PASZA

Peace AirShed Zone Association

"Kleskun Hills Sunrise" Photographer: Lloyd Dykstra

2009 Annual Report

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"October Sky at Kleskun Hills" Photographer: Katalin Ormay

Glossary of Terms

AAAQO - Alberta Ambient Air Quality Objectives
AAC - Alberta Airsheds Council
AENV - Alberta Environment
AQI - Air Quality Index
CASA - Clean Air Strategic Alliance
AQM - Air Quality Monitoring
CFOs - Confined Feeding Operations
CO - Carbon monoxide
CWS - Canadian wide standards
ERCB - Energy Resources Conservation Board
H_2S - Hydrogen sulphide
Micron - One-millionth of a meter (1X 10^{-6} m)
µg/m³ - microgram per cubic meter
NAPS - National Air Pollution Surveillance
NO_2 - Nitrogen dioxide
O_3 - Ozone
PASZA - Peace Airshed Zone Association
PM $_{2.5}$ - Respirable particulate matter
ppb - Parts per billion by volume
ppm - Parts per million by volume
QA/QC - Quality assurance/quality control
SO_2 - Sulphur dioxide
THC - Total hydrocarbons
TRS - Total reduced sulphur compounds
VOC - Volatile organic compounds

For definitions of terms, go to:
www.pasza.ca

"Jump for Joy" Photographer: Nyssa Badger

Message from the Chair

It is with pleasure that I present the 2009 Peace Airshed Zone Association (PASZA) Annual Report on behalf of the Board of Directors. This was a year of change and challenges for PASZA. The continued commitment from our growing membership and Board of Directors has largely contributed to our success in the past year.

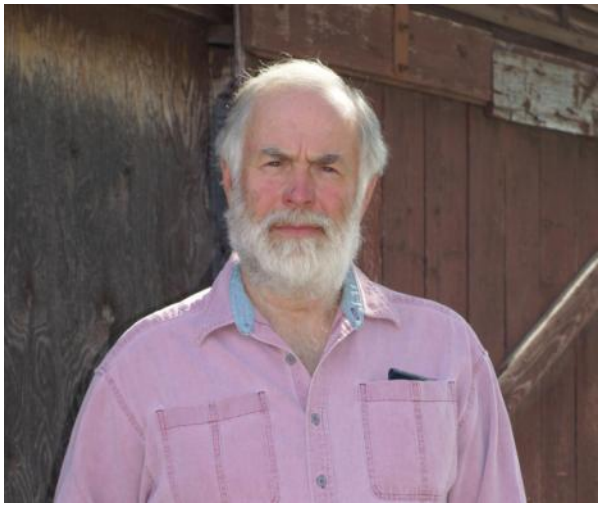
Our contractors and staff continue to operate our network with attention to detail that keeps our organizations credibility at a high level with regulators, our network supporters and the public.

Interest in regional air quality monitoring continues to grow. PASZA has received requests to provide information and support beyond PASZA's borders both North in the Peace River area and into British Columbia. Increased public awareness of air quality monitoring programs has provided PASZA the opportunity to promote the airshed model in new areas.

In 2009, I participated on the Clean Air Strategic Alliance (CASA) Airshed Zone Membership Committee that has come to successful resolution. Not with a board seat for the Alberta Airsheds Council (AAC) but, a high level committee to ensure airsheds interests are not overlooked in the development of air quality monitoring and management policy at the CASA Board and in team processes. However, there remains question at the provincial level as to how airsheds will integrate with land use planning and cumulative effects management.

PASZA worked hard to continue to build on the various communication outreach programs in 2009, thank you to members who voluntarily promote PASZA in their communities. Thank you to our numerous supporters for their hard work and dedication to PASZA's past success and I look forward to working with everyone in 2010.

Bob Cameron, PASZA Chair



The Year in Review

2009 was a busy year for PASZA with significant projects and organizational changes. In a difficult economic year, PASZA focused on eliminating capital expenditures and reducing operating costs where possible.

PASZA's AQM Program

In the eighth year of operation, the PASZA AQM program continues to measure air quality parameters to characterize regional air quality. Air quality is monitored continuously at 6 locations and passively at 43 stations.

In 2009, AQM program upgrades and improvements included a shelter replacement at the Beaverlodge station. The Henry Pirker and Beaverlodge stations received upgraded equipment to measure fine particulate matter.

Portable AQM Station

The purpose of the portable air quality monitoring station (rover station) is to continuously measure air quality where technical and geographical monitoring data gaps exist and/or there are local concerns about air quality. The rover station completed 18 months of monitoring in the Spirit River area in March 2009. The Spirit River location was selected because previous long-term air quality monitoring had not occurred in the area. The Rover station was relocated to the Kinuso area in April 2009 and has collected air quality data at this location for approximately 12 months. The Kinuso area was selected as it is an area with no previous long-term air quality monitoring.

Girouxville Confined Feeding Operations (CFOs) Monitoring Program

PASZA continues to operate 6 passive H_2S monitoring stations in the Girouxville area. These stations were installed in response to air quality concerns around CFOs. The AENV Portable Air Monitoring Lab (PAML-3) measured air quality in this area for approximately twelve months between 2007 and 2008. PASZA will have a report of the findings available on our web page in 2010.

"Kleskun Crocuses" Photographer: Katalin Ormay

The Year in Review

PASZA's Organization

In 2009 PASZA reviewed and modernized the society's bylaws based on organizational growth and changes since inception. The amended bylaws were formally registered with Alberta Registries and are available for review on our webpage.

PASZA Communication, Education and Outreach

Community outreach and education remains a high priority, to promote PASZA and PASZA's vision while improving understanding about air quality.

Presentations - PASZA made several presentations to various organizations, stakeholders and members throughout the year.

Trade shows - Participation in trade shows included the Oil and Gas Show, the Ag show and the Grande Prairie Canada Day celebrations.

Web Page - The web page redesign continues with improvements in a user friendly layout to access information.

Photo Contest - The photo contest encourages amateur photographers to submit photographs taken within PASZA's boundaries under the theme "Air Quality in the Peace Region". Thank you to everyone who entered photographs, the calibre of photographers in the Peace Region and their work is astounding. The winners will be recognized at the 2010 Annual General Meeting and their photographs are featured throughout this report.

Radio Advertising - Through local radio advertising PASZA shared an environmental message to promote better air quality and thank our funding members for their support.

PASZA's People

With the departure of the Airshed Program Manager early in 2009, PASZA was faced with the challenge of prioritizing tasks to ensure effective management of its Regional AQM Program. This resulted in the delay of technical projects and emphasis on program manager recruitment and community outreach. With new Board of Director appointments and the recruitment of a Program Manager in September 2009, PASZA has some new faces, ideas and experience.

Thank you to past board members

In the fall of 2009, PASZA said goodbye to two long-term Board Members who had been with PASZA since its inception. PASZA gratefully acknowledges the contribution of Board Members who stepped down in 2009.

Jim Meager	Alberta Health and Wellness
Gerald Feschuk	Alberta Environment

PASZA Looking Forward

In 2010 PASZA will maintain its focus of producing scientifically credible data across the AQM network with plans to conduct an internal review of it's AQM Program to ensure the program is meeting the needs of it's stakeholders. With a program manager in place, recommencement of technical projects is a priority in 2010. PASZA will continue to build upon the successes of community outreach initiatives to promote the PASZA organization and vision.

"Unnamed" Photographer: Justin Cloutier

PASZA
Peace AirShed Zone Association

Summary of Year End Financial Report

Peace Air Shed Zone Association
Statement of Operations
(Unaudited)

For the year ended December 31	2009	2008
Income		
Members' contributions	$ 642,285	$ 526,762
Government grants	110,000	82,500
	752,285	609,262
Expenses		
Advertising and promotion	1,928	1,131
Amortization	48,184	59,092
Bank charges and interest	525	123
Contract administration	52,551	56,668
Honoraria and travel	2,068	1,164
Insurance	12,117	10,263
Memberships and licences	2,642	1,354
Monitoring contracts	415,892	519,862
Office	4,455	1,618
Professional fees	4,500	6,363
Program management fees	35,032	44,753
Utilities	-	-
	579,894	702,391
Income (loss) before the undernoted	172,391	(93,129)
Other income		
Interest income	18	719
Net income (loss) for the year	$ 172,409	$ (92,410)

PAZSA Overview

Vision

People living and working in the Peace Region will have the best possible air quality

PASZA is a registered, not for profit society established in 1999 to monitor and report ambient air quality and address regional air quality concerns in the south Peace Region. PASZA's AQM network began operations in 2002 across an area of approximately 38,000 square kilometers.

PASZA is a multi-stakeholder group with members from industry, government, health services, non-government organizations (NGOs), and the public. PASZA members collaborate to design local solutions to local air quality concerns. Members work together to promote PASZA's mandate, goals and vision including public accessibility to data and information from its monitoring network. The AQM program provides a resource for the public to learn about local air quality to ensure continuous improvement of regional air quality, protect environmental health and influence policy.

PASZA follows guiding principles, including consensus decision making. Consensus is reached when there is unanimous agreement among stakeholders and each stakeholder can live with the outcome. The purpose is to find the optimal solution within the best interests of everyone. Decisions made through consensus processes are likely to be more innovative and longer lasting than those reached through traditional negotiation.

In 2003, PASZA became the fifth airshed management zone in Alberta recognized by the CASA.

Objectives

- Operate the air monitoring network
- Produce credible information
- Foster a communications plan
- Develop long-term financial stability
- Influence public policy

Guiding Principles

- Guided by honesty and integrity
- Sensitive to needs of all members
- Consensus decision making
- Open and transparent processes
- Two-way communication between stakeholders and their representatives
- Provide a forum for public views
- Equitable and fair funding based on emissions
- Scientifically defensible and credible data

"Unnamed " Photographer: Nicole Holway

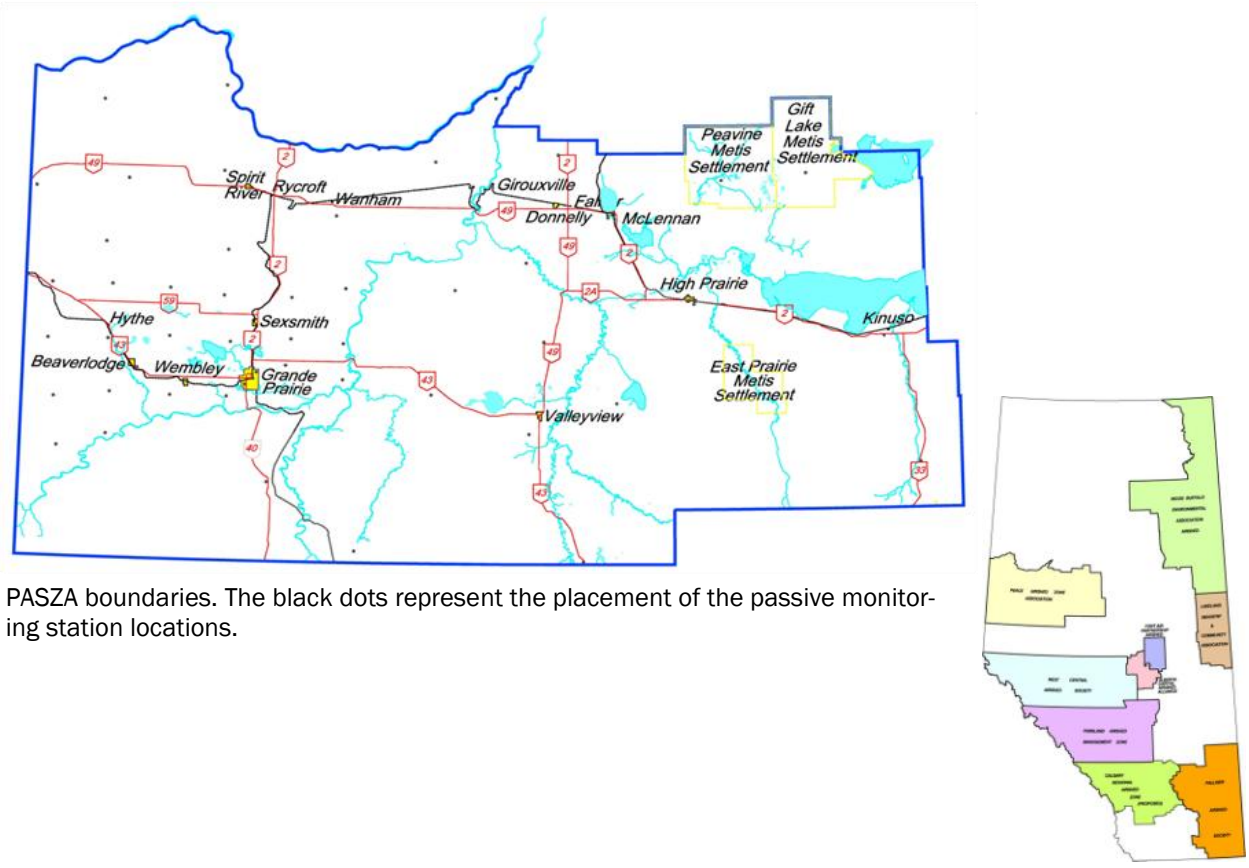
PASZA AQM Program

In 1999, PASZA initiated the development of a regional AQM Program and started reporting air quality data in 2002. The design of the monitoring program was the consensus of two years of work by PASZA's multi stakeholder Technical Committee in consultation with CASA stakeholder committees and groups in accordance Alberta's Clean Air Strategy written in 1995 and updated in 2001.

The PASZA boundary reaches west from the British Columbia border east to the eastern boundary of Range 8 West of the 5th Meridian, north to the Peace River and south to Township 65. The area encompasses approximately 38,000 square kilometers.

PASZA's AQM measures a broad range of parameters, including meteorological parameters that affect the transportation and dispersion of compounds measured in the network. The parameters that PASZA monitors are selected based on what is suspected to be present in the area and the technology available for air quality monitoring.

PASZA uses two types of air quality monitoring methods to monitor ambient air quality in the region; passive and continuous monitoring. PASZA operates a network of 6 continuous monitoring stations and 43 passive monitoring sites that collectively measure air quality in the region. In 2009, PASZA operated a temporary network of 6 passive monitoring stations around CFOs in the Girouxville area.



PASZA boundaries. The black dots represent the placement of the passive monitoring station locations.

PASZA AQM Program

Passive monitoring relies on the principles of permeation and diffusion to physically uptake the specific compound being sampled onto a reactive surface. Passive monitors sample for one calendar month and are then sent to an accredited laboratory for analysis. They provide a monthly average for the parameter being monitored.

The four parameters passively monitored include:

- Sulphur dioxide (SO_2)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Hydrogen sulphide (H_2S)

An advantage of using passive monitoring is the ability to cost effectively cover large geographical areas to measure pollutant concentrations, assess spatial variation of parameters and identify air quality trends. This method of monitoring is often used in rural and remote areas since no electricity is required.

A disadvantage to the passive monitoring is the limitation of identifying conditions related to a specific event measured during the sampling period.

Quality assurance procedures include the rotation of duplicate samples through 10 percent of the locations and the analysis of 10 percent field blanks. Laboratory analysis on all samples is done “blind” meaning that samples are analyzed with no knowledge of the sampling location.

