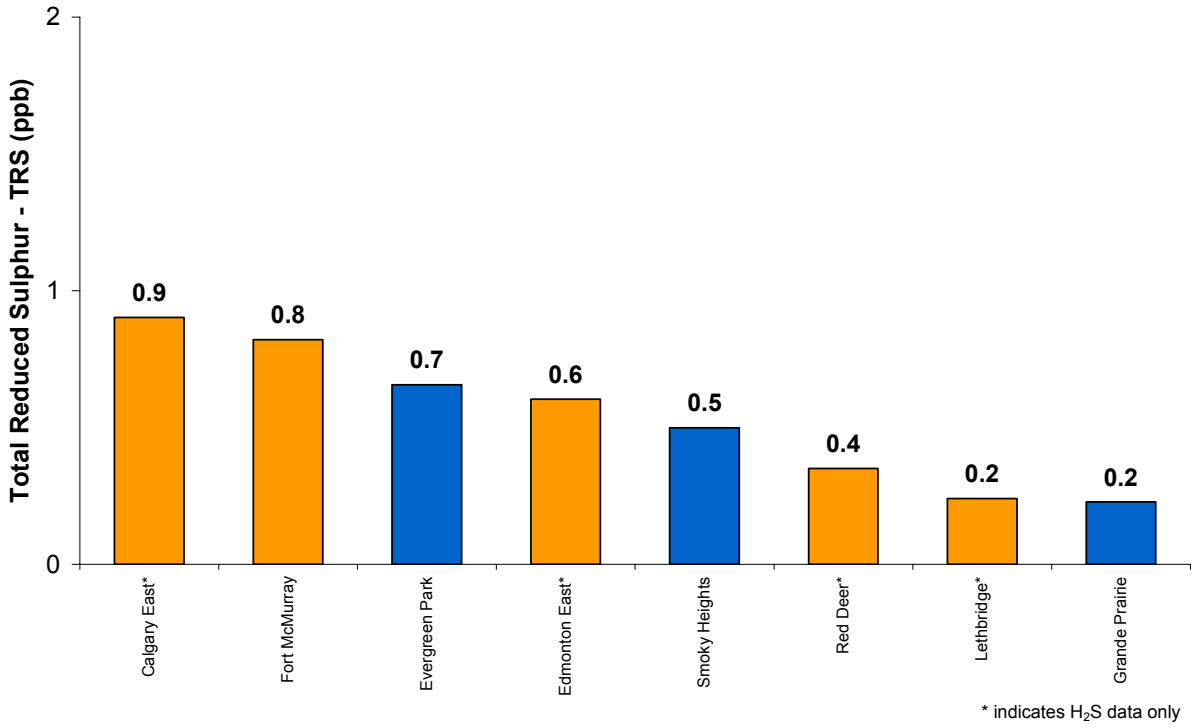
The maximum hourly average TRS concentration observed at the Evergreen Park Station in 2006 was 3 ppb. It occurred on the early morning of August 11 with light west south west winds. The maximum hourly average TRS concentration observed at the Henry Pirker Station was 2 ppb. It occurred on the evening of February 11 with light northwest winds.

The annual average total reduced sulphur concentrations observed at the Evergreen Park, Smoky Heights and Henry Pirker Stations in 2006 were 0.6, 0.5 ppb, and 0.2 ppb respectively.

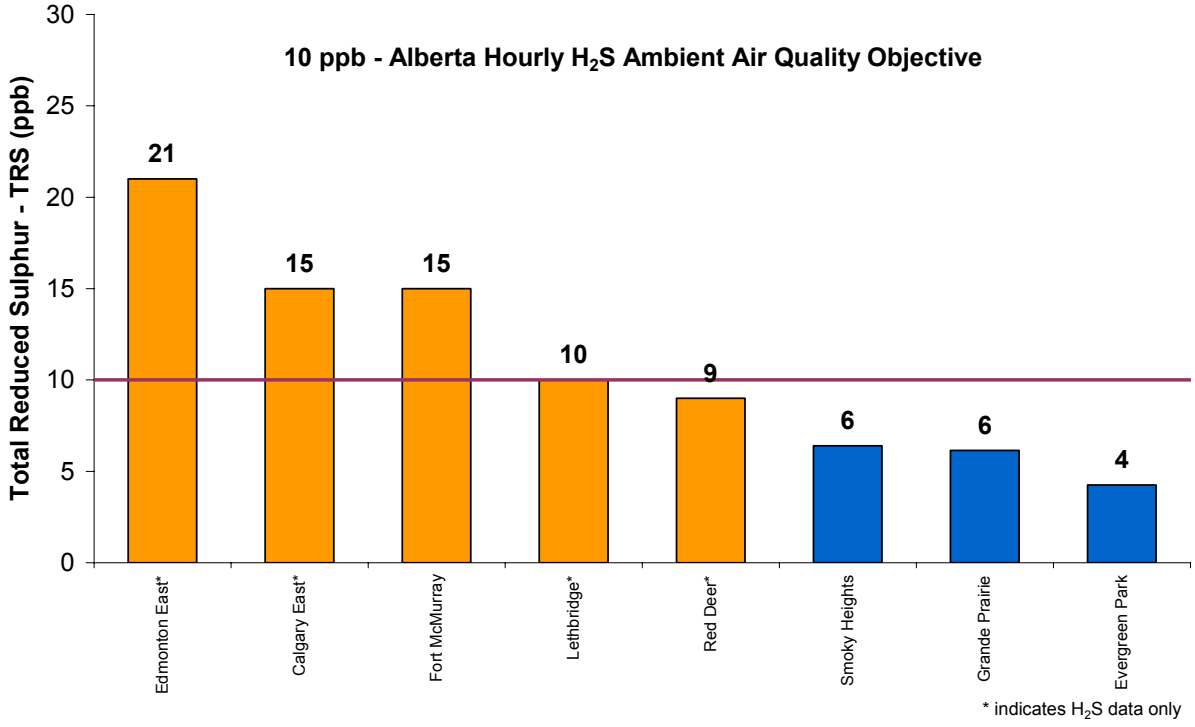
It should be noted that the Evergreen Park Station's location on the southeastern boundary of Grande Prairie could subject it to airborne emissions associated with the City Sewage Treatment Facilities located approximately 2.5 km northwest. However to date, the predominant winds observed at this location are from the west (17%) or west southwest (15%).



Total Reduced Sulphur (TRS) - 2006 Annual Averages



Total Reduced Sulphur (TRS) - 2006 Maximum 1-Hour Averages



5.8 Hydrogen Sulphide

Hydrogen Sulphide (H_2S) is a highly toxic colourless gas with an offensive odour. The odour can be described as that of rotten eggs at very low concentrations, and a sickening sweet odour at concentrations as low as 30-100 parts per million (ppm). The ability to smell hydrogen sulphide can begin to dull at 50 ppm and can be completely lost.

Exposures to low concentrations of hydrogen sulphide can cause irritation to eyes and respiratory tract, nausea, dizziness, and headaches. Prolonged exposure, for several hours or days, to concentration as low as 50-100 ppm can cause nose, throat and lung irritation as well as shortness of breath. Hydrogen sulphide is a potent chemical asphyxiant, and at prolonged exposures to higher concentrations can produce bronchitis, pneumonia and a potentially fatal build up of fluid in the lungs.

Total Reduced Sulphur (TRS) includes hydrogen sulphide, mercatans, and other sulphur compounds. Industrial sources of hydrogen sulphide and TRS include fugitive emissions from petroleum refineries, sewage treatment facilities, pulp and paper mills that use Kraft pulping processes, petrochemical plants, iron smelters, and food processing plants. Hydrogen sulphide can also occur naturally in crude petroleum, natural gas, sour gases, hot sulphur springs, stagnant water bodies, and livestock feedlots. As a naturally occurring process it is formed as a result of bacterial decomposition of organic material containing sulphur.