A grid system was used to establish the passive monitoring network to reduce bias in site selection. Within the County of Grande Prairie passive monitors are located every 200 square miles, with the exception of six locations decommissioned because results were redundant with neighboring stations. Outside the County of Grande Prairie stations are located every 300 square miles except where there is limited access.

In 2010 PASZA plans to review historically limited access areas to determine if the passive monitoring network can be expanded to complete the grid system.

PASZA AQM Program

Continuous Air Quality Monitoring

Continuous monitoring provides a near instantaneous measurement of ambient concentrations. Data is collected continually by drawing ambient air through a commercial analyzer for measurement. This type of monitoring is often used in larger urban centres or in areas where pollutants may be expected to vary over shorter periods of time.

The parameters continuously monitored include:

- Sulphur dioxide (SO_2)
- Total reduced sulphur (TRS)
- Hydrogen sulphide (H_2S)
- Oxides of nitrogen (NO_2, NO and NO_X)
- Carbon monoxide (CO)
- Total hydrocarbons (THC)
- Ozone (O_3)
- Fine particulate matter ($PM_{2.5}$)

PASZA also observes meteorological parameters that affect the transportation and dispersion of compounds measured in the network including:

- Wind speed
- Wind direction
- Solar Radiation
- Outdoor Temperature
- Relative Humidity

Continuous Monitoring Station Meteorological Equipment

An advantage to using continuous monitoring is the near instantaneous measurement of many parameters for intervals as short as one minute. This provides flexibility in data assessment for varying periods of time.

A disadvantage of continuous monitoring is the high purchase and operating costs and the electricity requirements.

The continuous monitoring network was developed using a “hot spot” site selection process. Continuous monitoring stations are located in areas of higher than average concentrations of O_3, SO_2 or NO_2 as identified by the passive monitoring data. The hot spot method selected areas where a higher resolution of air quality data will increase understanding of air quality in the region.

The continuous monitoring stations are operated in accordance with *Alberta’s Air Monitoring Directive* including daily instrument checks, monthly multipoint calibration, and annual audits conducted by AENV. A detailed quality assurance plan outlines the process by which data is collected and reported. PASZA conducts monthly and annual review of data for variances and trends.

Inside the Beaverlodge Air Quality Monitoring Station

Another advantage of continuous monitoring is the ability to calculate an Air Quality Index (AQI). AQI ratings provide people with a basic hourly measure of outdoor air quality.

The AQI rating is based on the hourly concentrations of the following five parameters:

- Fine Particulate Matter ($PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Sulphur dioxide (SO_2)
- Carbon monoxide (CO)

The AQI rating system using the following four categories:

AQI Rating	AQI Index	Effects
Good	1-25	No known harmful effects to soil, water, vegetation, animals, visibility or human health.
Fair	26-50	Adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health
Poor	51-100	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	>100	In this range, further deterioration of air quality and continued high readings could pose a risk to public health.

For more information on Alberta's AQI visit the AENV website at www.environment.alberta.ca.

The Beaverlodge and Henry Pirker Stations are equipped to calculate AQI ratings.

Reporting

PASZA provides up to the minute data for public viewing on our website at www.pasza.ca. PASZA also continues to submit hourly AQI data to AENV. The AQI is calculated and updated every hour, 24 hours a day and can be viewed on our website and the AENV website. PASZA reports validated data to the CASA Data Warehouse the province wide central data repository for all ambient air quality data in Alberta. As well, PASZA submits monthly and annual air quality monitoring summary reports to AENV.

All data collected in PASZA's AQM Program is compared against the AAAQO as defined in the *Alberta Environment Protection and Enhancement Act*. The AAAQO are intended to provide protection of the environment and human health. PASZA reports any exceedences of AAAQO to AENV 24 hours a day.

"Unnamed"
Photographer: Steven McQuaig

PASZA AQM Program

Henry Pirker Station

The Henry Pirker continuous monitoring station, located in Muskoseepi Park in Grande Prairie, has been in operation since February 2004.

Evergreen Park Station

The Evergreen Park continuous monitoring station is located along Resources Road, in the southeast end of the City of Grande Prairie. The station has been in operation since March 2005.

Kinuso—Rover Station

The Rover continuous monitoring station is a portable trailer equipped to measure various air quality monitoring parameters. The station was located in the Spirit River area until March 2009.

The Rover station was relocated to the Kinuso area in April 2009 .

Beaverlodge Station

The Beaverlodge continuous monitoring station is located on the Agriculture Canada Research Farm near Beaverlodge. This station was installed by AENV in November 1, 1997. This station has been operated by PASZA since April 2005.

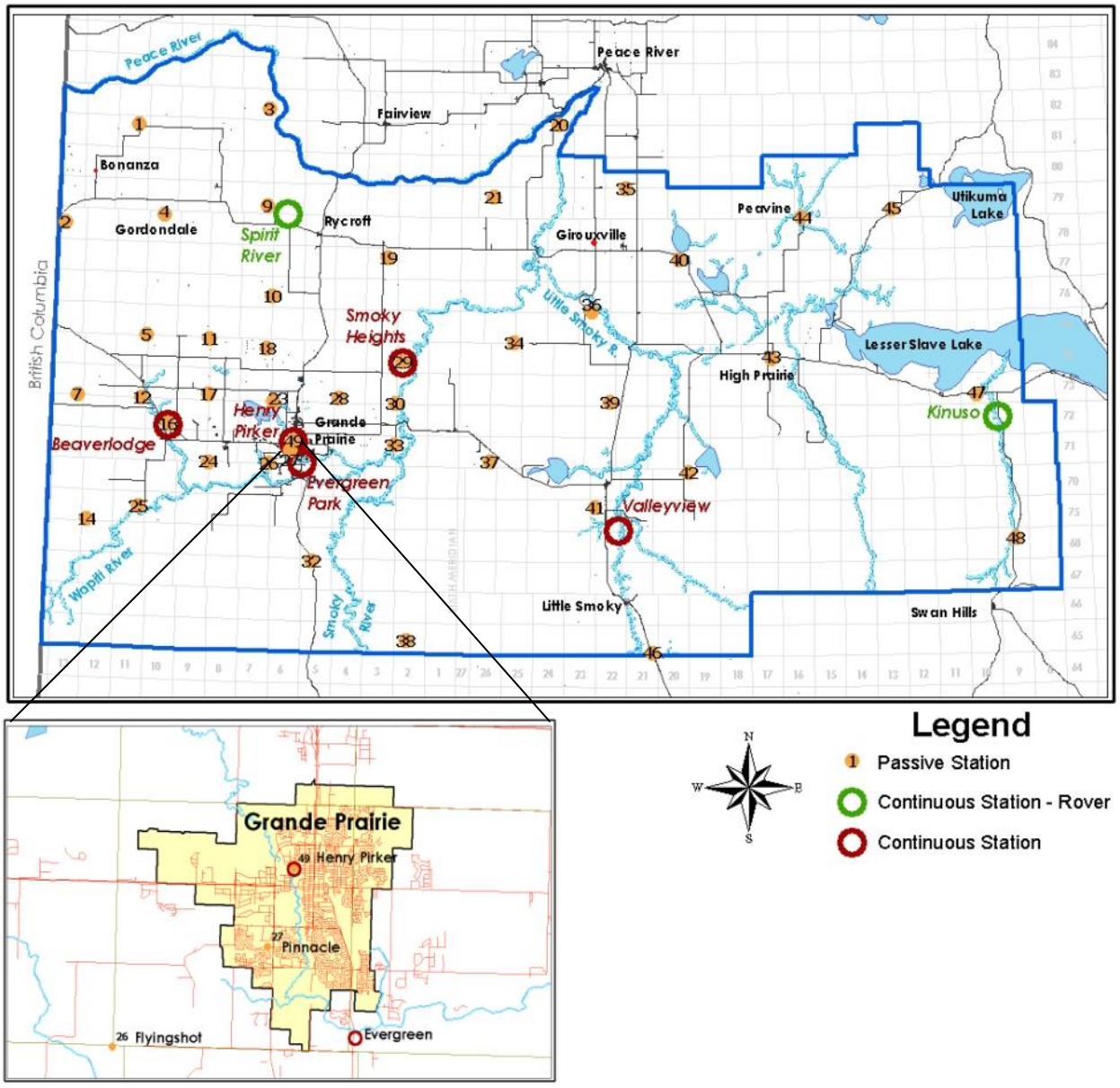
Smoky Heights Station

The Smoky Heights continuous monitoring station is located east of Teepee Creek near the banks of the Smoky River. The station has been in operation since March 2005.

Valleyview Station

The Valleyview continuous monitoring station is located approximately 14 km southeast of the town of Valleyview. This station has been operated by PASZA since September 2006. A building upgrade replacement is scheduled for 2010.

Map of PASZA Airshed and AQM Stations



Passive Monitoring Stations

1 Silver Valley
2 Bay Tree
3 Forth Creek
4 Gordondale
5 Boone Creek
7 Steeprock Creek
9 Spirit River
10 Woking
11 Webber Creek
12 Hythe
14 Sylvester
16 Beaverlodge
17 Poplar
18 Saddle Hills
19 Wanham
20 Shaftesbury
21 Eaglesham
23 Bear Lake
24 Wembley
25 Pinto Creek
26 Flyingshot
27 GP Pinnacle
28 Clairmont Lake
29 Smoky Heights
30 Fitzsimmons
32 Gold Creek
33 Wapiti
34 Puskwaskau
35 Jean Cote
36 Guy
38 Karr Creek
39 Clouston Creek
40 McLennan
41 Valleyview
42 Sunset House
43 High Prairie
44 Peavine
45 Gift Lake
46 Little Smoky
47 Kinuso
48 Deer Mountain
49 GP Henry Pirker

Summary of AQM Program Data

The table below lists the parameters measured at each continuous monitoring station and summarizes the percentage of time each monitoring instrument was in operation for 2009. PASZA monitors uptime to ensure proper operation of the network and strives to achieve a minimum of 95 percent operational uptime which is above the 90 percent guideline set out in the *Alberta Air Monitoring Directive.*

2009 Average Instrument Uptime (%)

Parameter	Henry Pirker	Evergreen Park	Smoky Heights	Beaverlodge	Valleyview	Spirit River-Rover	Kinuso-Rover
Sulphur Dioxide	100.0	99.9	92.0	98.8	99.8	94.9	99.1
Total Reduced Sulphurs	99.9	99.0	92.0	-	-	94.7	99.1
Nitrogen Dioxide	99.9	-	-	98.8	-	94.9	99.1
Ozone	99.9	-	-	98.8	-	85.9	72.9
Carbon Monoxide	99.9	-	-	-	-	-	-
Total Hydrocarbons	99.0	-	-	-	-	-	-
Fine Particulate	93.5	98.9	98.6	98.6	-	-	-
Hydrogen Sulphide	-	-	-	-	99.8	-	-
Wind Speed	98.8	99.4	99.2	98.8	99.8	88.2	98.7
Wind Direction	98.8	99.4	99.2	98.8	99.8	88.2	98.7
Solar Radiation	99.9	-	-	-	-	-	-
Outdoor Temperature	100.0	100.0	99.7	99.1	99.8	94.5	99.1
Relative Humidity	100.0	99.9	-	98.5	99.3	96.9	-

Note: - indicates parameter not monitored

An uncontrolled power outage resulted in an operational uptime of less than 90 percent for the wind speed and direction sensors at the Spirit River Rover station. The O_3 instrument at the Spirit River and Kinuso Rover stations had an operational uptime of 85.9 and 72.9 percent, respectively, resulting from equipment and

2009 Air Quality Objective Exceedances

Parameter Measured	AAAQO		2004	2005	2006	2007	2008	2009
Nitrogen dioxide ($NO_{2)}$	212 ppb	1 hour	0	0	0	0	0	0
	106 ppb	24 hour	0	0	0	0	0	0
	32 ppb	Annual	0	0	0	0	0	0
Ozone (O_3)	82 ppb	1 hour	0	0	0	0	0	3
Sulphur dioxide ($SO_{2)}$	172 ppb	1 hour	0	0	0	0	0	0
	57 ppb	24 hour	0	0	0	0	0	0
	11 ppb	Annual	0	0	0	0	0	0
Hydrogen sulphide (H_2S)	10 ppb	1 hour	0	3	3	1	0	0
	3 ppb	24 hour	0	0	1	0	0	0
Carbon monoxide (CO)	13 ppm	1 hour	0	0	0	0	0	0
	5 ppm	3 hour	0	0	0	0	0	0
Particulate matter ($PM_{2.5}$)	30 (ug/m^3)	24 hour	-	-	-	0	0	6

* - indicates not monitored

The table above summarizes exceedences of the AAAQO observed at PASZA continuous monitoring stations from 2004 through 2009. Exceedences of the AAAQO are reported to AENV. An increase in $PM_{2.5}$ across the network resulted in 6 24-hour AAAQO exceedances in 2009. The AAAQO exceedances for O_3 and $PM_{2.5}$ are discussed in more detail in subsequent sections of this report.

Nitrogen Oxides (NO_2)

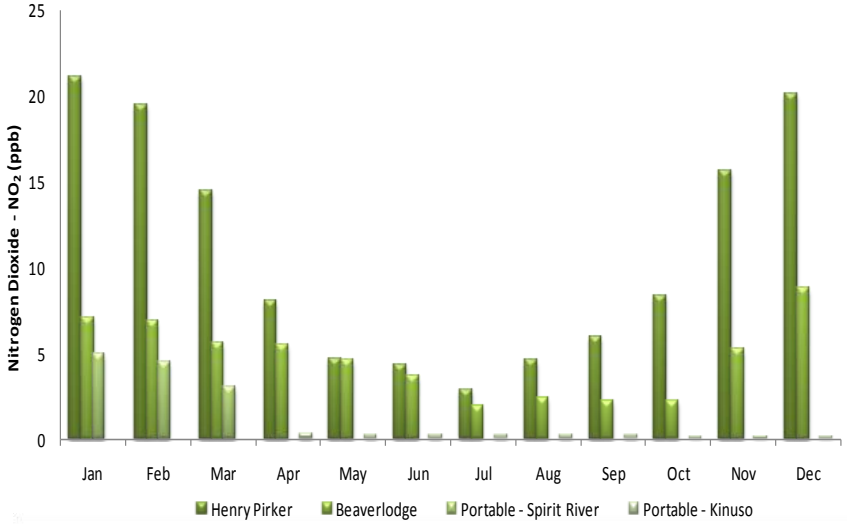
NO_2 and nitric oxide (NO) are known collectively as oxides of nitrogen (NO_x). NO_x is partially responsible for the brown haze sometimes observed near urban centres. In Alberta, transportation (cars, trucks, trains and planes) is the major source of NO_x. Other major sources include the oil and gas industries and power plants. High temperature combustion (burning of coal, gasoline and oil) generates NO, NO_2 is produced when NO reacts with O_3 to form NO_2. NO_2 can form acidic compounds in the air responsible for acid deposition.

AAAQO for NO_2	
1—hour average:	212 parts per billion
24—hour average:	106 parts per billion
Annual average:	32 parts per billion

Monthly Average NO_2

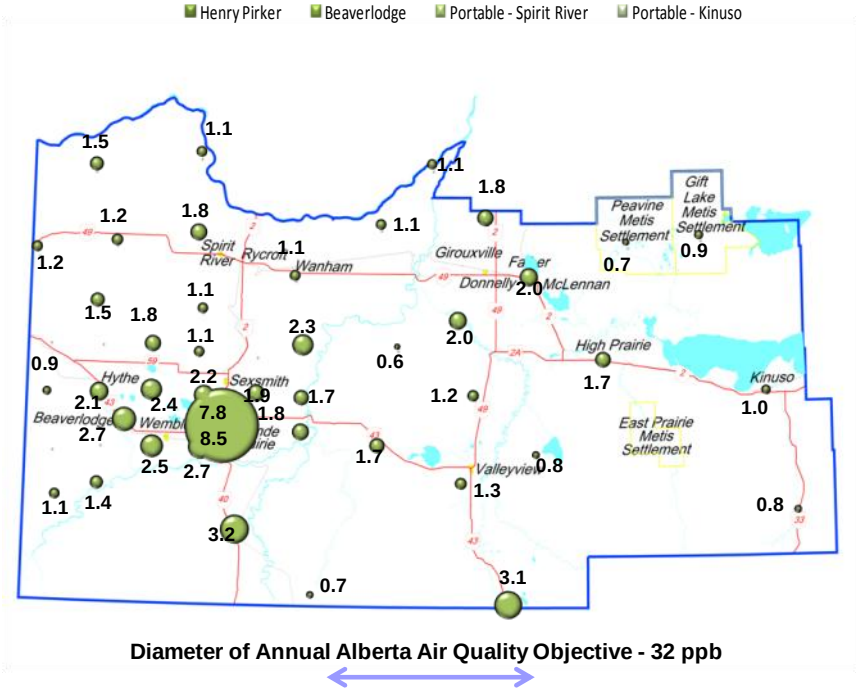
2009 Continuous Monitoring Data

Increase NO_2 emissions during winter months may be attributed to increase emissions from residential heating and vehicle idling.



Annual Average NO_2

2009 Passive Monitoring Data



The 2009 NO_2 concentrations observed in the network illustrate higher average concentrations within the City of Grande Prairie and may be attributed to higher concentration of sources including vehicle traffic and residential heating. The lowest NO_2 levels were at the Puskwaskau station located north of Debolt.

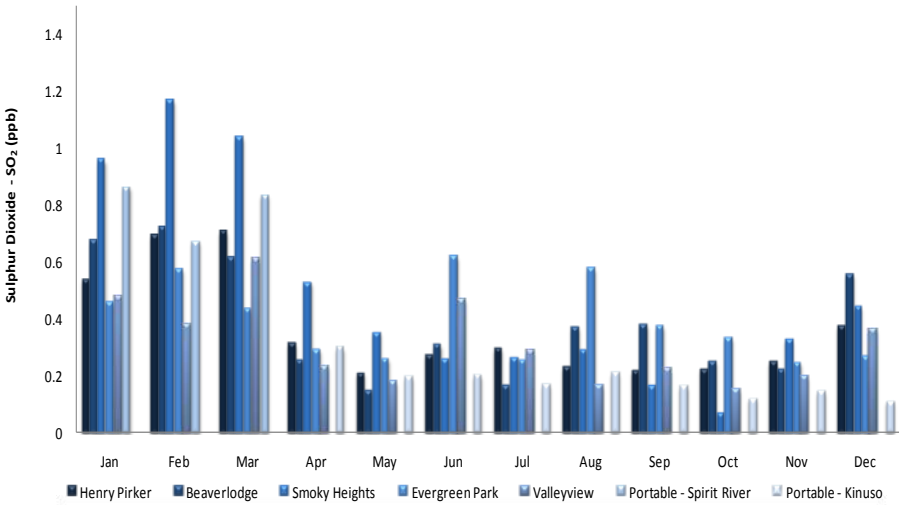
Sulphur Dioxide (SO_2)

SO_2 is a colourless gas with a pungent odour. SO_2 is produced by the burning of fossil fuels. In Alberta, natural gas processing plants are responsible for close to half of the emissions of this gas. Oil sands facilities and power plants are also major sources. Other sources include gas plant flares, oil refineries, pulp and paper mills and fertilizer plants. SO_2 also contributes to for acid deposition and the formation of suspended fine particulate matter.

AAAQO for SO_2	
1—hour average:	172parts per billion
24—hour average:	57parts per billion
Annual average:	11 parts per billion

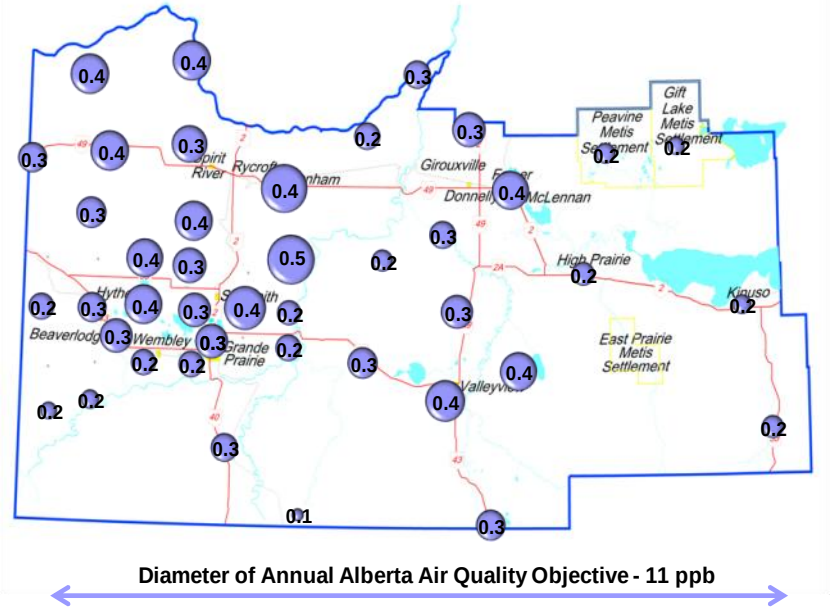
Monthly Average SO_2

2009 Continuous Monitoring Data



Annual Average SO_2

2009 Passive Monitoring Data



Diameter of Annual Alberta Air Quality Objective - 11 ppb

Ozone (O_3)

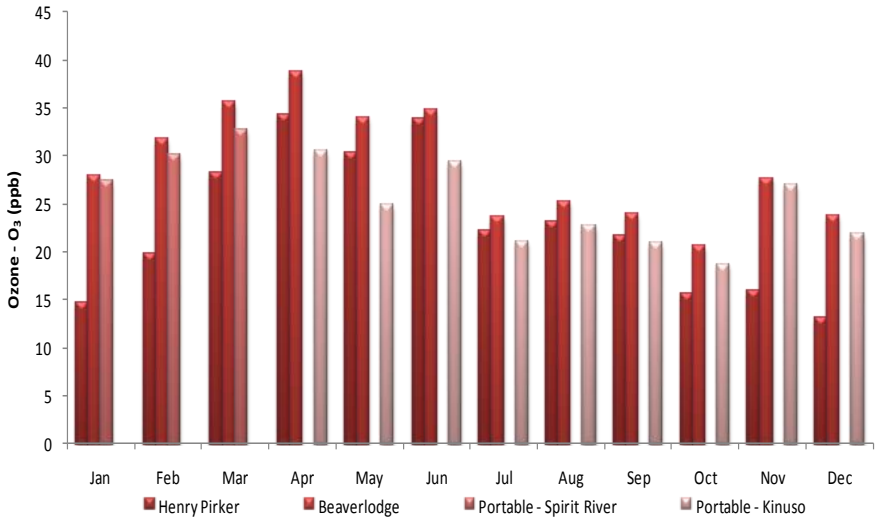
O_3, unlike other pollutants is not emitted directly by human activities, but is produced by a complex chemical reaction involving NO_x and volatile organic carbons (VOCs) in the presence of sunlight. O_3 in the upper atmosphere is also transported to the ground level from natural weather processes. Ground level O_3 is a component of summer time smog. O_3 can be carried from upwind sources such as urban centres and industrial complexes. At normal concentrations, O_3 is a colourless, odourless gas but can have a sharp odour at very high concentrations. O_3 has a minimum perceptible threshold of 7.6 ppb.

AAAQO for O_3	
1—hour average:	82 parts per billion

Monthly Average O_3

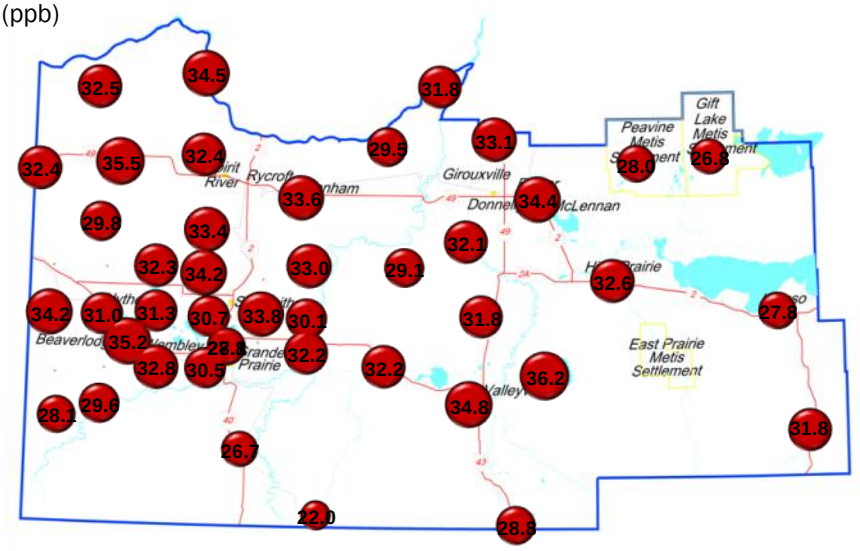
2009 Continuous Monitoring Data

The O_3 concentrations are highest in the spring and early summer when O_3 production at ground level is at a maximum due to higher levels of sunlight. Increased O_3 values during the winter months may be caused by atmospheric process.



Annual Average O_3

2009 Passive Monitoring Data (ppb)



The bubble map displays the relatively homogeneous levels of zone throughout the region. The highest annual average concentrations were measured near Sunset House a community located northwest of Valleyview. In 2009, there were 3 exceedences of the 1-hour AAAQO for O_3 of 98 ppb, 98 ppb and 105 ppb, which, occurred at the Kinuso station on August 29th. At this time forest fires adjacent to the PASZA region may have caused high O_3 readings.

Total Reduced Sulphur (TRS)

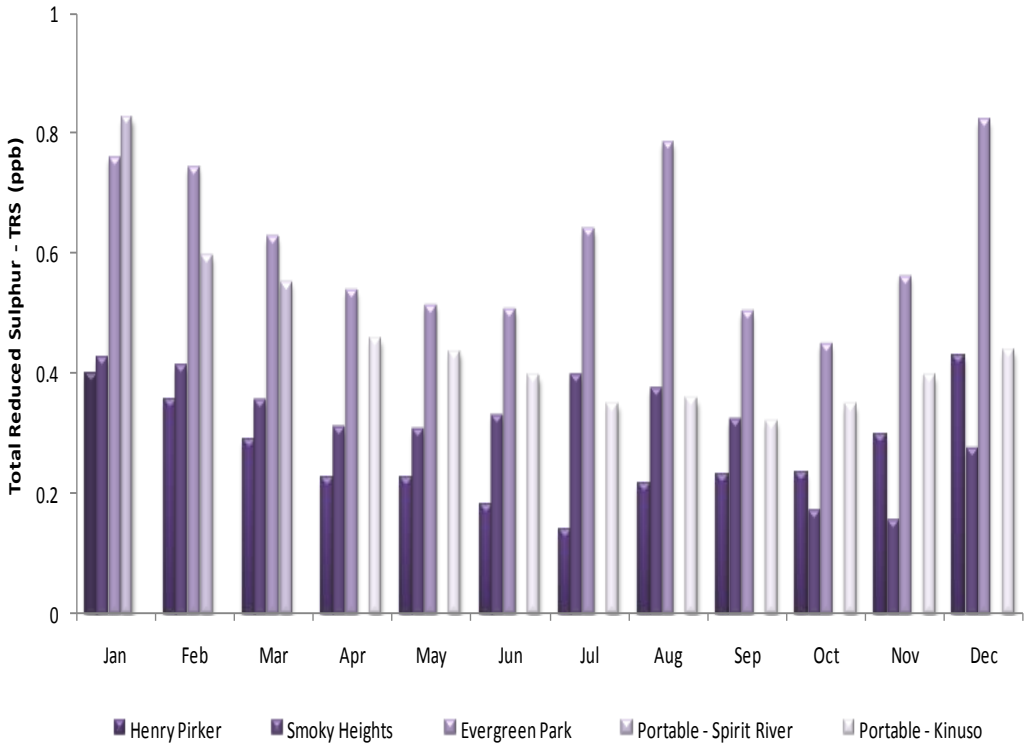
TRS includes hydrogen sulphide (H_2S), mercaptans, dimethyl sulphide, dimethyl disulphide and other sulphur compounds. The major industrial sources of TRS and H_2S are petroleum refineries, tank farms for unrefined petroleum products, natural gas plants, petrochemical plants, oil sands plants, sewage treatment facilities, pulp and paper plants that use the Kraft pulping process, and animal feedlots. SO_2 is not a reduced sulphur.

AAAAQO for TRS

Currently there is no AAAQO for TRS only H_2S

Monthly Average TRS

2009 Continuous Monitoring Data



The above represents the average monthly concentrations of TRS measured across the network.

Hydrogen Sulphide (H_2S)

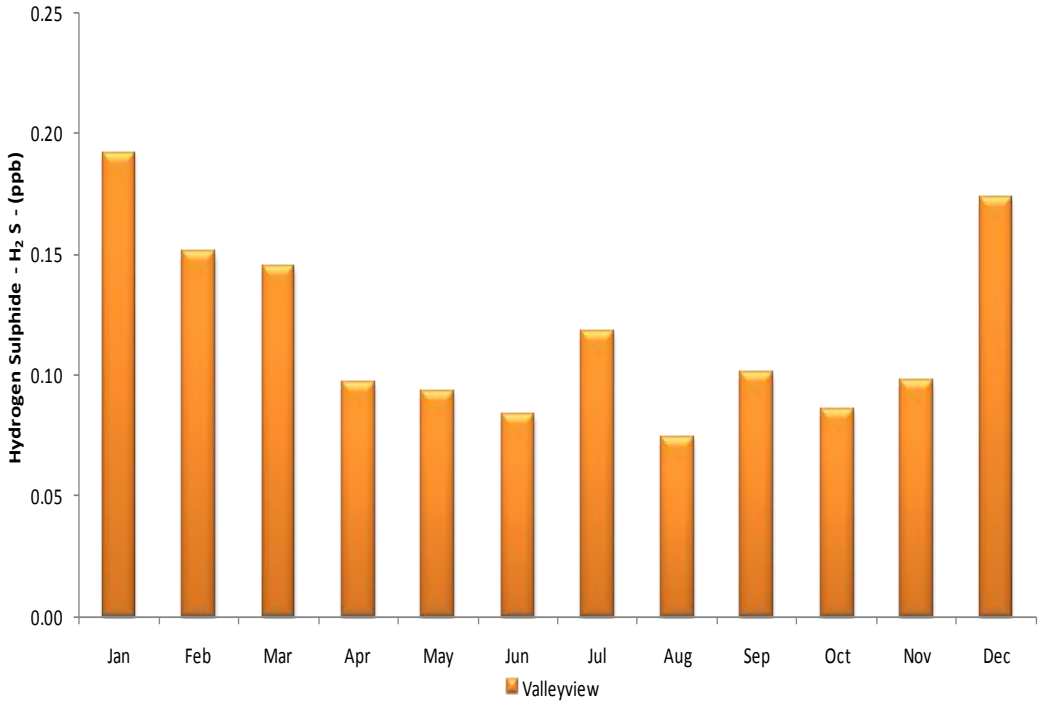
H_2S is a highly toxic colourless gas with an offensive odour, often compared to rotten eggs. Sources of H_2S include fugitive emissions from petroleum refineries, sewage treatment facilities, pulp and paper mills that use Kraft pulping processes, natural gas processing plants, petrochemical plants, iron smelters and animal feedlots. Natural sources include sulphur hot springs, stagnant water bodies and animal waste.