The Alberta Ambient Air Quality Objectives (AAAQO) for hydrogen sulphide are:

- 10 ppb averaged over a one-hour period
- 3 ppb averaged over a twenty-four hour period

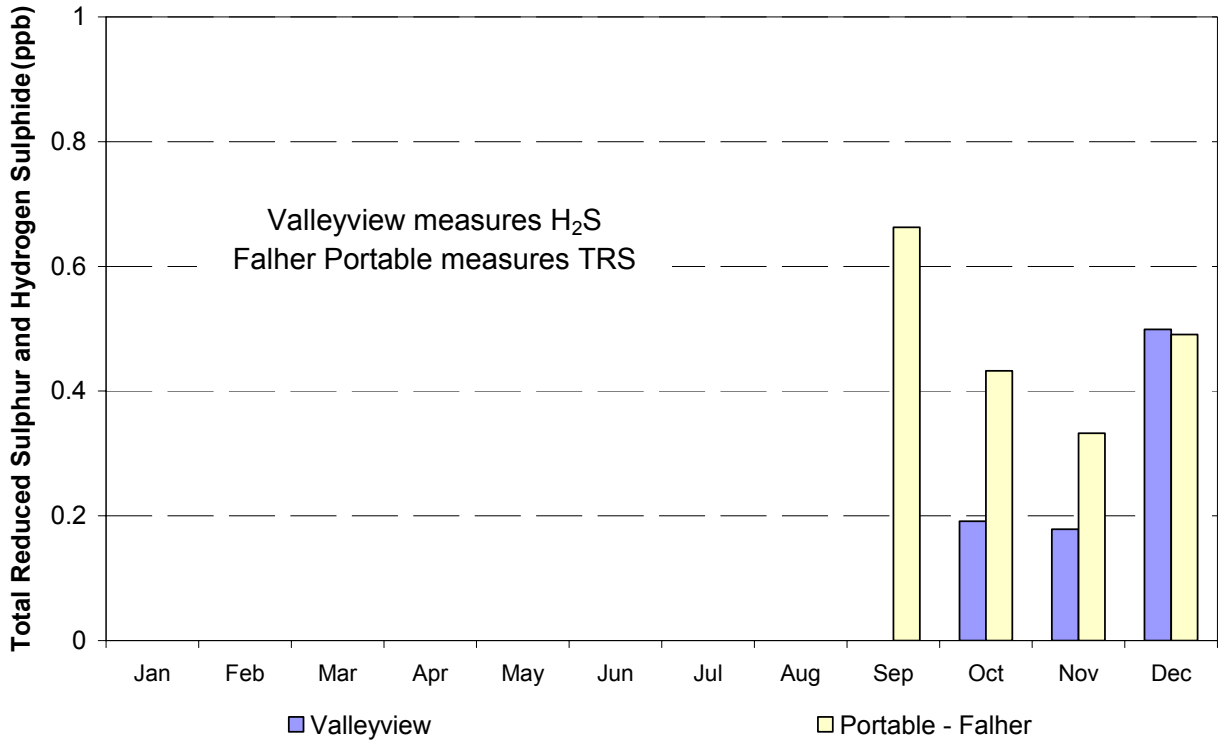
As indicated earlier, within the PASZA air quality monitoring network hydrogen sulphide is monitored continuously at the Valleyview station while total reduced sulphides are continuously monitored at the Henry Pirker, Evergreen Park, Smoky Heights, and the Falher Portable station. The Valleyview station was commissioned in late fall and began collecting data October 2006.

The average for the three months of data collection in 2006 at the Valleyview station was 0.3 ppb. There were four exceedences of the provincial objectives for one-hour averages (10ppb) and one exceedence of the twenty-four hour objective for hydrogen sulphide (3 ppb) at the Valleyview station in this time period. The exceedences were observed the early morning of December 31 and the details of the events are summarized below:

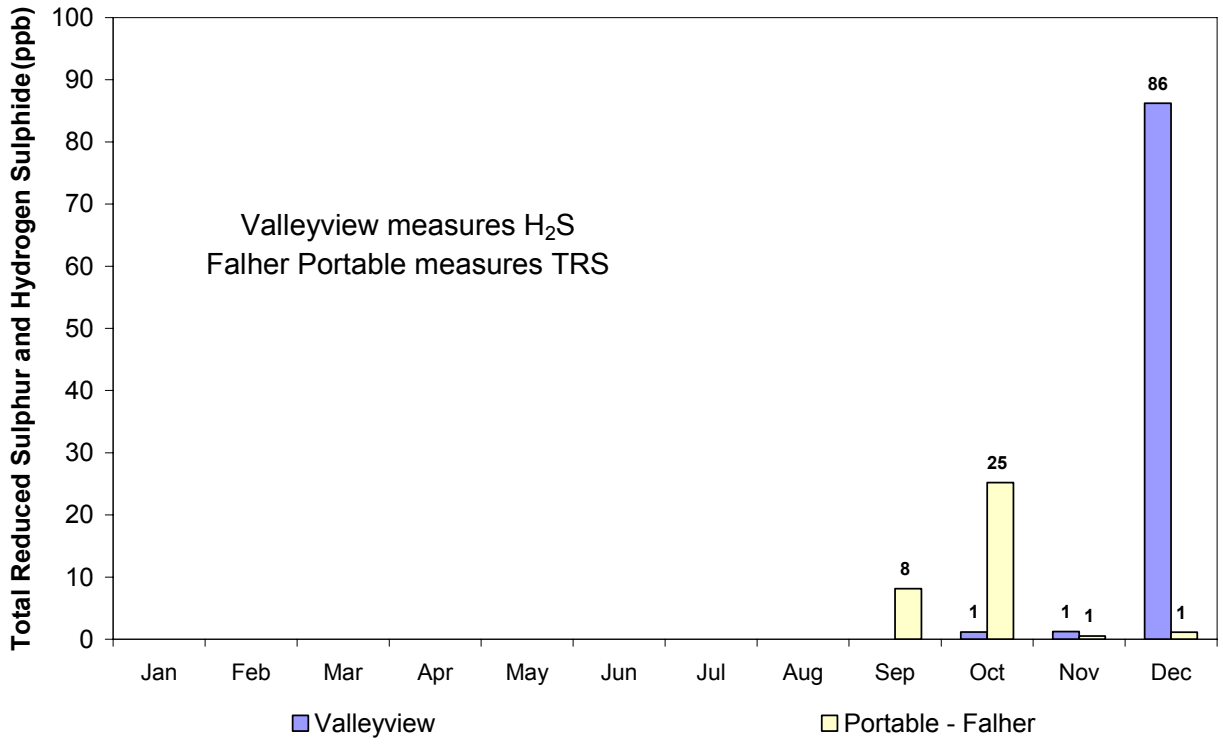
Applicable Objective	Time	Concentration	Wind Direction and Speed
1-hour	4:00	86 ppb	SW at 4 km/hr
1-hour	5:00	53 ppb	SW at 3 km/hr
1-hour	6:00	24 ppb	SW at 2 km/hr
1-hour	7:00	58 ppb	WSW at 2km/hr
24-hour	N/A	9.9 ppb	SSW at 4km/hr

Investigation into the incidences indicated that the source of the contraventions was from a nearby Sour Gas Plant when a pressure gauge on a well casing failed causing fugitive emissions.

PASZA - 2006 Monthly Average



PASZA - 2006 Monthly Maximum Hour



5.9 Hydrocarbons

Hydrocarbons are divided into two broad categories, "reactive" and "non-reactive" hydrocarbons. The term "total hydrocarbons" (THC) refers to a family of chemicals containing carbon and hydrogen atoms and includes both reactive and non-reactive hydrocarbons.

Reactive hydrocarbons include many volatile organic compounds such as alkenes, alkynes, benzene, toluene, ethylbenzenes and xylenes and other aromatics. Reactive hydrocarbons are important because they can react with oxides of nitrogen in the presence of sunlight to form ozone and may be toxic to humans, animals or vegetation. Polycyclic aromatic hydrocarbons are of particular interest because they are less volatile than other reactive hydrocarbons and many are known carcinogens.

Trees and plants are major natural emitters of reactive hydrocarbons with other significant sources being intensive livestock operations, vehicular emissions, gasoline marketing and storage tanks, petroleum and chemical industries, dry cleaning, fireplaces, natural gas combustion and aircraft traffic. Motor vehicles are the major source of hydrocarbons in urban areas.