AAAQO for H_2S

1—hour average:	10 parts per billion
24—hour average:	3 parts per billion

Monthly Average H_2S

2009 Continuous Monitoring Data



The above represents the average monthly concentrations of H_2S concentrations measured at the Valleyview Station.

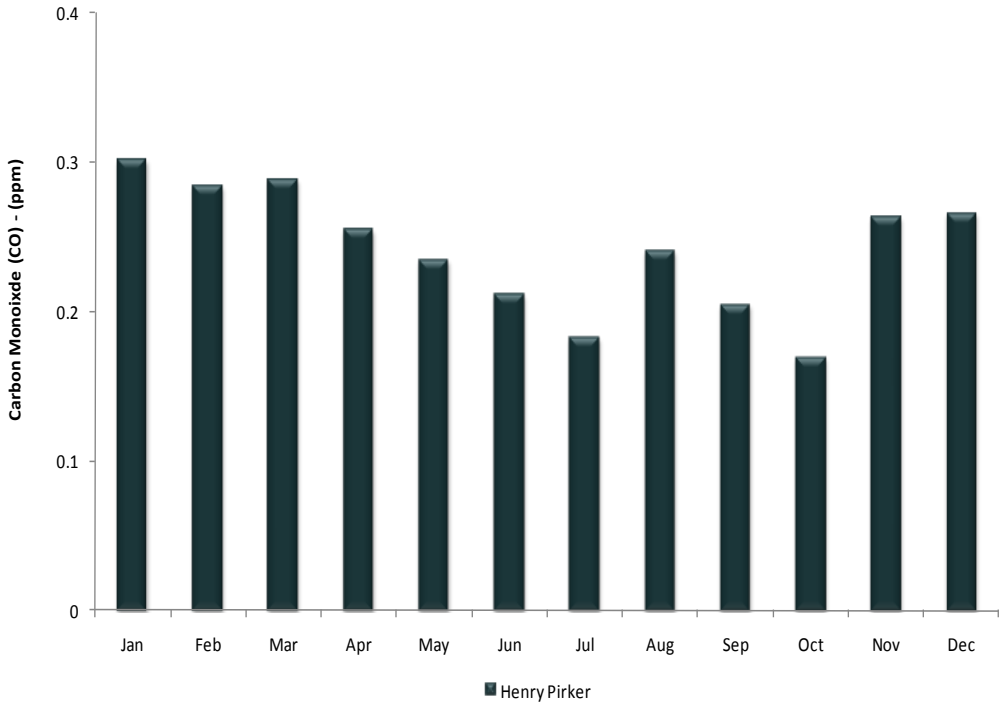
Carbon Monoxide (CO)

CO is a colourless, odourless gas formed primarily from the incomplete combustion of gasoline, wood, and diesel. 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.

AAAQO for CO	
1—hour average:	13 parts per million
24 hour average:	5 parts per million

Monthly Average CO

2009 Continuous Monitoring Data



The above represents the average monthly concentrations of CO measured at the Henry Pirker Station. The major source of CO at this location is vehicle emissions.

Total Hydrocarbons (THC)

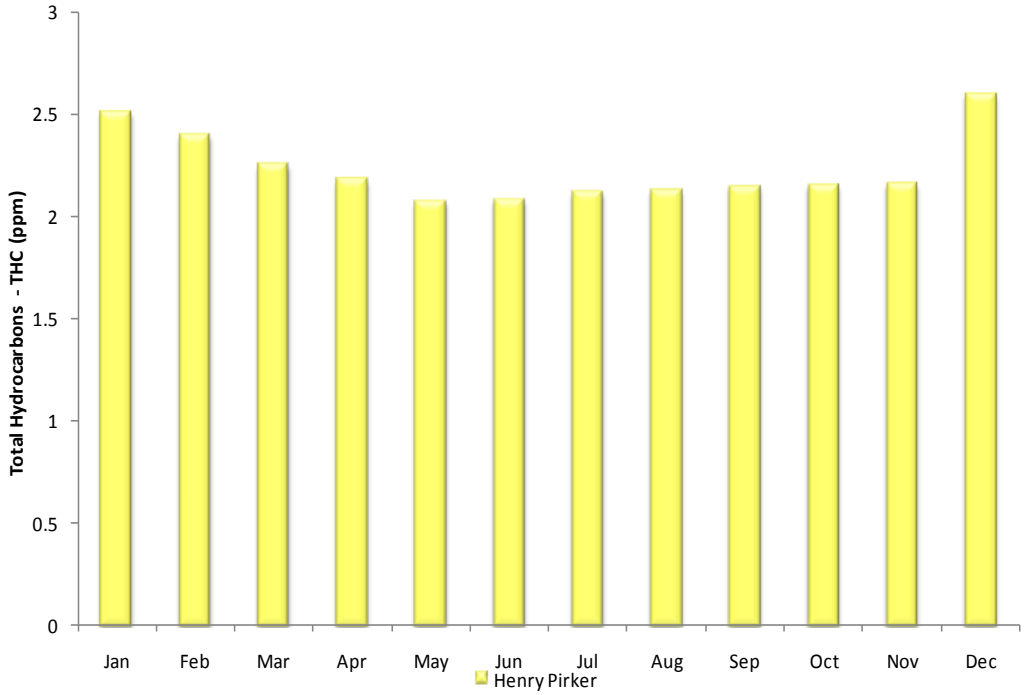
THC refers to a broad family of chemicals that contain carbon and hydrogen atoms. Methane a non-reactive hydrocarbon, is the most common hydrocarbon in the Earth's atmosphere. Specific reactive hydrocarbons or non-methane hydrocarbons are important as they react with NO_x in the presence of sunlight to form O_3 and they can be toxic at high concentrations to humans, animals and vegetation. Major sources of hydrocarbons include vegetation, vehicle emissions, gasoline storage tanks, petroleum and chemical industries and fugitive emissions such as leaks and evaporation of solvents. Hydrocarbons are highest in the winter at monitoring stations located close to major traffic routes. Normal background THC concentrations recorded in rural Alberta range from 1.5 to 2 ppm

AAAQO for THC

Currently there is no AAAQO for THC

Monthly Average THC

2009 Continuous Monitoring Data



The above represents the average monthly concentrations of THC measured at the Henry Pirker Station.

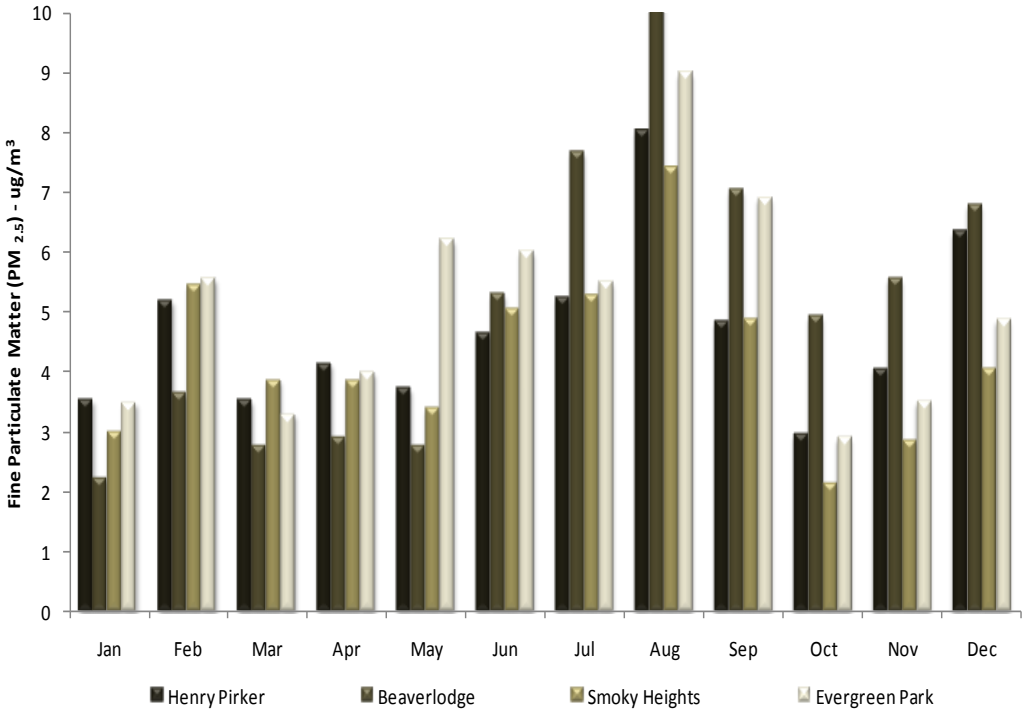
Fine Particulate Matter (PM 2.5)

Inhalable particulates are particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}). Human hair for example, is about 70 µm in diameter. PM_{10} can be inhaled into the nose and throat. Sources include soil dust, road dust, agricultural dust during harvest, smoke from forest fires and wood burning, vehicle exhaust and industrial emissions. Respirable particulates are those particulate matter less than 2.5 µm ($PM_{2.5}$) in aerodynamic diameter. $PM_{2.5}$ may form in the atmosphere or arise from combustion sources such as vehicle exhaust emissions, industrial emissions and wood burning.

AAAQO for $PM_{2.5}$	
24 hour average:	30 micrograms/m³

Monthly Average $PM_{2.5}$

2009 Continuous Monitoring Data



The above represents the average monthly concentrations of PM 2.5 measured across the network. PM 2.5 concentrations increased across the entire network in 2009, with the highest increased concentrations observed during the summer months.

In 2009, there were 6 exceedences of the 24-hour AAAQO for $PM_{2.5}$. On August 29th 4 exceedences were observed at the Henry Pirker, Evergreen Park, Smoky Heights and Beaverlodge stations. Henry Pirker measured a value of 32.6 µg/m³, while Evergreen Park, Smoky Heights and Beaverlodge stations all measured 35 µg/m³. At this time forest fires were burning in British Columbia and may have caused high $PM_{2.5}$ readings across the PASZA zone.

The Evergreen Park station observed 2 additional exceedences of the $PM_{2.5}$ 24-hour guideline. They were measured on May 30th and September 26th of 2009. The values of the 24-hour average were 60µg/m³ and 50.5µg/m³ respectively and both observed winds from the west. Several industrial sources are located west of the station and road construction was in progress during this time.

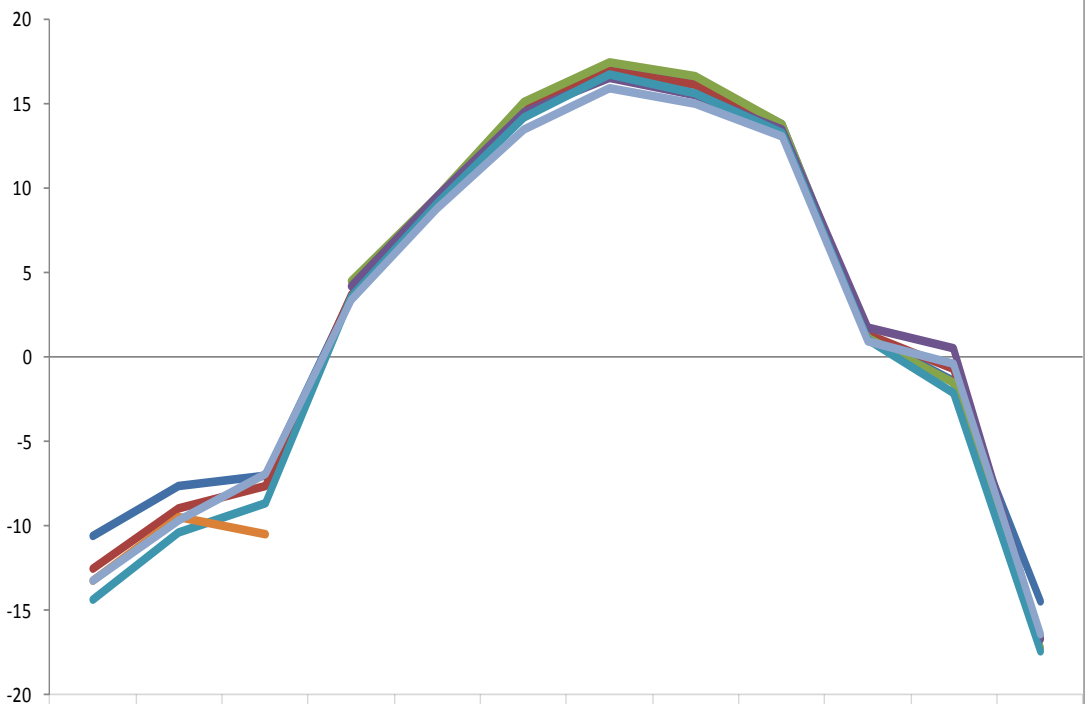
Meteorology

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 source. Air pollution transport and dispersion are influenced by wind speed and direction, the temperature structure of the atmosphere, the solar cycle, and turbulence. As well as changes in these elements induced by local topography.

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

Monthly Average Outdoor Air Temperature (Degrees Celsius)

2009 Continuous Monitoring Data



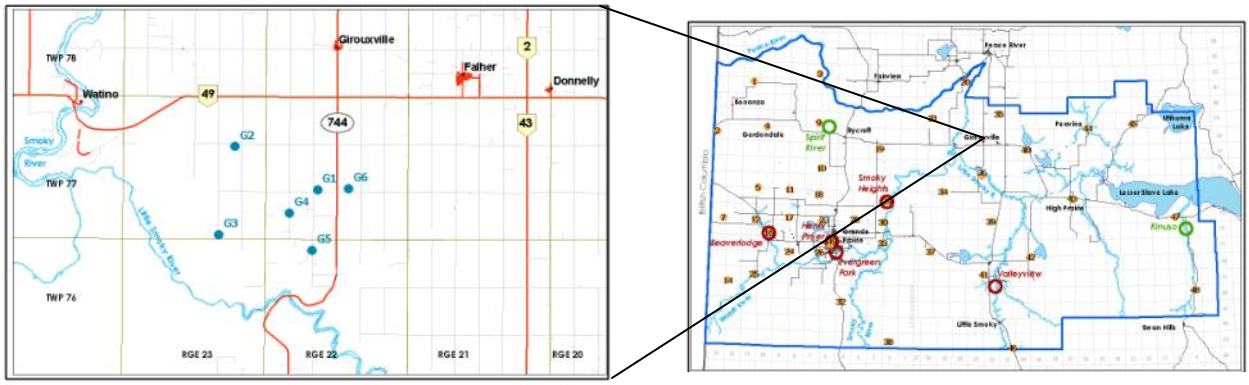
	January	February	March	April	May	June	July	August	September	October	November	December
Beaverlodge	-10.6	-7.6	-7.1	3.6	9.1	14.5	17.2	16.4	13.7	1.2	-1.5	-14.5
Evergreen Park	-12.6	-9.0	-7.7	3.6	9.1	14.6	16.9	16.1	13.6	1.3	-0.8	-16.7
Henry Pirker				4.4	9.4	15.0	17.4	16.6	13.7	1.1	-1.5	-17.3
Kinuso - Portable				4.2	9.5	14.4	16.5	15.5	13.4	1.7	0.5	-16.7
Smoky Heights	-14.3	-10.4	-8.6	3.6	9.1	14.1	16.7	15.6	13.3	1.0	-2.2	-17.5
Spirit River - Portable	-13.3	-9.5	-10.5									
Valleyview	-13.3	-9.7	-7.0	3.4	8.7	13.5	15.9	15.0	13.0	0.9	-0.5	-16.4

Girouxville Monitoring Program

PASZA installed six passive hydrogen sulphide (H_2S) monitoring stations in the Girouxville area to assess air quality surrounding CFOs. The passive monitoring stations have been operating since 2007 and were installed in coordination with the operation of the AENV Portable Air Monitoring Lab (PAML-3) in response to air quality concerns around CFOs. While the PAML-3 was operated until October 2008, PASZA continues to operate six passive H_2S stations in this area.

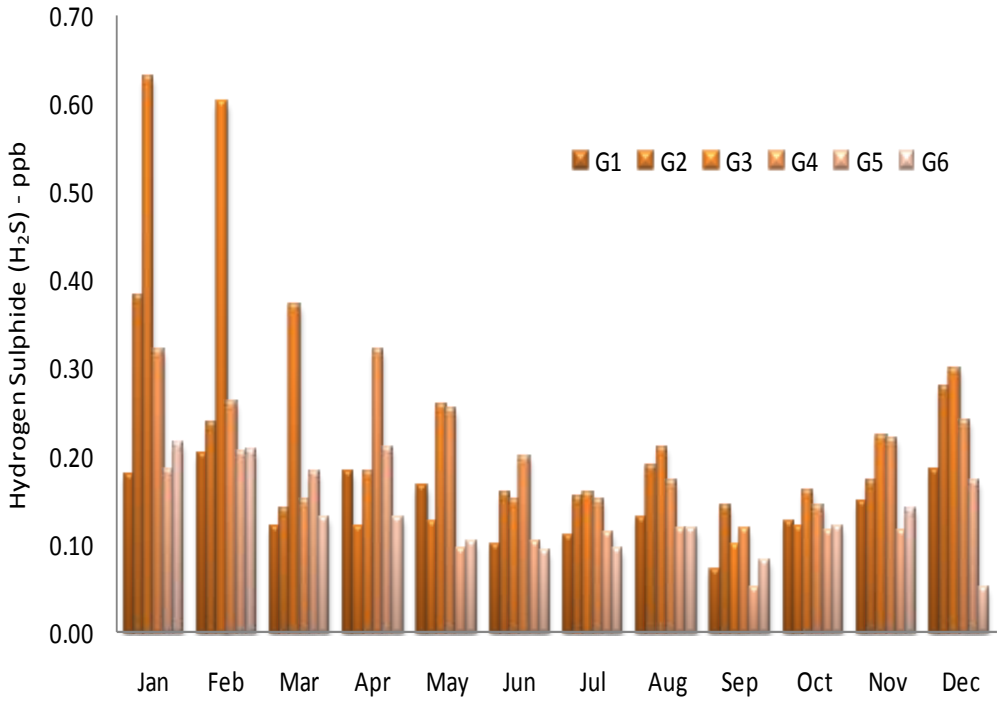
AAAQO for H_2S	
1–hour average:	10 ppb
24–hour average:	3 ppb

Passive Monitoring Station Locations



Monthly Average H_2S (ppb)

2009 Passive Monitoring Data



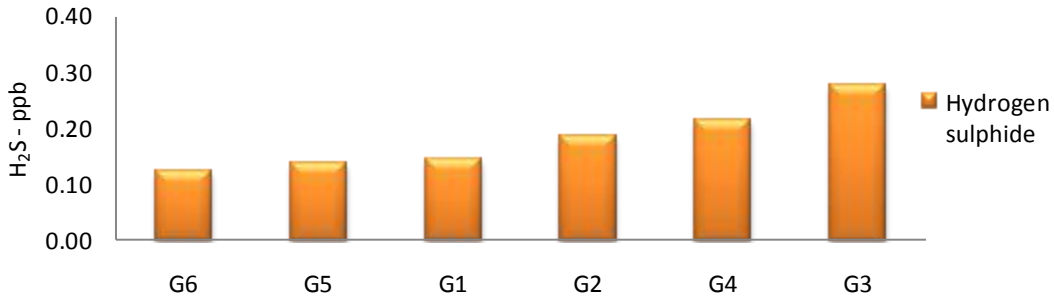
H_2S monthly average concentrations measured indicate higher levels during the winter and spring seasons. The highest measured concentrations were at the G3 passive station located furthest southwest, closest to the Little Smoky River. The lowest concentrations measured were at the G6 station located furthest east in the network, east of Highway 744.

Girouxville Monitoring Program

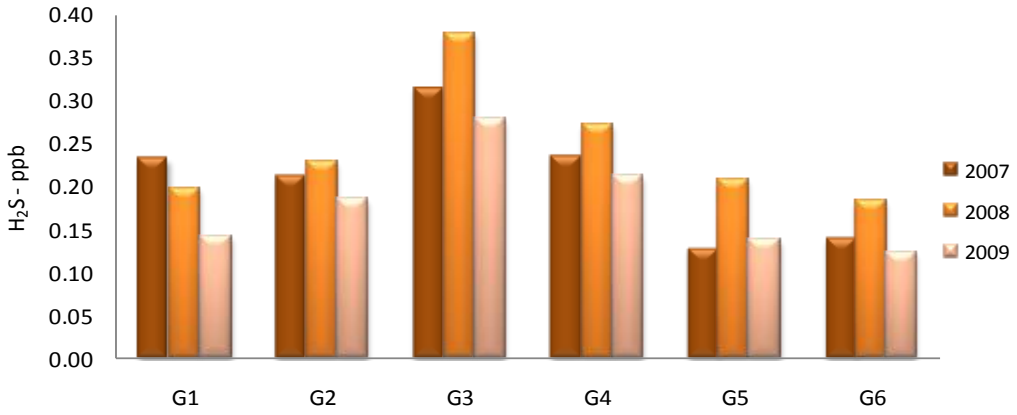
AAAQO for H_2S	
1—hour average:	10 ppb
24—hour average:	3 ppb

Annual Average H_2S (ppb)

2009 Passive Monitoring Data



2007 - 2009 Passive Monitoring Data

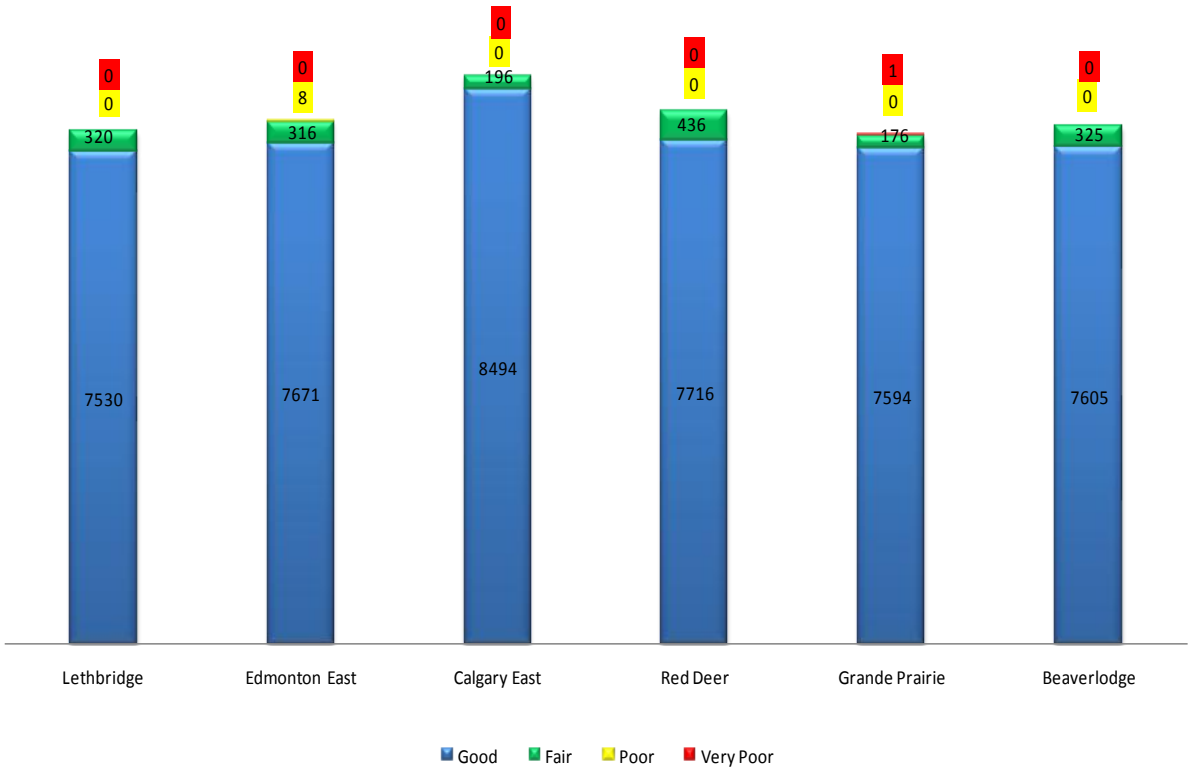


The highest H_2S concentrations in the Girouxville network continue to be measured at the G3 passive station from 2007 through 2009.

Air Quality Index (AQI)

The figure below presents a comparison of the 2009 AQI ratings for select stations throughout Alberta, including Henry Pirker and Beaverlodge. It outlines the number of hourly readings measured at each station for good, fair, poor and very poor AQI ratings. The AQI rating for the Henry Pirker and Beaverlodge stations was recorded as good or fair, with the exception of 1 very poor rating. This very poor AQI was measured at the Henry Pirker station during the Canada Day fireworks.

AQI Rating



AQI Rating Percentage of Hours

AQI Rating	AQI Index	Lethbridge	Edmonton East	Calgary East	Red Deer	Henry Pirker	Beaverlodge
Good	(1-25)	95.9	95.9	97.7	94.7	97.7	95.9
Fair	(25-50)	4.1	4.0	2.3	5.3	2.3	4.1
Poor	(51-100)	0.0	0.1	0.0	0.0	0.0	0.0
Very Poor	(>100)	0.0	0.0	0.0	0.0	0.0	0.0

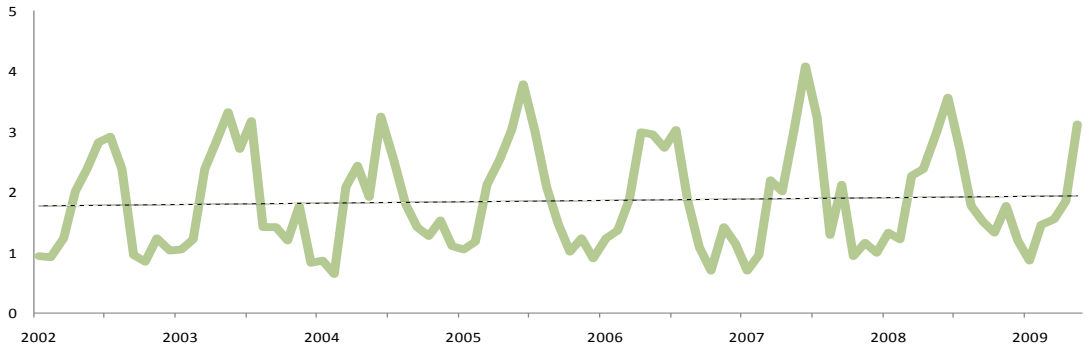
The chart above summarizes the percentage of hours recorded for each AQI category at stations across Alberta. The Henry Pirker and Beaverlodge stations observed “Good” AQI ratings 97.7% and 95.9% of the year, respectively. Hourly AQI ratings can be accessed, 24 hours a day, on our website.

Historical Data Comparisons - Passive Data

The graphs below represent the average monthly passive monitoring data from 2002 through 2009. The dashed line indicates a linear trend for the monitoring period.

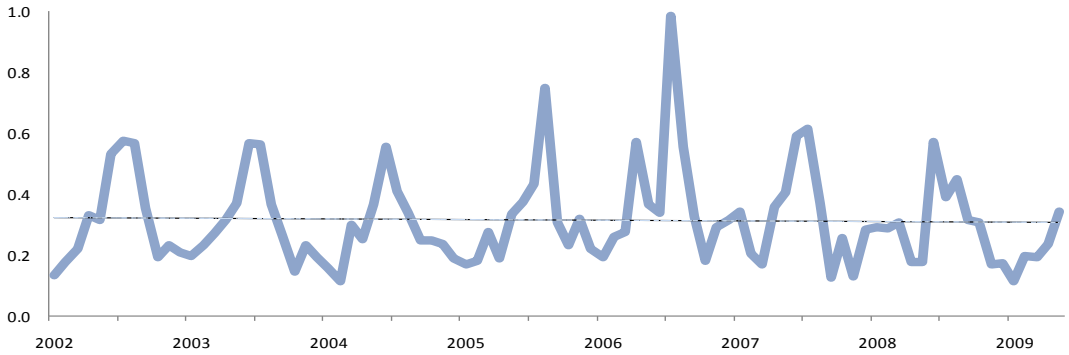
Monthly Average NO_2 (ppb)

Passive monitoring data 2002—2009



Monthly Average SO_2 (ppb)

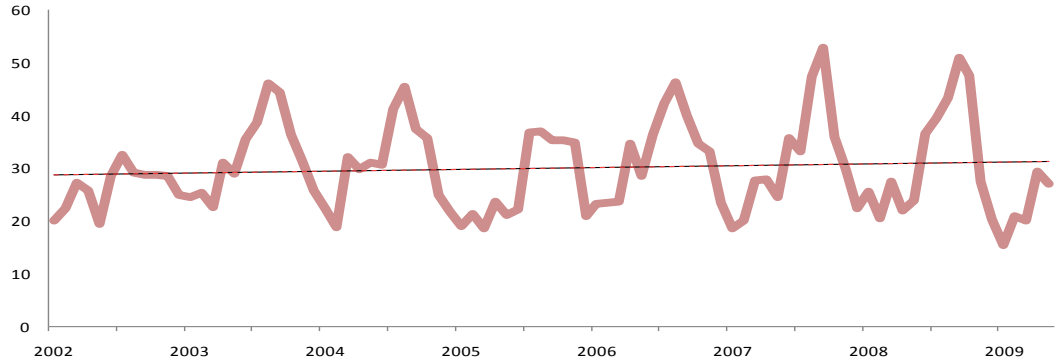
Passive monitoring data 2002—2009



Improvements to technology, legislative changes or decreased industrial activity may have contributed to the decreasing SO_2 concentrations across the passive network.