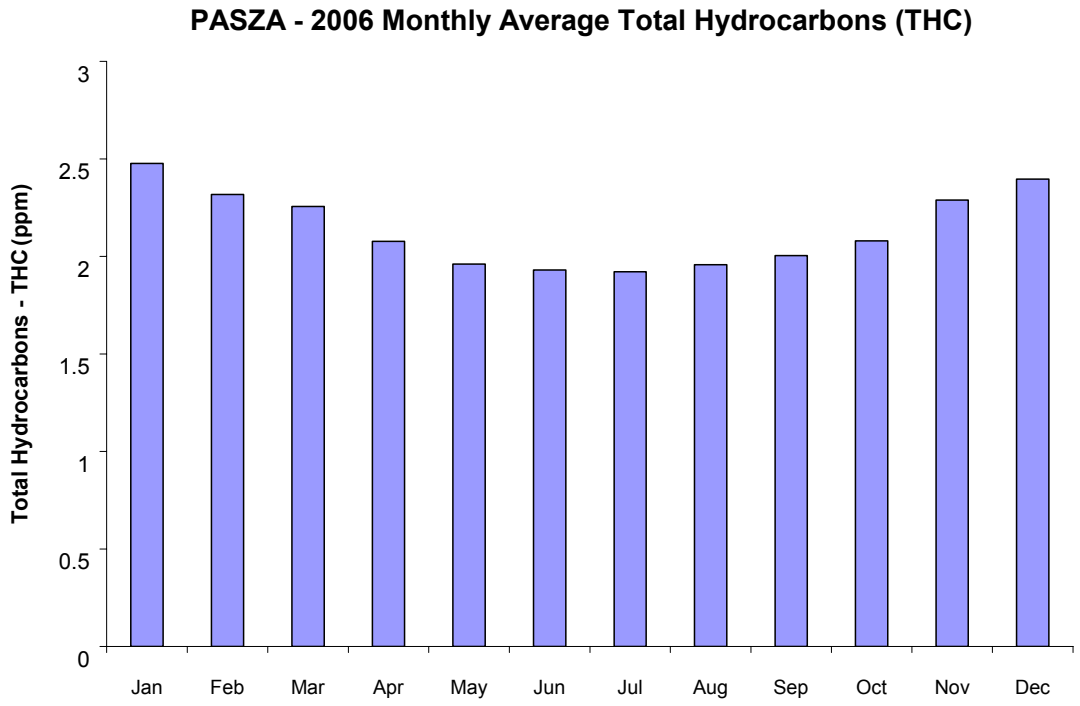
The major non-reactive hydrocarbon in the atmosphere is methane, which is a naturally occurring colorless, odorless gas that is regarded by many to be a major contributor to the greenhouse effect. Large amounts of methane are produced naturally from bogs, shallow lakes and soils through the decay of vegetation under anaerobic conditions. The global background total hydrocarbon level is currently about 1.8 ppm consisting primarily of methane. Human activity is contributing to a worldwide increase in ambient methane concentrations of approximately 2-8 ppb/year in recent years.

While Alberta Environment does not have objectives for ambient (outdoor) concentrations of total hydrocarbons it does have guidelines for some specific reactive hydrocarbons such as benzene and styrene. The establishment of guidelines for more reactive hydrocarbons is currently being considered.

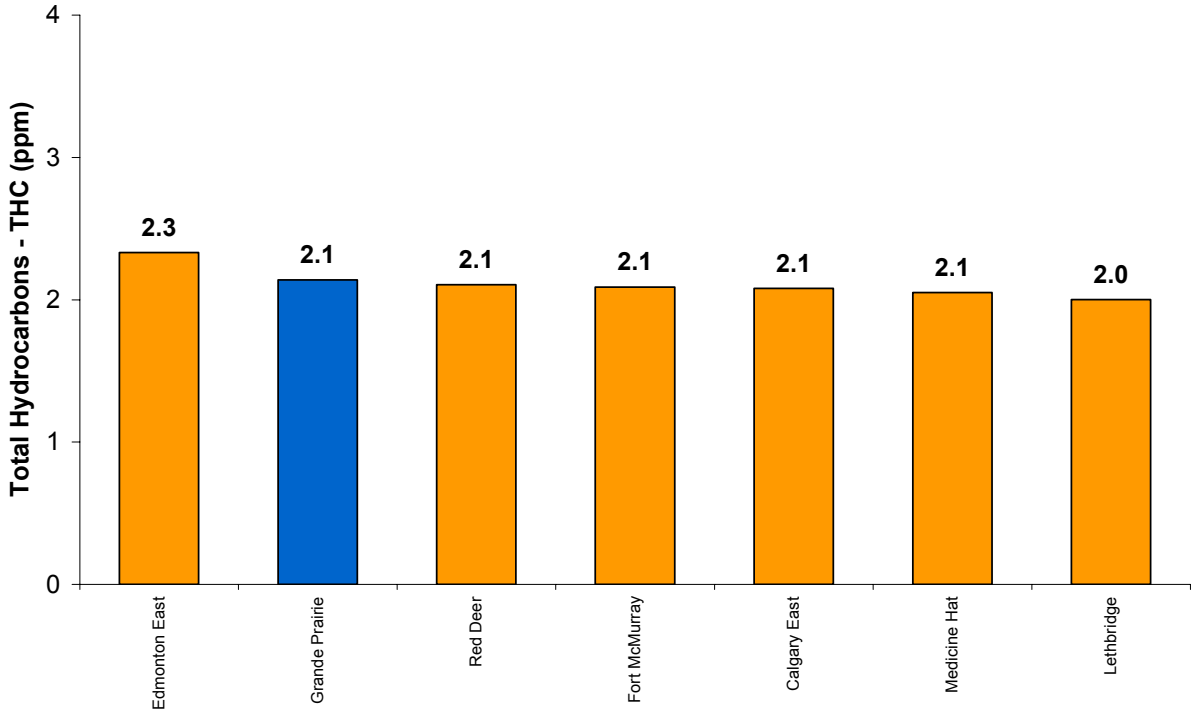
As indicated earlier, within the PASZA air quality monitoring network total hydrocarbons are monitored continuously only at the Henry Pirker station.

The annual average total hydrocarbon concentration observed at the Henry Pirker station in Grande Prairie in 2006 was 2.17 ppm This value was similar to the averages observed in the larger cities of Edmonton, Calgary and Red Deer.

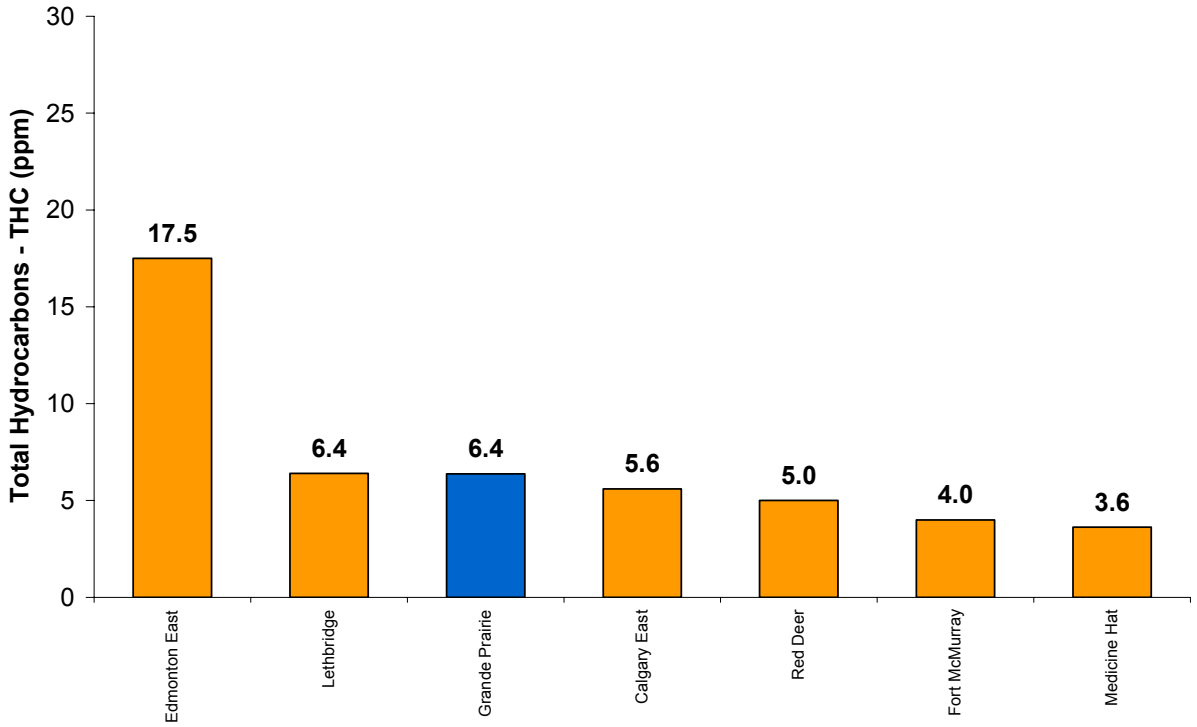
The maximum one-hour average THC concentration observed at the Henry Pirker Station was the 6.4 ppm reading observed during the early morning of April 14 with light east winds.