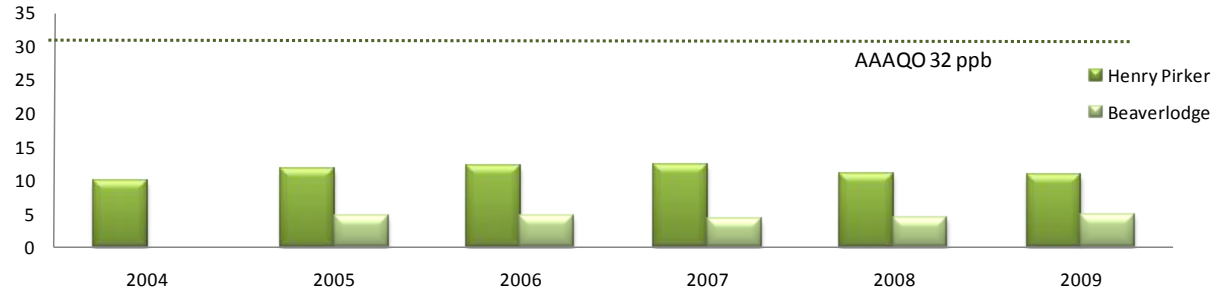
Monthly Average O_3 (ppb)

Passive monitoring data 2002—2009

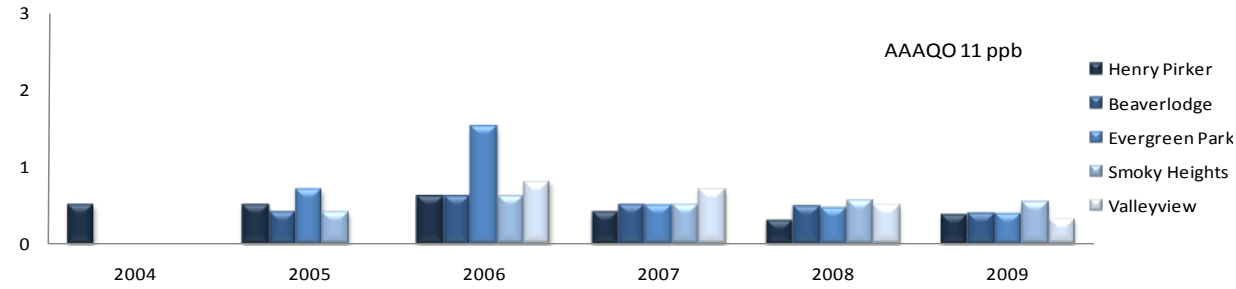


Historical Data Comparisons - Continuous Data

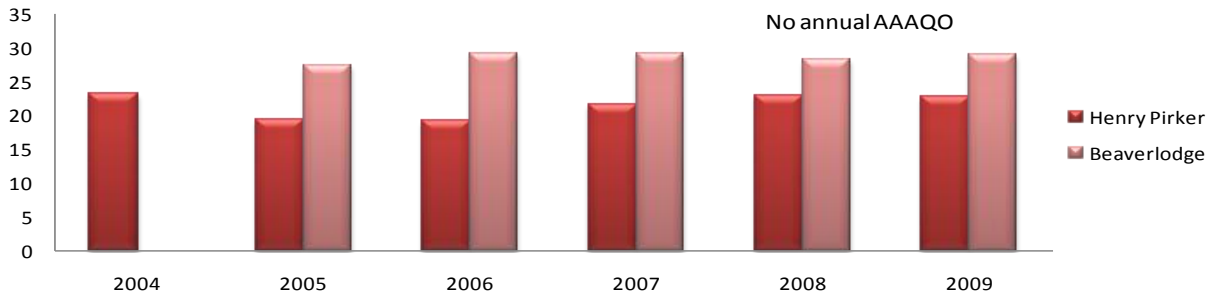
Annual Average NO_2 (ppb)



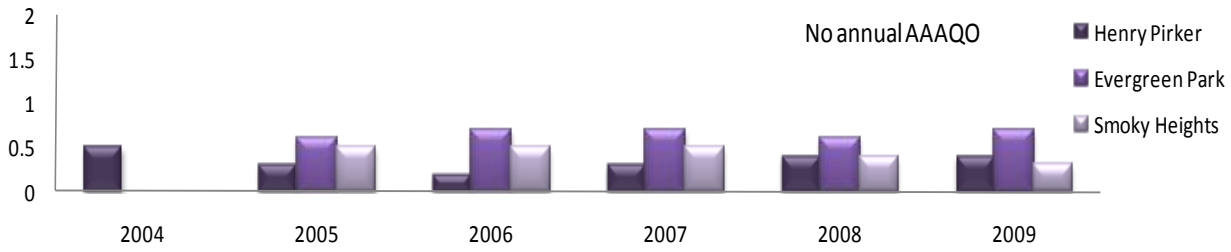
Annual Average SO_2 (ppb)



Annual Average O_3 (ppb)

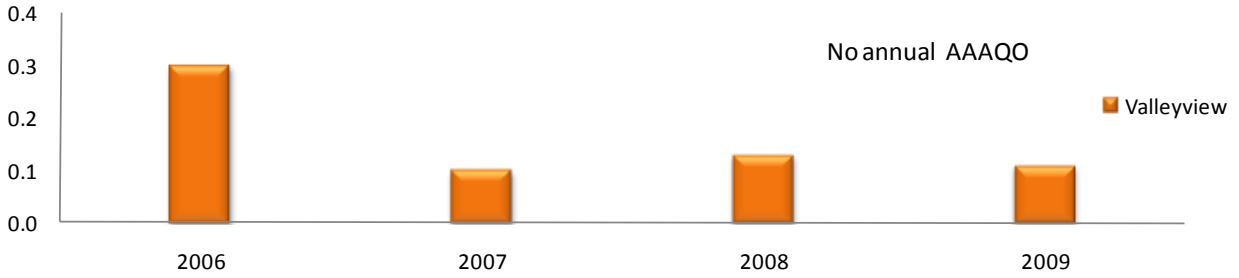


Annual Average TRS (ppb)

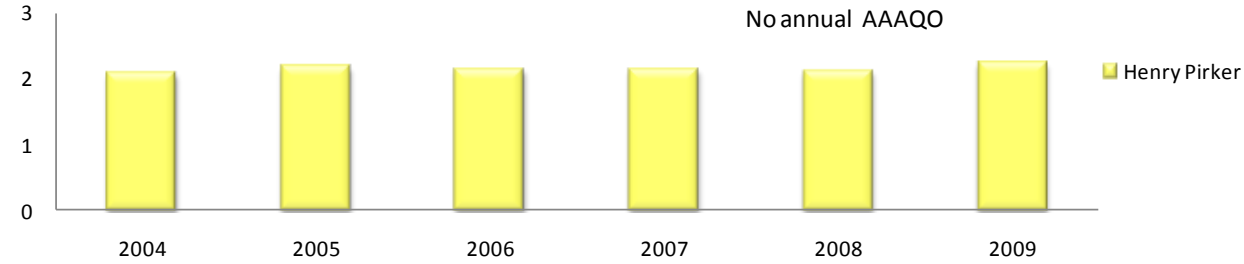


Historical Data Comparisons - Continuous Data

Annual Average H_2S (ppb)

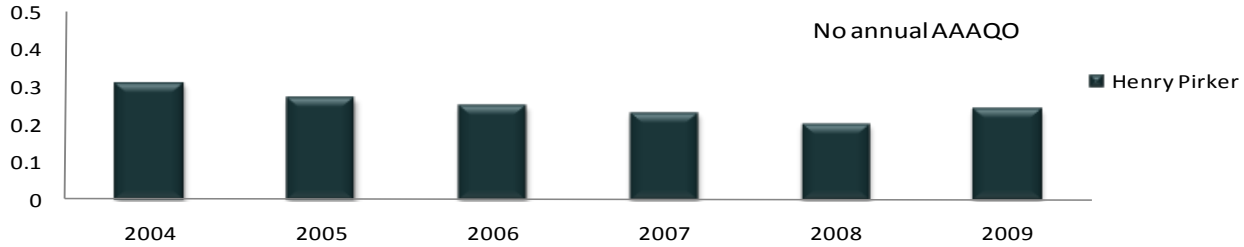


Annual Average THC (ppm)

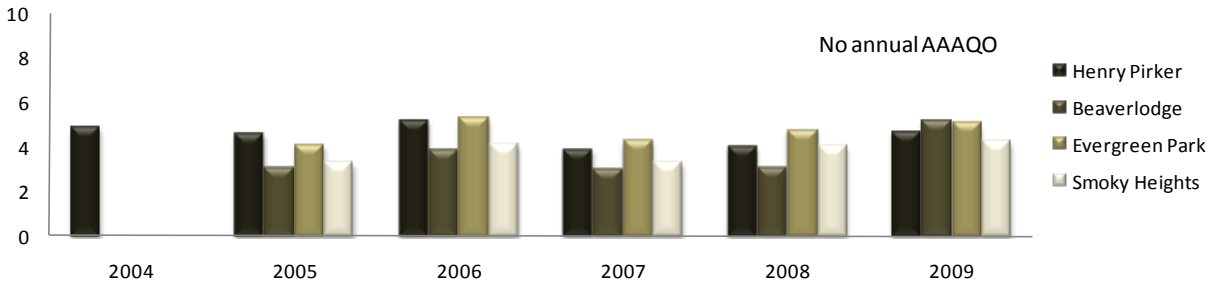


The highest measured THC annual average concentration is 2.23 ppm measured in 2009 which is slightly higher than the normal background concentrations recorded in rural Alberta ranging from 1.5 to 2 ppm.

Annual Average CO (ppm)



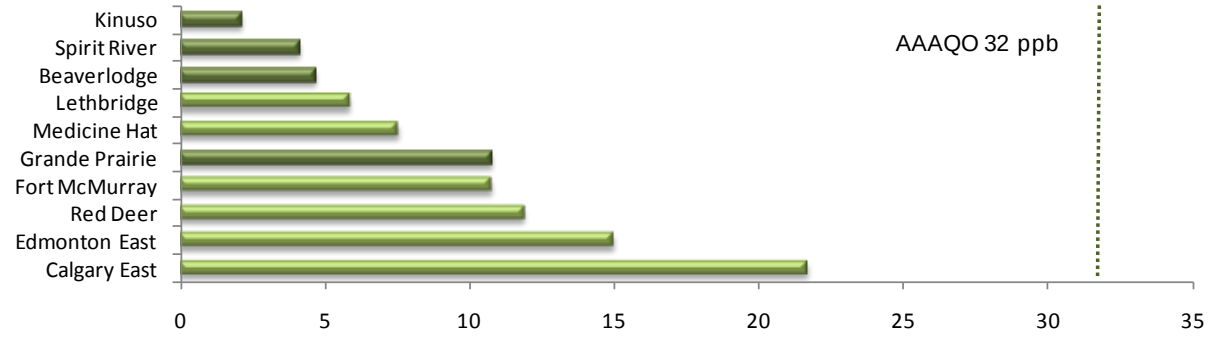
Annual Average PM $_{2.5}$ (ug/m^3)



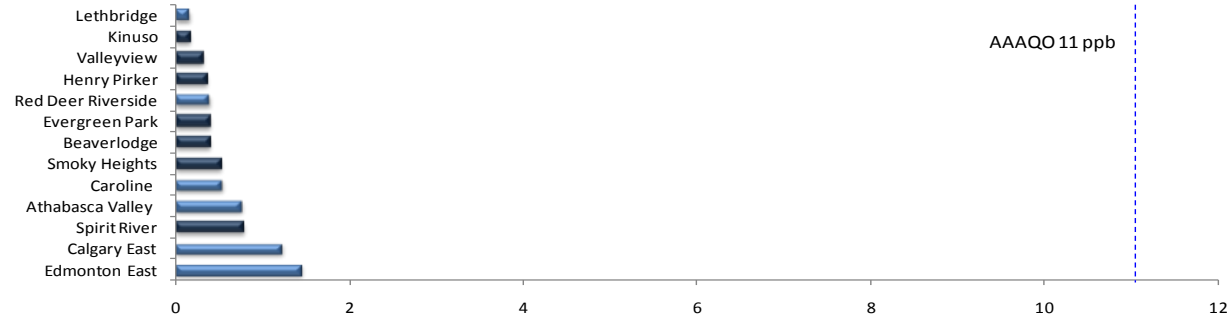
PM $_{2.5}$ concentrations increased in across the network in 2009, with the highest annual average concentrations observed at the Beaverlodge station.