Total Hydrocarbons (THC) - 2006 Annual Averages



Total Hydrocarbons (THC) - 2006 Maximum Hourly Averages



5.10 Carbon Monoxide

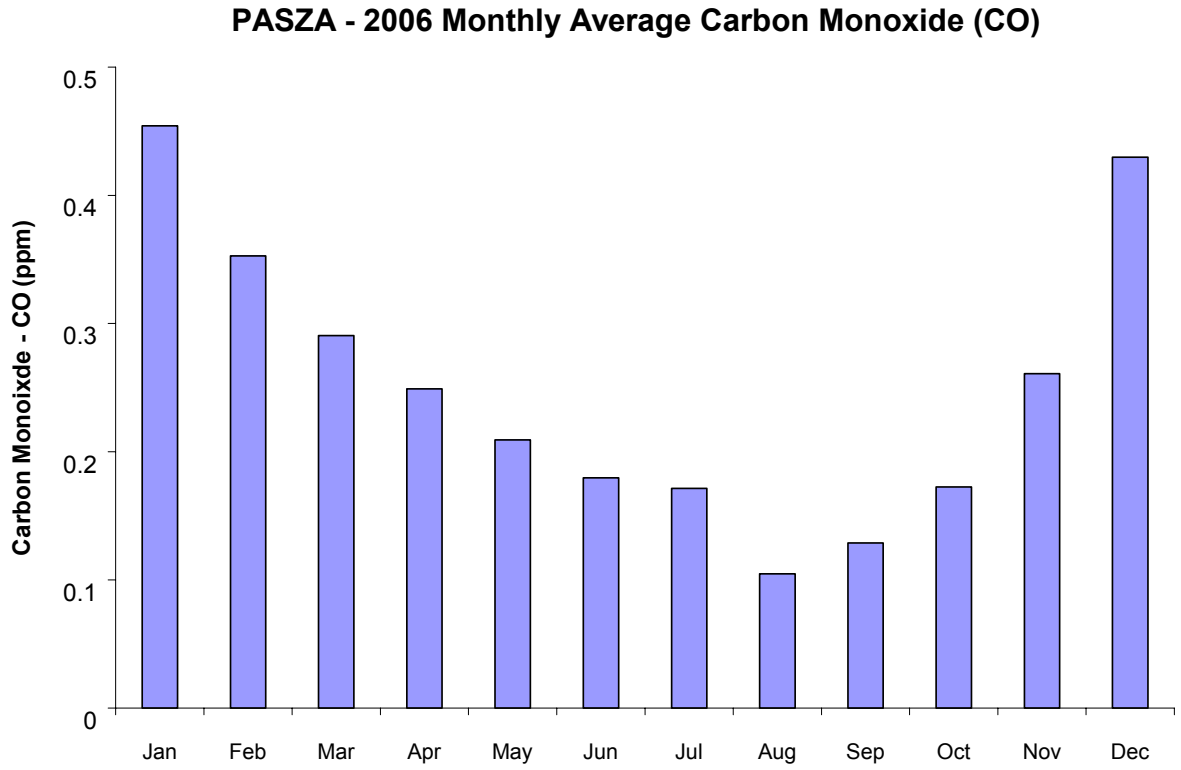
Carbon monoxide (CO) is a colourless, odourless gas formed when carbon-based fuels such as gasoline, oil, and wood burn with an insufficient supply of oxygen. Except for carbon dioxide, it is one of the longest lived naturally occurring atmospheric carbon compounds. The major source of CO in urban locations is motor vehicle exhaust emissions. Forest fires are also an important natural source of CO. Minor sources include fireplaces, industry, aircraft and natural gas combustion.

CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. The AAAQO for CO are based on the prevention of adverse human health effects. Alberta has adopted Environment Canada's most rigorous ambient air quality objective for CO. The AAAQO are:

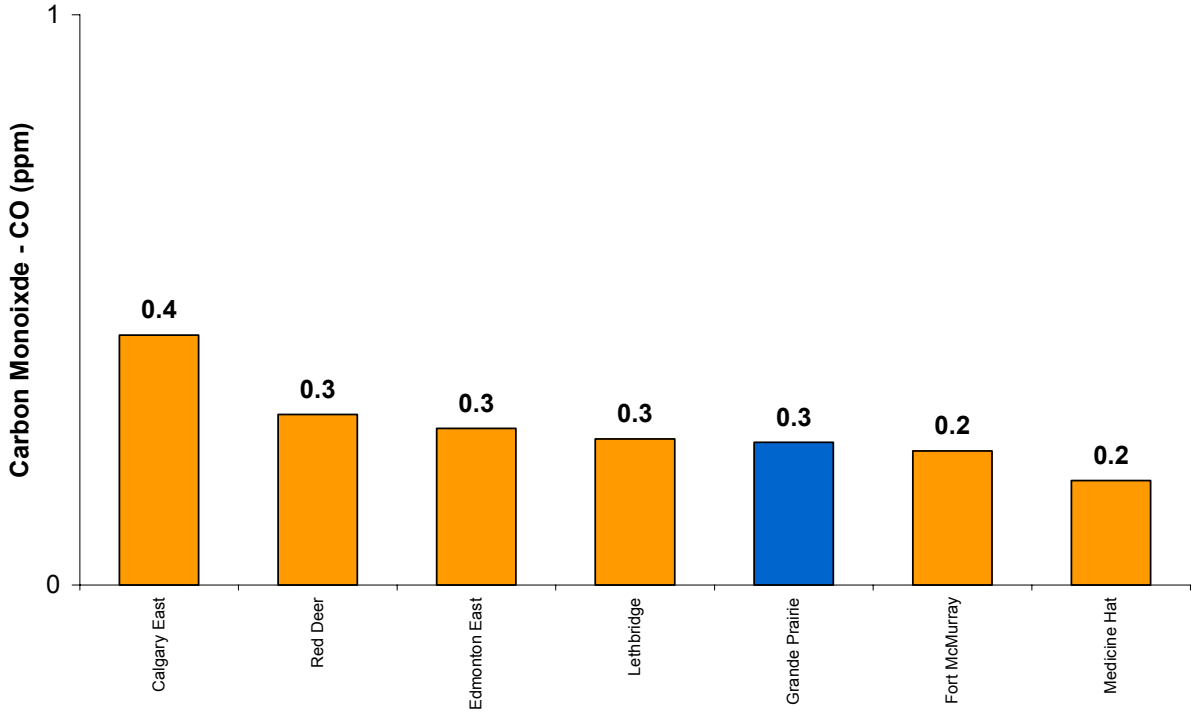
- 13 ppm averaged over a one-hour period
- 5 ppm averaged over an eight-hour period

As indicated earlier, within the PASZA air quality monitoring network carbon monoxide is monitored continuously only at the Henry Pirker station.
The annual average carbon monoxide concentration observed at the Henry Pirker Station in Grande Prairie in 2006 was 0.23 ppm. This value was slightly lower than the averages observed in the larger cities of Edmonton, Calgary and Red Deer and higher than the averages observed in Medicine Hat, Fort McMurray, and Lethbridge.

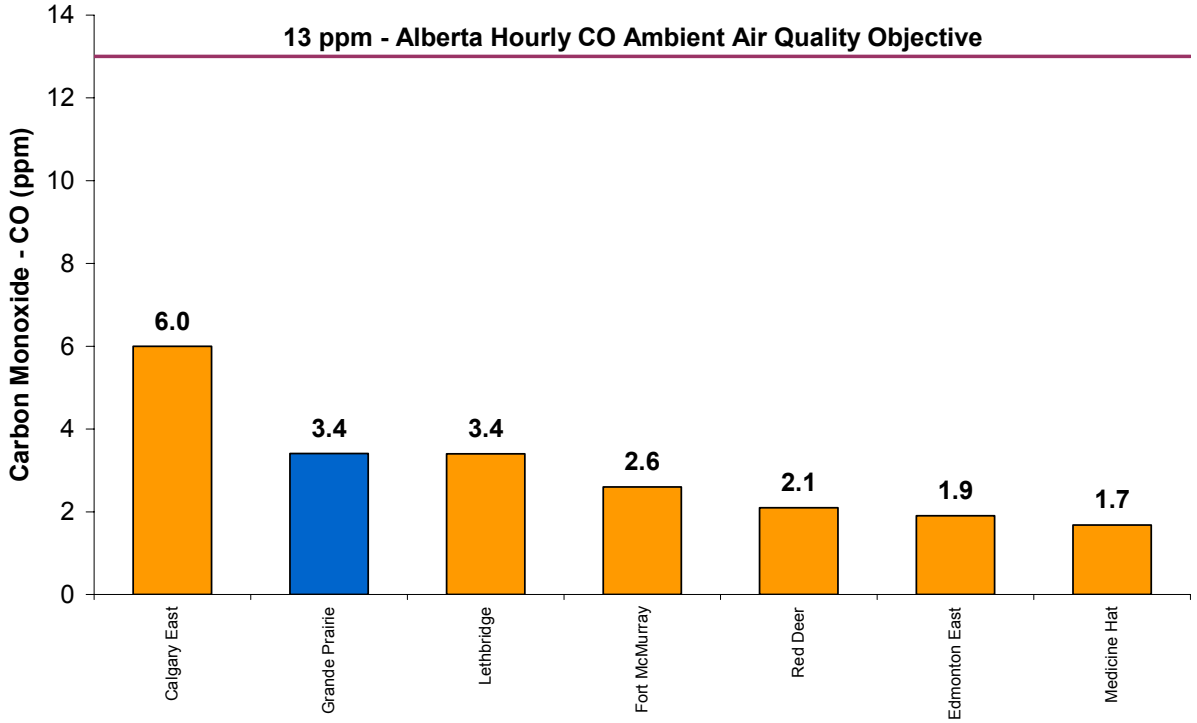
No exceedences of the CO one or eight-hour AAAQO were observed at the Henry Pirker Station during 2006. The maximum hourly average CO concentration observed at the Henry Pirker Station in 2006 was 3.4 ppm. It occurred on the evening of January 21 with light easterly winds.



Carbon Monoxide (CO) - 2006 Annual Averages



Carbon Monoxide (CO) - 2006 Maximum Hourly Averages



5.11 Fine Particulate Matter

The term inhalable particulates, or PM_{10}, refers to particles that have a diameter of less than 10 microns and are suspended in the air for an indefinite period of time. PM_{10} is a mixture of various substances. These substances occur in the form of solid particles or as liquid drops. Some particles are emitted directly into the atmosphere. Other particles result from gases that are transformed into particles through physical and chemical processes in the atmosphere.

PM_{10} can be divided into two groups of particles based on size: fine particles and coarse particles. The fine particles are those particles that are less than about 2.5 microns in diameter and are known collectively as $PM_{2.5}$. In contrast, the coarse particles are those that are greater than about 2.5 microns in diameter.

Generally, the fine particles pose the greater health risk because these particles can be deposited deep in the lung and contain substances that may be harmful to health. In addition to their health impacts, the fine particles are the main contributors to reduced visibility. The particles give smog its colour. This fine fraction is also known as respirable particulate. Particulate pollution can cause eye, nose and throat irritation and other health problems. Numerous studies have linked respirable particulate matter to aggravated heart and lung diseases such as asthma, bronchitis and emphysema.

In Alberta, sources of inhalable particulates include soil, road dust, dust resulting from other human activities (e.g. harvesting), smoke from forest fires, smoke from recreational sources (e.g. campfires and fireplaces), smoke from other various sources (e.g. stubble-burning), vehicle exhaust emissions, and industrial emission sources (e.g. power plants, cement manufacturing facilities, coal mining operations and the forest products industry).

There are currently no Alberta Environment Objectives for PM_{10} or $PM_{2.5}$. A Canada Wide Standard (CWS) for $PM_{2.5}$ has been issued. The CWS for $PM_{2.5}$ is a 24 hour average of 30 micrograms per cubic meter ($\mu g/m^3$) based on the 98th percentile ambient measured annually, and averaged over 3 consecutive years.

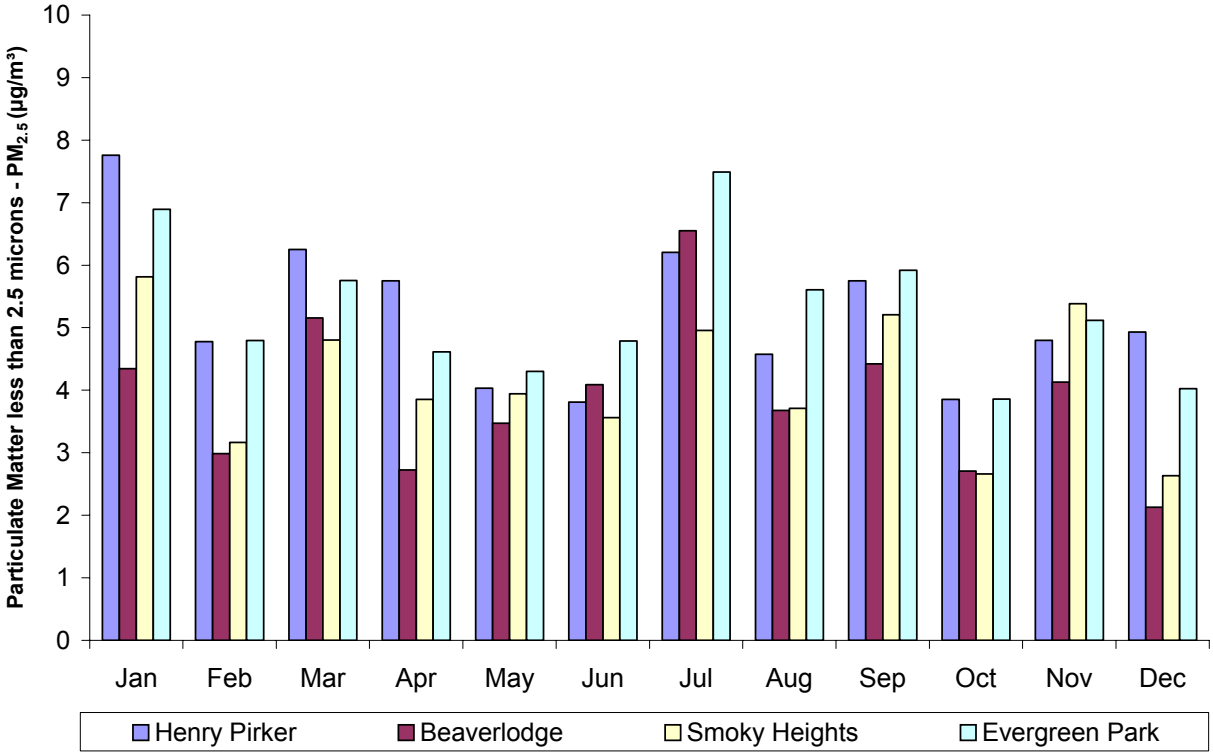
As indicated earlier, within the PASZA air quality monitoring network fine particulate ($PM_{2.5}$) is monitored continuously at the Henry Pirker, Beaverlodge, Evergreen Park and Smoky Heights stations.

For 2006, the annual average $PM_{2.5}$ concentration at the Henry Pirker Station in Grande Prairie was higher than those observed in Edmonton and Calgary and similar to that observed in Red Deer. The average was slightly higher than the averages observed in the cities of Lethbridge and Medicine Hat. At all these urban locations a significant portion of the $PM_{2.5}$ monitored can be attributed directly to motor vehicle traffic. The annual average $PM_{2.5}$ concentrations observed at the Beaverlodge and Smoky Heights Stations were all above those observed at Henry Pirker and the same as the annual average observed at the Evergreen Park station.