2009 Alberta Comparisons-Continuous Data

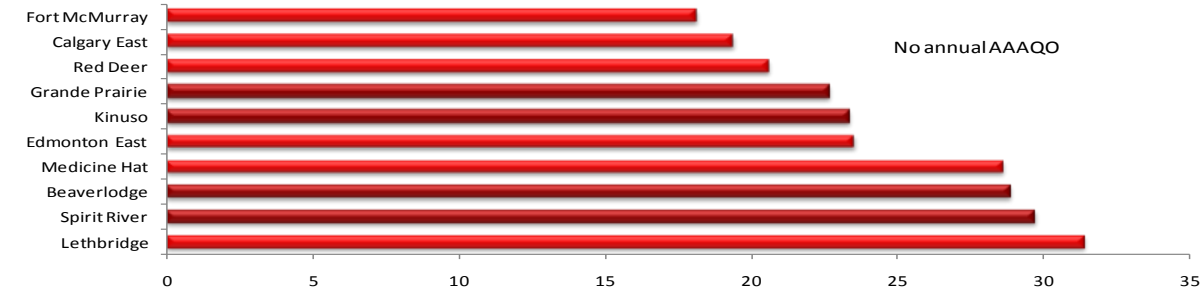
Annual Average NO_2 (ppb)



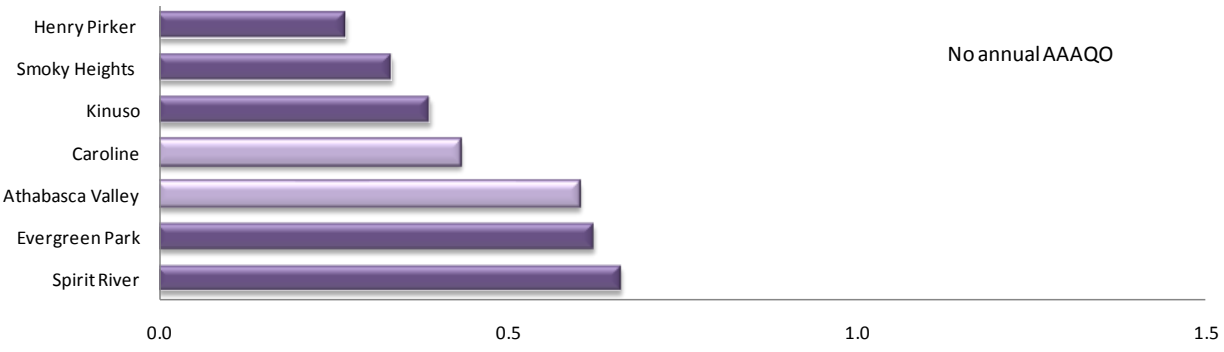
Annual Average SO_2 (ppb)



Annual Average O_3 (ppb)

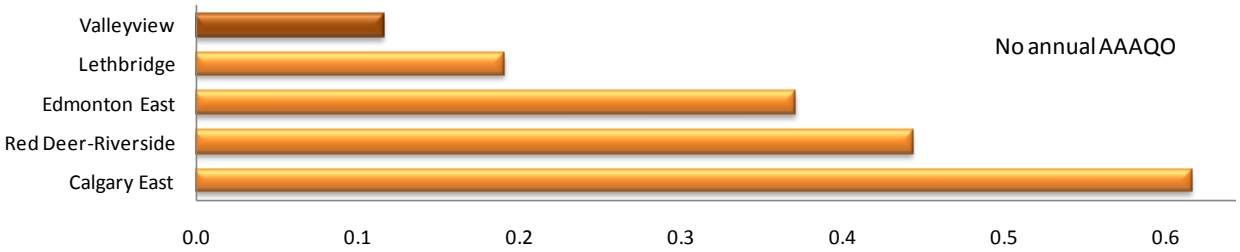


Annual Average TRS (ppb)

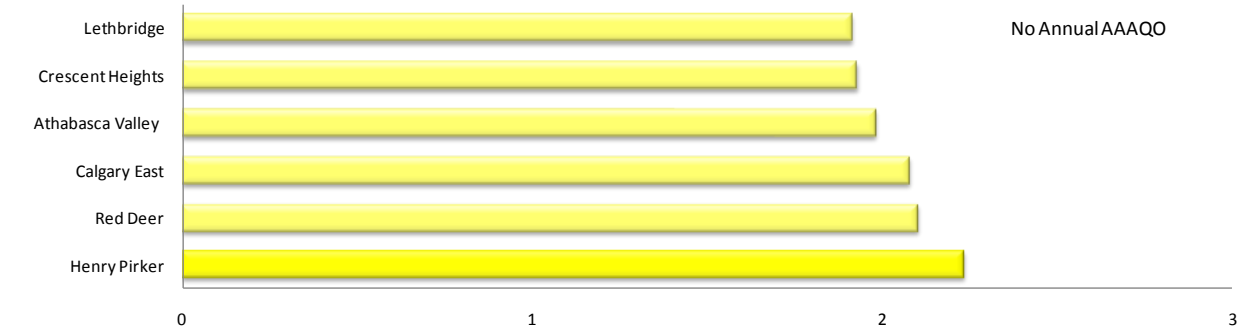


2009 Alberta Comparisons-Continuous Data

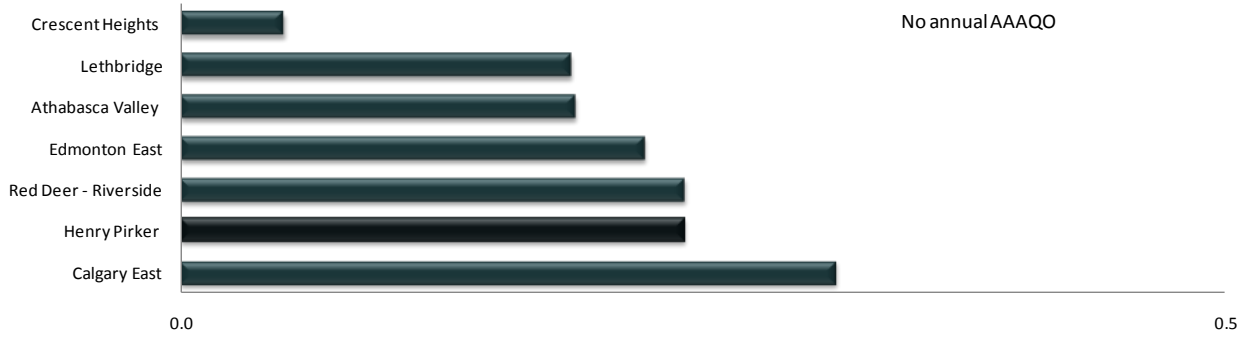
Annual Average H_2S (ppb)



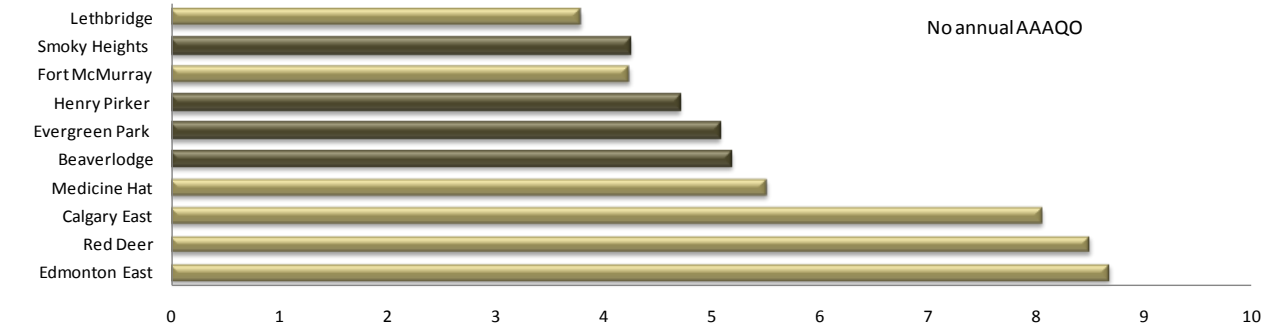
Annual Average THC (ppm)



Annual Average CO (ppm)



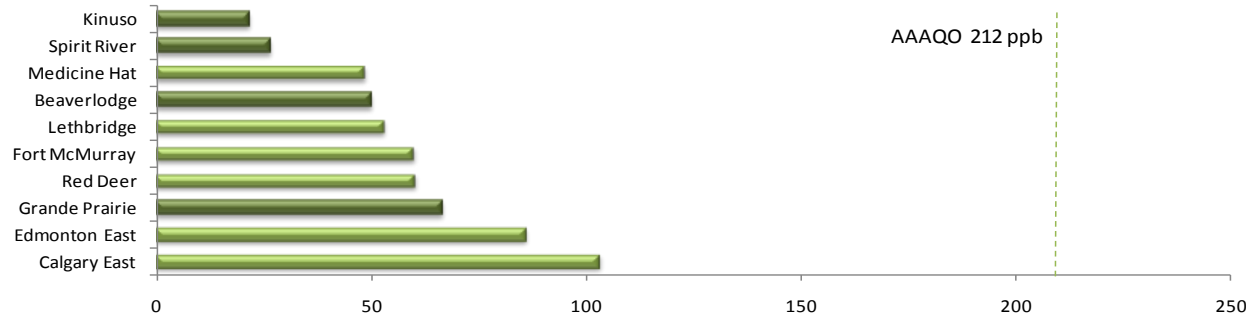
Annual Average PM $_{2.5}$ (ug/m^3)



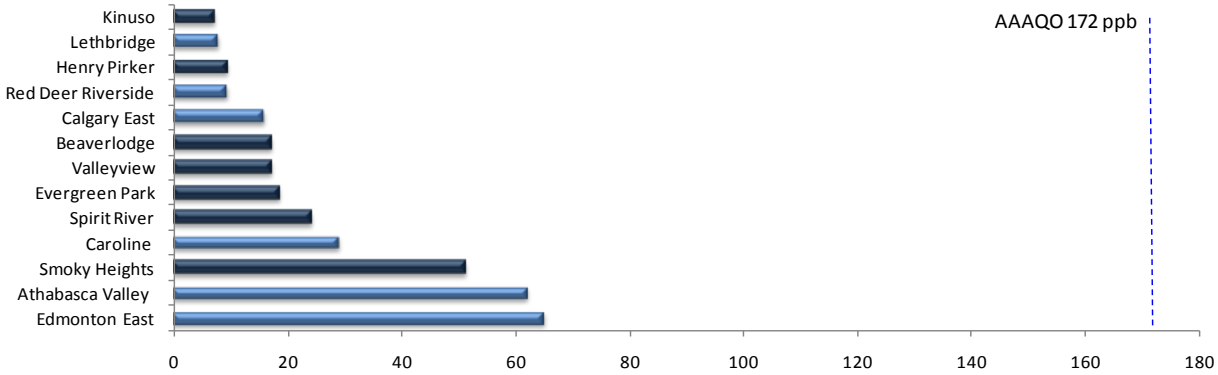
2009 Alberta Comparisons-Continuous Data

The maximum hourly concentration depict only the highest hourly concentrations measured in 2009.

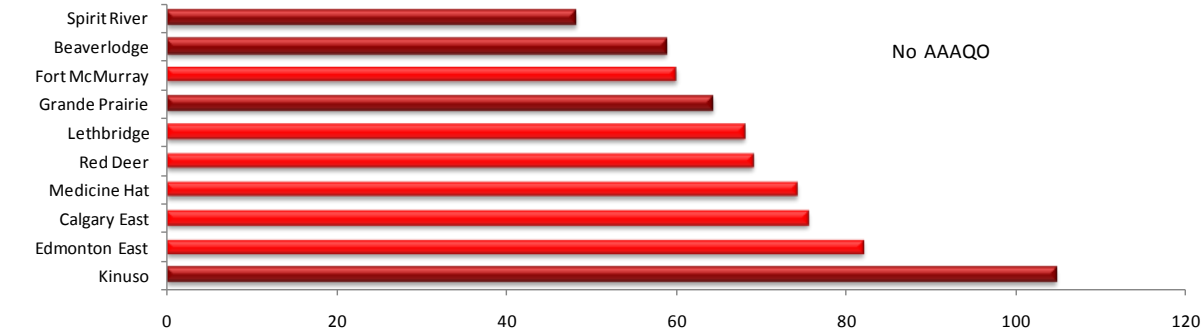
Annual Maximum 1 Hour Readings NO_2 (ppb)



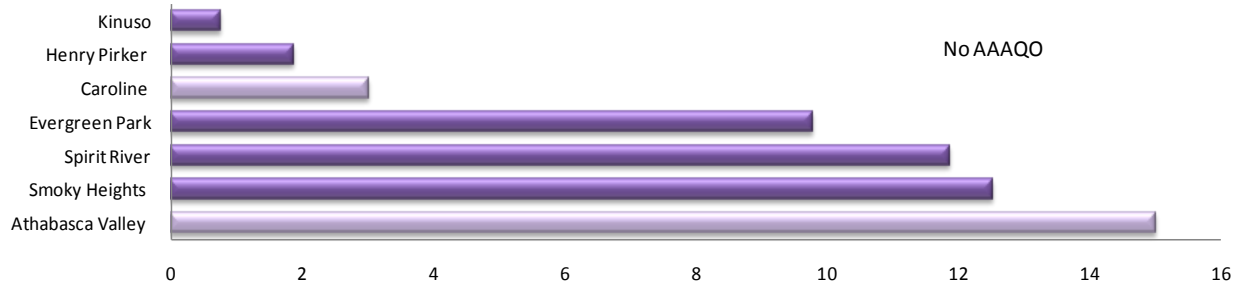
Annual Maximum 1 Hour Readings SO_2 (ppb)



Annual Maximum 1 Hour Readings O_3 (ppb)



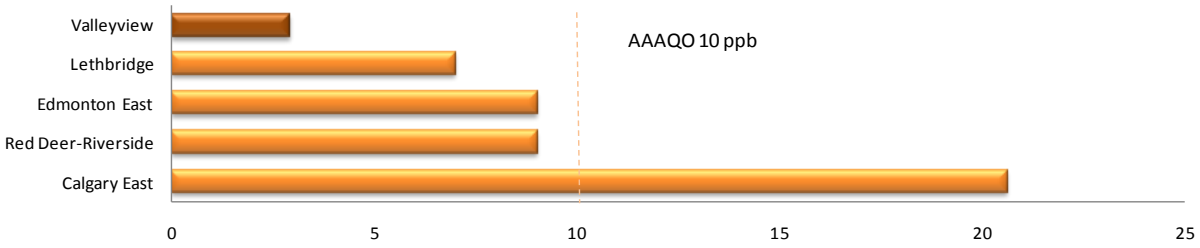
Annual Maximum 1 Hour Readings TRS (ppb)



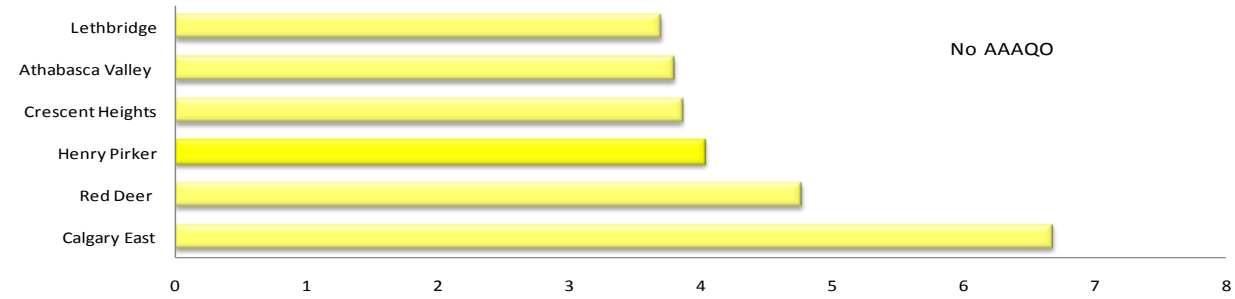
2009 Alberta Comparisons-Continuous Data

The maximum hourly concentration depict only the highest hourly concentrations measured in 2009.