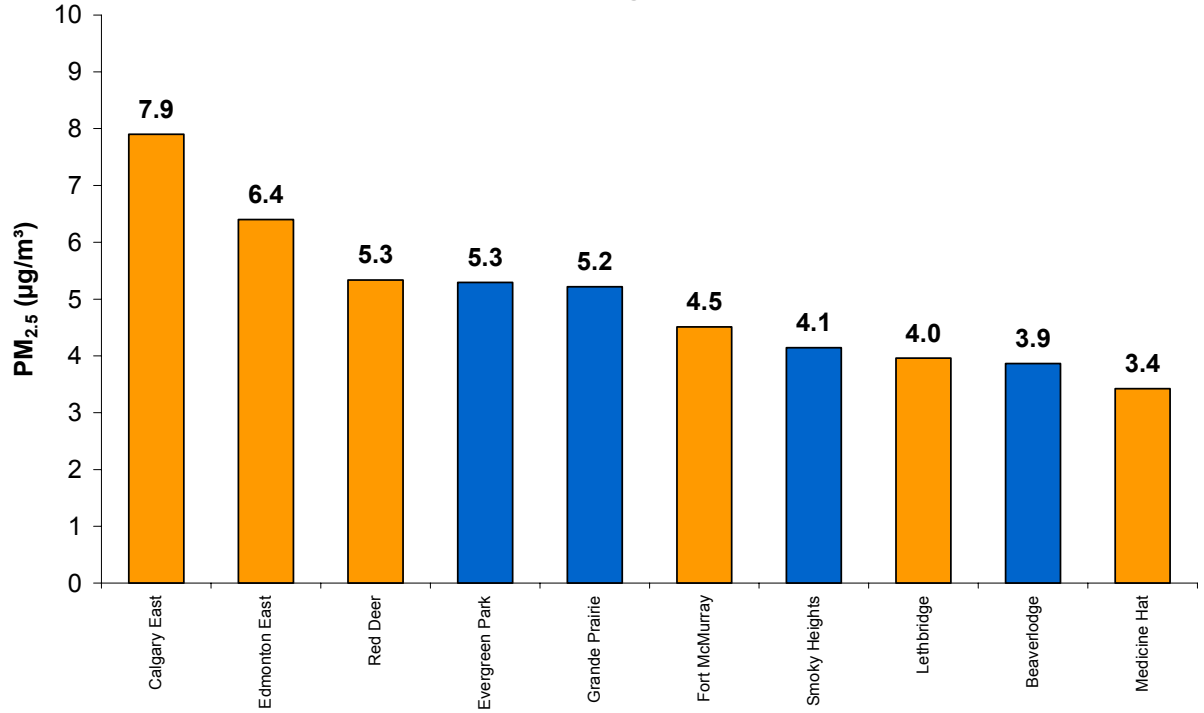
During 2006, all of the recorded daily averages at the all of the stations in the PASZA air quality monitoring network were below the absolute $PM_{2.5}$ CWS level of $30\mu g/m^3$.

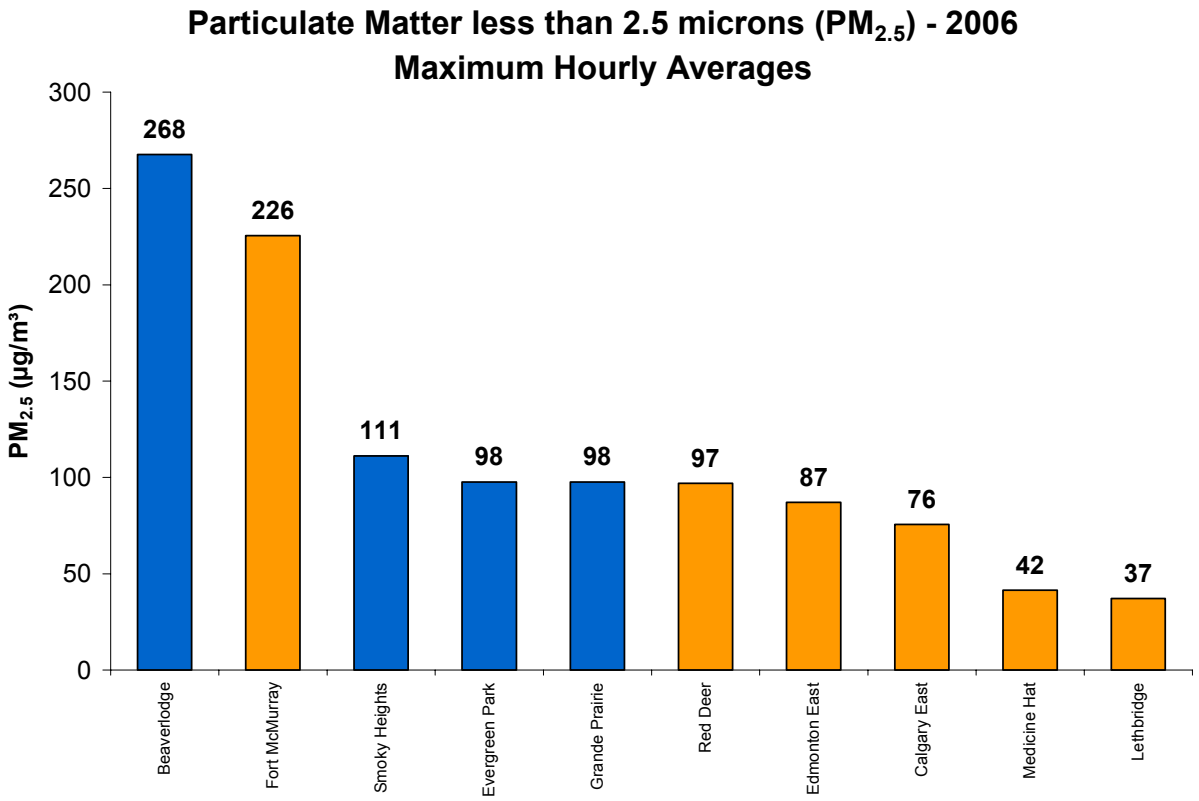
The highest hourly average $PM_{2.5}$ concentration ($87\mu g/m^3$) at the Evergreen Park Station was observed on the afternoon of July 23 with moderate westerly winds. The highest hourly average $PM_{2.5}$ concentration ($64\ \mu g/m^3$) at the Smoky Heights Station was observed in the afternoon of May 14 with moderate northwest winds. The highest hourly average $PM_{2.5}$ concentration ($268\ \mu g/m^3$) at the Beaverlodge Station was observed during the morning of July 4 with moderate northwest winds. The highest hourly average $PM_{2.5}$ concentration ($74\ \mu g/m^3$) at the Henry Pirker Station was observed on the afternoon of September 3 with light southwest winds.

PASZA - 2006 Monthly Average Particulate Matter less than 2.5 microns ($PM_{2.5}$)



Particulate Matter less than 2.5 microns ($PM_{2.5}$) - 2006 Annual Averages





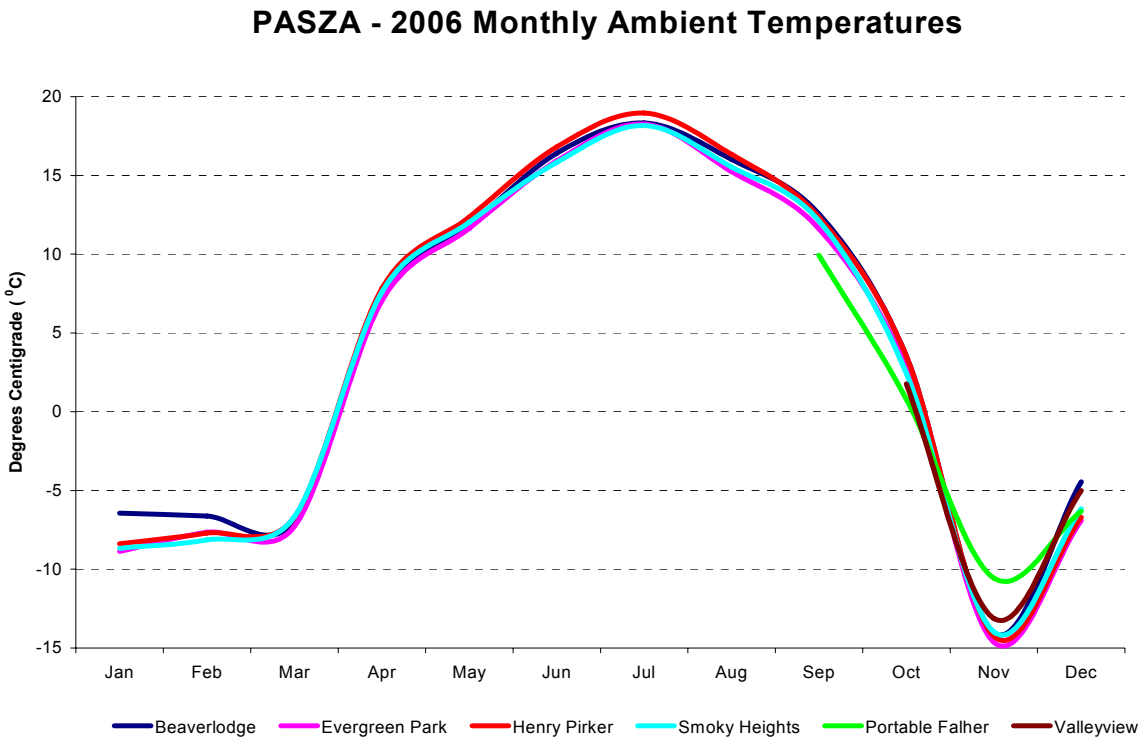
5.12 Meteorology

Air quality depends on the rate that pollutants are emitted to the atmosphere and the rate at which these compounds are dispersed away from the sources. Air pollution transport and dispersion are influenced by wind speed and direction, the temperature structure of the atmosphere, the solar cycle, turbulence and changes in these elements induced by local topography.

The interpretation of the continuous and passive data is supported by basic meteorological measurements of parameters that affect the transport and dispersion of emissions.

The meteorological parameters measured in support of the Peace Airshed Zone Association's Air Quality Monitoring Program are:

- wind speed and direction
- temperature
- solar radiation
- relative humidity



6.0 Links to CASA and Other Airsheds

The Peace Airshed Zone Association was established under the umbrella of the Clean Air Strategic Alliance (CASA), adopting the CASA principles of consensus-based multi-stakeholder representation and following its Zone Air Quality Management Guidelines. PASZA is an independent entity that provides progress updates to CASA, shares some common members and directors, and whose members contribute significantly to the following CASA project teams:

- Ambient Air Quality Monitoring Operations Steering Committee
- Air Monitoring Strategic Planning Committee
- Ecological Effects Workshop Organizing Committee
- Confined Feeding Operations Project Team

PASZA shares information with the other existing regional airshed management zones and new zones as they establish their management plans and develop their monitoring programs.

The West Central Airshed Society (WCAS), is located approximately 80 km south of PASZA's southern boundary and includes the towns of Hinton, Edson, and Drayton Valley. In 2006, the society operated a regional air quality monitoring network consisting of ten continuous and fourteen passive monitoring stations.

The Wood Buffalo Zone, operated by the Wood Buffalo Environmental Association (WBEA), has implemented a monitoring network in the Regional Municipality of Wood Buffalo. This Zone covers an area of 75,000 square kilometers, stretching south from the Alberta/Northwest Territories border to the south of Fort McMurray and includes the regions two major population centers, Fort Chipewyan and Fort McMurray. The association operates a regional air quality monitoring network that consists of fourteen continuous and ten passive monitoring stations as well as an extensive terrestrial effects monitoring program.

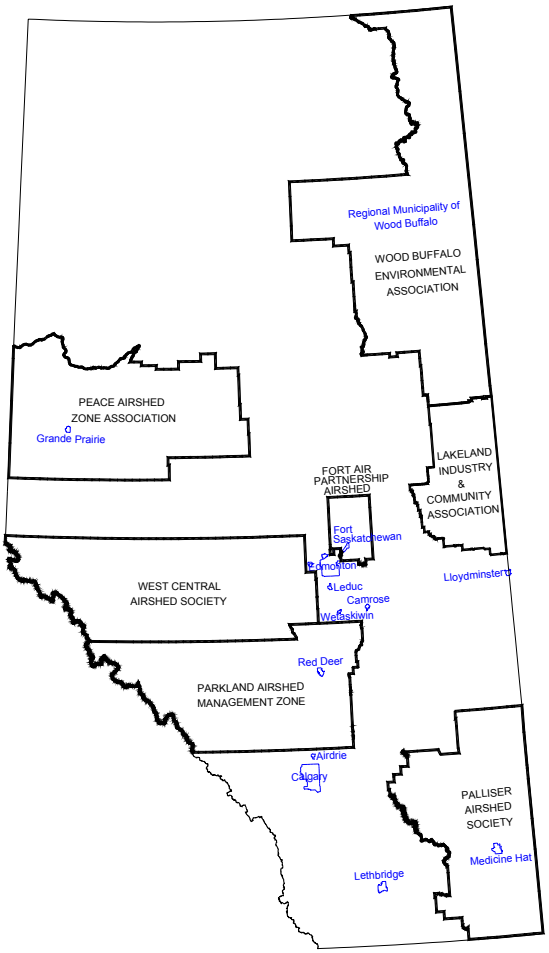
The Fort Air Partnership Zone located northeast of Edmonton covers an area of 6,000 square kilometers, encompassing Fort Saskatchewan and the surrounding area. The partnership operates a regional air quality monitoring network consisting of eight continuous and thirty passive monitoring stations.

The Parkland Airshed Management Zone (PAMZ) is located south of the WCAS Zone and covers an area of approximately 42,000 sq. km. and includes the City of Red Deer. The association operates a regional monitoring network consisting of four continuous and thirty-four passive stations.

The province's smallest airshed, the Palliser Airshed, expanded its boundaries in 2006 includes the City of Medicine Hat and Town of Redcliff. Its air quality monitoring network consists of one continuous and six passive monitoring stations.

The Lakeland Industry and Community Association's (LICA) airshed zone encompasses an area of approximately 15,500 square kilometers in the Bonnyville-Cold Lake-Elk Point Region. LICA operates a regional air quality monitoring network consisting of one continuous and twenty-five passive monitoring stations

Two new airshed are emerging in Alberta: The Calgary Region Airshed Zone and the Alberta Capital Airshed Alliance. These airshed zones are in various stages of development taking on tasks such drafting business plans and monitoring programs as well as member recruitment and emissions inventory development



7.0 Financial Report

Peace Airshed Zone Association
Financial Report* for the Year Ended December 31, 2006

		2006	2005
Revenue:	Contributions	$ 595,200	$ 567,426
	Sales	135,000	-
	Interest Income	4	24
		$ 730,204	$ 567,450
Expenses:			
	Advertising and Promotion	-	413
	Amortization	50,305	38,077
	Bank Charges and Interest	950	481
	Boundary Expansion Feasibility Study	47,200	-
	Contract Administration	85,200	81,412
	Equipment Lease	36,731	44,894
	Honoraria and Travel	582	1,093
	Insurance	7,763	7,705
	Monitoring Contracts	344,545	319,712
	Office	2,171	111
	Professional Fees	3,320	4,500
	Program Management Fees	29,847	23,827
	Rent	-	182
		608614	522407
Net Income for the Year		**$ 121,590**	**$ 45,043**
	Assets		
Current			
	Cash	$ 171,064	$ 126,901
	Accounts Receivable	2,840	3,927
	Prepaid Expenses	-	2,500
		173,904	133,328
Property and Equipment		271,435	152,309
		$ 445,339	**$ 285,637**
	Liabilities and Member's Equity		
Current			
	Accounts Payable and Accrued Liabilities	$ 93,644	$ 55,533
Net Assets			
	Invested in Property and Equipment	266,436	152,308
	Unrestricted Net Assets	85,259	77,796
		351,695	230,104
		$ 445,339	**$ 285,637**

*A copy of the audited financial report is available from the PASZA Treasurer upon request.

8.0 Membership

8.1 Board of Directors

Board of Directors	Association	Sector	Position
Mike Weeks	Saddle Hills Awareness Comm.	NGO	Board Chairman
Richard Harpe	County of Grande Prairie	Government	Past Chairman
Jim Meagher	Peace Country Health	Government	Vice Chairman
Rod Burr	Alberta Environment	Government	Secretary
Nichole Belcourt	County of Grande Prairie	Government	Treasurer
Dale Gervais	MD of Greenview #16	Government	
Uli Wolf	Aquatera	Government	
Bill Nalder	CNRL	Industry	
Bob Savage	Talisman Energy	Industry	
Brian Lieverse	EnCana	Industry	
Dan Crowley	Suncor Energy Inc.	Industry	
Ed Lamy	Weyerhaeuser	Industry	
Bob Cameron	South Peace Environmental Assn.	NGO	

8.2 Individual Members

Individual Members	Association	Sector
Andy Trudeau	MD of Smoky River	Government
Brian Scarth	Anadarko	Industry
Dario Castro	BP Canada	Industry
Denis Sauvageau	FOUL	NGO
Doug Baggett	Ainsworth Lumber	Industry
Doug Beddome	NRCB	Government
Eldon Siegle	Encana	Industry
Gerald Feschuk	AENV	Government
Harold Gold	Bonavista Petroleum	Industry
Jim Terpsma	Kereco Energy	Industry
Ken Melnyk	MD of Big Lakes	Government
Lars Depauw	PennWest Petroleum	Industry
Martin Belanger	Prime West Energy	Industry
Miles Sherris	Kereco Energy	Industry
Milton Hommy	Public	Public
Ming To	Duke Energy Midstream Services Canada Ltd.	Industry
Roxanne Pettipas	ConocoPhillips	Industry
Sheldon Reves	Burlington Resources	Industry
Tammy Kehl	EnCana	Industry
Teresa Von Tiesenhausen	Public	Public
Tracy Hunt	Devon Canada	Industry
Wanda Dennis	Apache Canada Ltd.	Industry