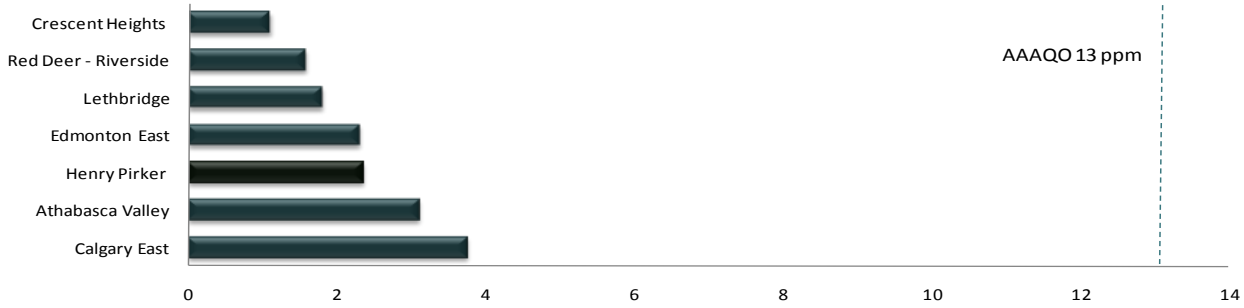
Annual Maximum 1 Hour H_2S Readings (ppb)



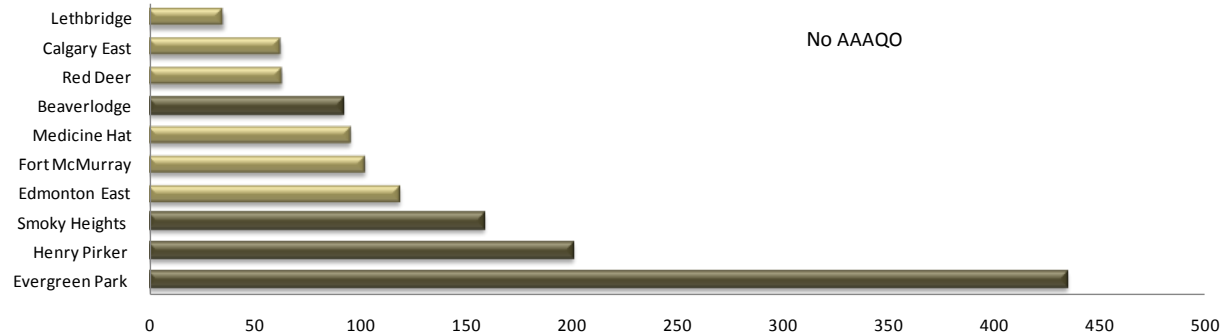
Annual Maximum 1 Hour Readings THC (ppm)



Annual Maximum 1 Hour Readings CO (ppm)



Annual Maximum 1 Hour Readings PM $_{2.5}$ (µg/m^3)



The Evergreen Park station is located in a highly commercial/industrial area and adjacent to a highly travelled transportation route that under went significant construction in 2009 which may have contributed to high $PM_{2.5}$ hourly readings.

PASZA Organizational Structure

PASZA operates under the direction of a Board of Directors, who provide direction and leadership to the organization. The Board of Directors may establish subcommittees to assist with the work of the organization. PASZA employs contract staff and services contractors who are responsible for the successful management and administration of the organization.

PASZA Board and Staff, as of December 2009:

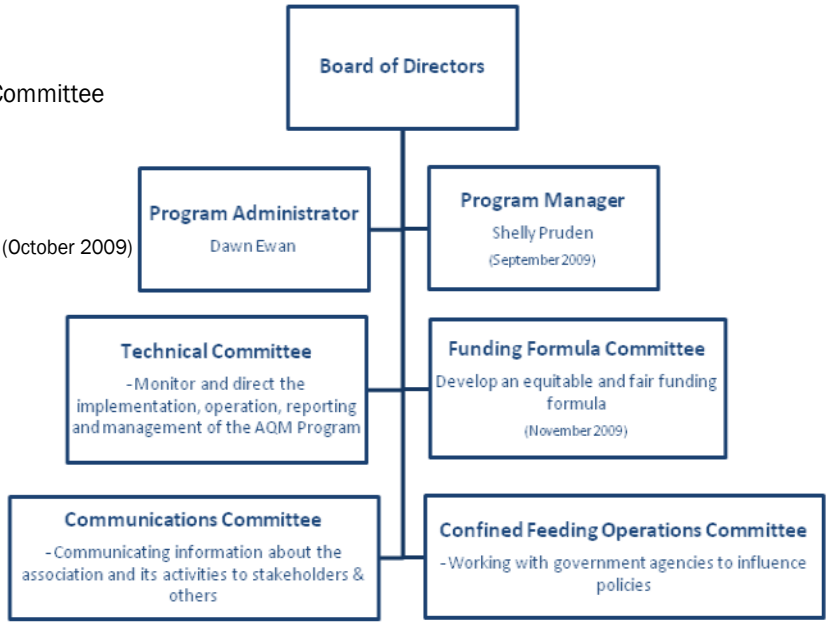
Executive

Bob Cameron
Chair, Public Member

Mike Weeks
Vice-Chair, Saddle Hills Awareness Committee

Sharon Nelson
Treasurer, County of Grande Prairie

Drennen Hallett
Secretary, Golden Sheep Power Inc. (October 2009)



Directors

Barb Ringle
Public Member

Bill Nalder
Canadian Natural Resources Ltd.

Bob Savage
Talisman Energy

Brian Lieverse
EnCana Corporation

Dale Gervais
Municipal District of Greenview

Dan Crowley
Suncor Energy

Denis Sauvageau
Friends of an Unpolluted Lifestyle

Ed Lamy
Weyerhaeuser Canada

Greg Smith
Alberta Environment

Leanne Chartrand
Energy Resources Conservation Board (October 2009)

Nadine Newman
Alberta Health Services (October 2009)

Tim Stone
Saddle Hills County

Trina Villieux
Advanced Flush Systems (October 2009)

Technical Committee

Bob Cameron
Public Member

Jennifer Keturakis
Alberta Environment

Bob Savage
Talisman Energy

Jamie Hallett
Golden Sheep Power Inc.

Dale Gervais
Municipal District of Greenview

Dawn Ewan
Program Administrator

Shelly Pruden
Program Manager (October 2009)

PASZA Organizational Structure

Communications Committee

Sharon Nelson
County of Grande Prairie

Jennifer Keturakis
Alberta Environment

Leanne Chartrand
Energy Resources Conservation Board

Gary Cross
Focus

Doug Beddome
Natural Resources Conservation Board

Dan Crowley
Suncor Energy

Dawn Ewan
Program Administrator

Shelly Pruden
Program Manager (October 2009)

Confined Feeding Operations Committee

Barb Ringle
Public Member

Dennis Sauvageau
Friends of an unpolluted Lifestyle

Doug Beddome
Natural Resources Conservation Board

Andy Trudeau
MD of Smoky River

Dawn Ewan
Program Administrator

Shelly Pruden
Program Manager (October 2009)

Funding Formula Review Committee
(formed November 2009)

Bob Cameron
Public Member

Dan Crowley
Suncor Energy

Ed Lamy
Weyerhaeuser Canada

Tim Stone
Saddle Hills County

Gary Cross
Focus

Dawn Ewan
Program Administrator

Shelly Pruden
Program Manager

Contracted Staff and Services

Shelly Pruden
Program Manager (September 2009)

Dawn Ewan
Program Administrator

Focus Corporation
Network Operations

Gene Lessoway
Passive Network Operations (to April, 2009)

Dawn Ewan
Passive Network Operations (from May, 2009)

Maxxam Analytics Inc.
Analytical Laboratory Services

"Summer Afternoon" Photographer: Nyssa Badger

Sincere thanks for the many hours of volunteer board and committee time.

PASZA Members

Adrian Smedstad
Golden Sheep Power Inc.

Alvin Hubert
Saddle Hills County

Andy Trudeau
MD of Smoky River

Audrey Curran
Lee's Sheet Metal

Brian Harcourt
Clear Hills County

Brian Boyle
BP Canada

Charlene Antaya
Alberta Environment

Dan Sifeldeen
Trilogy Energy

Doug Beddome
Natural Resources Conservation Board

Frances Davis
Clear Hills County

Isak Skjevland
Town of Sexsmith

Jamie Hallett
Energy Resources Conservation Board

Jennifer Keturakis
Alberta Environment

Jim Meagher
Alberta Health Services

Kendel Reiswig
Talisman

Len Salacki
Grande Prairie Generation

Neil Guay
AltaGas

Tina Hronek
Energy Resources Conservation Board

Tracy Hunt
Devon

Warren Stewart
Town of Valleyview

"Unnamed" Photographer: Emalee Steinke

PASZA Funding Members

Action Energy Inc.
Advanced Flush Systems Inc.
Advantage Oil & Gas Ltd.
Alberta Environment
Alberta Health Services
AltaGas Operating Partnership
Aquatera Utilities Inc.
ARC Resources Ltd.
Arcan Resources Ltd.
Arclin (Dynea)
Artek Exploration Ltd.
ATCO Power Canada
Barrick Partnership
Birchcliff Energy Ltd.
Bonavista Petroleum
BP Canada Energy Company
Breaker Energy Ltd.
Canadian Natural Resources Ltd.
Cequence Energy Ltd.
Conoco Phillips Canada
County of Grande Prairie
Crescent Point Resources L.P.
Crew Energy Inc.
Dark Energy Ltd.
Daylight Energy Ltd.
Delphi Energy Corp.
Devon Canada
EnCana
EnerMark Inc
Enerplus Resources Corporation
Enterra Energy Corp.
Exshaw Oil Corp.
Fairborne Energy Ltd.
Galleon Energy
Glencoe Resources Ltd.
Grande Prairie Generation
Great Plains Oil & Gas Partnership
Grey Wolf Exploration
Hunt Oil Company of Canada Inc
KinMerc Oil & Gas Inc.
LSM Lee's Sheet Metal
Masters Energy Inc.
Maxim Power Corp.
MD of Greenview
MD of Spirit River No 133
Municipal District of Smoky River
Natural Resources Conservation Board
Nuloch Resources Inc.
Oban Energy Ltd.
Orleans Energy Ltd.
Pearl E& P Canada Ltd.
Pengrowth
Penn West Petroleum Ltd.
Polar Star Canadian Oil & Gas Inc.
Progress Exploration
Prosper Petroleum Ltd.
Provident Energy Ltd.
Reber Exploration Ltd.
Response Energy
Saddle Hills County MD 20
Spectra Energy Midstream
Standard Energy Inc.
Storm Exploration Inc.
Suncor Energy Natural Gas
Talisman Energy
TAQA North
Town of Sexsmith
Town of Valleyview
Trilogy Blue Mountain Ltd.
Tristar Oil & Gas Ltd.
Village of Hythe
Weyerhaeuser Canada

What YOU Can Do About Air Quality

Learn
Get involved
Get ACTIVE

"How can I make a difference?"
The truth is everyone has the power to make small changes to improve air quality.

Learn— It is important to think for yourself and become informed. Resources about air quality are extensive on the internet.

Canada Lung Association www.lung.ca
Clean Air www.cleanair.ca
Alberta One Simple Act www.onesimpleact.alberta.ca
Health Canada www.hc-sc.gc.ca
Environment Canada www.ec.gc.ca
State of the Environment www.environment.alberta.ca
CASA www.casa.org
PASZA www.pasza.ca

Get Involved—If you are interested in air quality in your community, the Peace Region or beyond—Get Involved. PASZA welcomes anyone with an interest in air quality. The public is welcome to attend our board meeting. The meeting schedule is posted on our web page. Comments are always helpful to assess whether we are meeting the needs of the community.

For more information , contact us at
www.pasza.ca or
1-866-764-2681

Get Active—Individuals can take action to reduce energy use at home, on the road, at work and at play. There are numerous things that you can do to improve air quality.

- Don't idle your vehicle
- Maintain your vehicles, tire pressure
- Rotate your tires
- Avoid aggressive driving
- Walk, Bike or Carpool
- Turn off non-essential lights & electronics
- Use energy-efficient appliances
- Clean the condenser coils on your refrigerator
- Install a programmable thermostat
- Use cold water instead of hot water
- Take shorter showers
- Decrease the temperature on your hot water tank
- Caulk or weathers strip doors and windows
- Reduce, Reuse, then Recycle
- Buy local
- Compost
- Garden organically
- Plant a tree
- Don't use pesticides
- Share this information with others

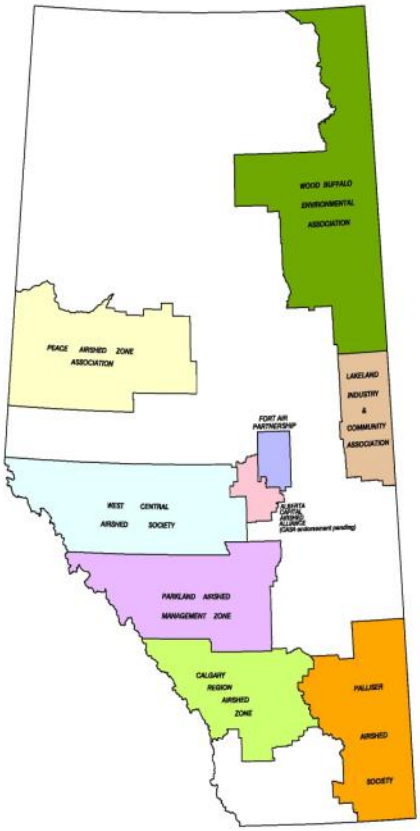
Alberta Air Quality Organizations

Air Quality Organizations in Alberta

Clean Air Strategic Alliance (CASA) - www.casa.org
Alberta Airshed Council (AAC) - www.albertaairshedscouncil.ca

Other Airshed Zones in Alberta:

West Central Airshed Society (WCAS) - www.wcas.ca
Wood Buffalo Environmental Association (WBEA) - www.wbea.org
Fort Air Partnership (FAP) - www.fortair.org
Parkland Airshed Management Zone (PAMZ) - www.pamz.org
Palliser Airshed (PAS) - www.paliserairshed.org
Lakeland Industry Community Association (LICA) - www.lica.ca
Calgary Region Airshed Zone (CRAZ) - www.craz.ca
Alberta Capital Airshed Alliance (ACAA) - www.capitalairshed.ca



"Horses Summer" Photographer: Mary Dahr

PASZA Acknowledgements

Sincere thanks for the many hours of volunteer board and committee time and funding from our members.

PASZA acknowledges the hard work and contribution of all stakeholders of the association. Continued dedication and hard work moves PASZA forward in its vision "People living and working in the Peace Region will have the best possible air quality".

The day to day success of PASZA is largely attributed to the efforts of PASZA contractors. Thank you to the Focus Corporation team for their high level of service in operating and maintaining the air quality monitoring network; Gary Cross, Kelly Baragar, Sharon Whiteley, Grover Christianson and Conor Whiteley. These individuals provide years of experience highly valuable to PASZA's operations. Dawn Ewan for her high level of service to PASZA in operating and maintaining the passive air quality monitoring network in 2009.

The PASZA Program Managers; Shelly Pruden and Michael Bisaga of OTONABEE Consulting for providing leadership and management of PASZA's operations. Dawn Ewan, as the PASZA Administrator, for her continued hard work and enthusiasm in maintaining the day to day operations of the association. As well, special thanks are due for her exceptional work, with the addition of the interim Program Manager responsibilities for most of 2009.

Thank you to Ana Bustamante of Zeta Byte for her continued work in the redesign of the PASZA web page.

The individuals and organizations who agree to have air quality monitoring stations on their property. Thank you to the Quist, Dufour and Halldorson families for your assistance and cooperation in locating the PASZA continuous monitoring stations.

Thank you to the Girouxville community for their commitment and support in the Girouxville Monitoring Program.

Thank you to the Town of Sexsmith and the Elk's Club Room, Sexsmith Curling Club, County of Grande Prairie, ERCB and AENV for meeting space. Channel 7 and local radio stations Big Country, and YL Country for assisting PASZA with event promotion through community calendars and providing news coverage of various events.

Thank you to all the individuals that participated in community events and trade shows.

Thank you to the photo contest participants for sharing their wonderful photos from the region.

Thank you to EVERYONE who has made contributions to PASZA in 2009. Looking forward, PASZA will continue to build on your hard work and dedication.

"Little House on the Ice Prairie" Photographer: Albert de Villiers

PASZA

Peace AirShed Zone Association

Box 21135
Grande Prairie, AB
T8V 6W7

780.833.4343
1.866.764.2681
www.pasza.ca