8.3 Funding Members

Companies

Advantage Oil & Gas Ltd.
AEC Oil & Gas
Ainsworth LP
Alliance Pipeline
Anadarko Canada Corporation
Anderson Exploration
Ankerton Holdings Ltd.
ARC Energy Trust
Atco Power
Atlas Energy
Baytex Energy
Bear Ridge Resources Ltd.
Blue Mountain Energy
Bonavista Petroleum Ltd.
Bow Valley Energy Ltd.
BP Canada Energy Company
Burlington Resources Canada
C1 Energy Ltd.
Calpine Natural Gas Limited
Canadian Natural Resources Ltd.
Canetic Resources Ltd.
Can-For Products (Sawmills)
Capture Resources Corp.
Chariot Energy
Krang Energy Inc.
Clear Energy Inc.
Compton Petroleum Corporation
ConocoPhillips Canada Energy
Crescent Point Energy Partnership
Crest Star Energy
Cyries Energy Inc
Dark Energy Ltd.
Daylight Energy Ltd.
Delphi Energy Corp.
Devon Canada Corporation
Dominion Exploration Canada Ltd.
Duke Energy Field Services Canada
Duvernay Oil Corp.
Elkpoint Resources Inc.
EnCana Corporation
Enermark Inc.
Enerplus Resources Fund
Enterra Energy Corp.
Escalade Energy Inc.
Fairborne Energy Ltd.
Fairsky Energy Inc.
Forte Oil Corporation
Fortune Energy Inc.
Galleon Energy Inc.
Glencoe Reources Limited
Grey Wolf Exploration Inc.
Hunt Oil Company Of Canada, Inc.
Husky Oil Operations Limited
Impact Energy
Imperial Oil
Kereco Energy Ltd.
Ketch Resources Ltd.
Koch Exploration Canada Corp.
Mancal Energy Inc.
Midnight Oil & Gas Limited
NCE Resources Group
Northrock Resources Ltd.
Paramount Resources Ltd.
Penn West Petroleum Ltd.
Petro Canada
Petrofund Energy Trust
Pivotal Energy Limited
Primewest Energy Inc.
Raven Energy Limited
Real Resources Inc.
Reber Exploration Ltd.
Resolute Energy Inc.
Response Energy Corporation
RSX Energy Inc.
Shiningbank Energy Ltd.
Signalta Resources Ltd.
Star Oil & Gas Limited
Storm Exploration Inc.
Suncor Energy Inc.
Talisman Energy Canada
Titan Exploration Ltd.
Tolko Industries Ltd.
Turmoil Energy Limited
Veteran Resources Inc.
Vintage Petroleum Canada, Inc.
Westbow Energy Inc.
Weyerhaeuser Canada

Government & Municipalities

Alberta Environment
Aquatera Utilities Inc.
MD of Big Lakes
MD of Greenview
MD of Smoky River
Birch Hills County
County of Grande Prairie
MD of Spirit River
Peace Country Health Region
Saddle Hills County
Town of Beaverlodge
Town of Hythe
Town of Valleyview
Town of Falher
Town of McLennan
Town of Sexsmith
Town of Valleyview
Village of Hythe

Acknowledgements

The Peace Airshed Zone Association would like to acknowledge the hard work and contributions of all stakeholders of the association. With a lot of hard work, we have made significant strides in 2006 towards achieving our vision. Our member companies and municipalities have continued to provide experience and financial stability to PASZA. Members from the public, health, environment, and municipal sectors have contributed to ensuring accountability, sustainability, and transparency of the association.

Amarok Consulting, specifically Kevin Warren, has continued to provide leadership in the technical management of the air quality monitoring program and many other areas as well. The Focus Corporation has provided exemplary service to PASZA in the administrative management of the program, and in establishing, operating and maintaining the air quality monitoring network. Focus staff members Gary Cross, Kelly Baragar, Barb Johnson, Kevin McCullum and a local contract employee, Dawn Ewan all have all played key roles in that success.

Thanks are due to the CASA Secretariat, who through the early years of PASZA's existence have provided a substantial amount of support and resources enabling us to build a strong and sustainable foundation.

Special thanks are also due to past members of the association who made significant contributions of their time and spirit and have been valuable resources for PASZA during its formative years.

Glossary

Acid Deposition: A comprehensive term for the various ways acidic compounds precipitate from the atmosphere and deposit onto surfaces. It can include: 1) wet deposition by means of acid rain, fog, and snow; and 2) dry deposition of acidic particles (aerosols).

Alberta Ambient Air Quality Objective (AAAQO) : Concentration value adopted by the province of Alberta with the intention of preventing deterioration of air quality. Guidelines for SO2, NO2, O3 and several other pollutants are based on the prevention of adverse human health and vegetation effects. Guidelines may be for 1 hour, 24 hours, or 1-year average concentrations.

Anthropogenic: Made by or arising from man, not of natural origin.

Average Annual Concentration: The sum of the 1-hour average concentration measurements for the year divided by the number of hours that measurements were made within that year. It can be compared against the Alberta Ambient Air Quality Guideline for the same period to assess absolute air quality, against data collected at other locations with similar characteristics (sources, population, etc.) for the same period for assessment purposes or against other years' data to assess improvement or degradation of air quality at the same location.

Carbon Monoxide (CO): A colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. Over 80% of the CO emitted in urban areas is contributed by motor vehicles.

Greenhouse Gases: Atmospheric gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapor that slow the passage of re-radiated heat through the Earth's atmosphere.

Hydrocarbons: Compounds containing various combinations of hydrogen and carbon atoms. They may be emitted into the air by natural sources (e.g., trees) and as a result of fossil and vegetative fuel combustion, fuel volatilization, and solvent use. Hydrocarbons are a major contributor to smog. Hydrocarbons include aromatics and volatile organic compounds, many of which are toxic.

Hydrogen Sulphide (H_2S): A colorless, flammable, poisonous compound having a characteristic rotten-egg odor. About one third of the gas produced in Alberta contains H_2S.

Inversion: The atmospheric property of temperature increasing with height.

Micron (μm): One one-millionth of a meter ($1X\ 10^{-6}$ m)

Mobile Sources: Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes.

Natural Sources: Non-manmade emission sources, including biological and geological sources, wildfires, and windblown dust.

Nitric Oxide (NO): Precursor of ozone, NO_2, and nitrate; nitric oxide is usually emitted from combustion processes. Nitric oxide is converted to nitrogen dioxide (NO_2) in the atmosphere, and then becomes involved in the photochemical processes and/or particulate formation.

Nitrogen Oxides (Oxides of Nitrogen, NO_X): A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO_2 at higher concentrations is associated with numerous adverse health effects.

Non-Methane Hydrocarbon (NMHC): The sum of all hydrocarbon air pollutants except methane. NMHCs are significant precursors to ozone formation.

Ozone (O_3): A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy and ozone precursors, such as hydrocarbons and oxides of nitrogen. Ozone exists in the upper atmosphere ozone layer (stratospheric ozone) as well as at the Earth's surface in the troposphere (ozone). Ozone in the troposphere is associated with numerous adverse health effects. It is a major component of smog.

Particulate Matter (PM): Any material, except pure water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse, wind-blown dust particles to fine particle combustion products.

PPB or PPM: Parts per billion by volume or parts per million by volume

$PM_{2.5}$: Includes tiny particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. Their small size allows them to make their way to the air sacs deep within the lungs where they may be deposited and result in adverse health effects.

Sulfur Dioxide (SO_2): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Sour gas processing plants, oil sands processing plants and coal-fired power generating plants are major sources of SO_2. SO_2 and other sulfur oxides contribute to the problem of acid deposition.

Total Hydrocarbons (THC): The sum of all hydrocarbon air pollutants.

Total Organic Compounds (TOC): Gaseous organic compounds, including reactive organic gases and the relatively unreactive organic gases such as methane.

Total Reduced Sulphur Compounds (TRS): Sulphur-containing family of compounds consisting of hydrogen sulphide, mercaptans and others.

Volatile Organic Compounds (VOCs): Carbon-containing compounds that evaporate into the air (with a few exceptions). VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints.

PASZA

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