



PASZA

Peace AirShed Zone Association



2008 Annual Report

Photo Credit: Katalin Ormay

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Photo Credit: Traci Richards

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1.0 Introduction



This report will communicate to the general public and stakeholders a review of the Peace Airshed Zone Association's activities in 2008.

The report is divided into two main sections. The first section gives an overview of the Peace Airshed Zone Association (PASZA), the structure of the organization, members, a brief overview of our accomplishments and plans for the future. It provides a summary of PASZA's Air Quality Monitoring Program, including locations of monitors and types of monitoring

systems used by PASZA.

The second section provides a technical summary of air quality monitoring data collected by PASZA's Air Quality Monitoring Program. The technical review provides data of interest and includes monthly air quality monitoring data, comparisons of data collected by PASZA to other air monitoring stations within Alberta and a historical review of annual average data.



Photo Credit: Nyssa Badger

2.0 Report From the Chair

The accomplishments of PASZA in 2008 are a result of the support received from PASZA members through financial donations and volunteered time. I extend special thanks to all members who continue to support our organization through voluntary contributions in these times of financial turbulence in addition to regular contributors. The contributions of all members who attend our meetings, taking time away from other duties at home and work have contributed to the success of PASZA. Meetings over the last year have routinely had twenty or more attendees representing various stakeholders. Thank you as well to the Town of Sexsmith, County of Grande Prairie, Energy Resources Conservation Board and Alberta Environment for donating meeting space.

The day to day success of PASZA is largely attributed to the efforts of PASZA contractors. The team at Focus Corporation lead by Gary Cross, Conor Whiteley and Grover Christianson has been instrumental in maintaining the operations of the network. Thank you to the Focus team for all their hard work and assistance. Our very able Administrator, Dawn Ewan, has quickly brought our organization's affairs and operations under control. Her diligence has resulted in considerable cost savings to PASZA. Dawn's professional manner coupled with genuine enthusiasm for the success of our organization has helped our Board of Directors understand the tasks we face in the year ahead.

In the last year and a half other airshed monitoring results and system designs have been questioned before both the Environmental Appeal Board and the Energy Resource Conservation Board. I anticipate that this trend may continue and pledge on behalf of the board that our primary goal is to provide credible air quality monitoring in our region that will stand the test of peers, the court, public opinion and regulatory processes.



Bob Cameron, PASZA Chair





3.0 PASZA Overview

The Peace Airshed Zone Association (PASZA) is an airshed management zone. An airshed management zone is established to address local air quality concerns where province-wide solutions may be unsuitable. Airshed zones allow local stakeholders freedom to design local solutions to local air quality issues. Zones make it possible to improve existing monitoring, make local monitoring systems more efficient, collect data to address regional air quality concerns and obtain information about air quality.

PASZA is a multi-stakeholder non-profit organization with stakeholders consisting of industry, local government, non-government organizations (NGOs), Alberta Environment, Energy Resources Conservation Board, Alberta Health Services, and members of the public.

Formed in 1999, PASZA was the fifth airshed management zone in Alberta. Members work together to promote PASZA's mandates, goals and vision including public accessibility to data

and information from its monitoring activities. The air quality monitoring program developed by PASZA provides a better understanding of local air quality and acts as a first step to ensure continuous improvement of regional air quality, protect environmental health and influence policy.

PASZA uses the guiding principle of consensus decision making. Consensus is reached when there is unanimous agreement and each stakeholder can live with the outcome. Stakeholders may not achieve all their goals, but the purpose is to find the optimal solution that is 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.

The PASZA web page www.pasza.ca provides extensive information about the organization. Please visit our site and learn more about PASZA, our members and air quality.

Mandate

- Operate the air monitoring network
- Produce Credible Information
- 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
- Develop a communications plan

Vision

People living and working in the peace region
will have the best possible air quality.

3.1 PASZA Structure

In October 2008 PASZA amended its bylaws to support the growth of the association. The amendments resulted in the following organizational structure:

PASZA's Board of Directors is composed of six stakeholder groups:

- Industry
- Government
- Alberta Health Services
- Aboriginal groups
- Non-government organizations
- Members of the public

In 2008 the stakeholder groups were represented on the Board of Directors as follows:

- Six industry members
- Four government members
- One Alberta Health Services member
- Two non-government members
- Two public members

Michael Bisaga (OTONABEE Consulting) continued to act as PASZA's Program Manager in 2008. The Pro-

gram Manager supervised the operations of the air quality network and acted as PASZA's representative on various committees including Clean Air Strategic Alliance and Alberta Airshed Council.

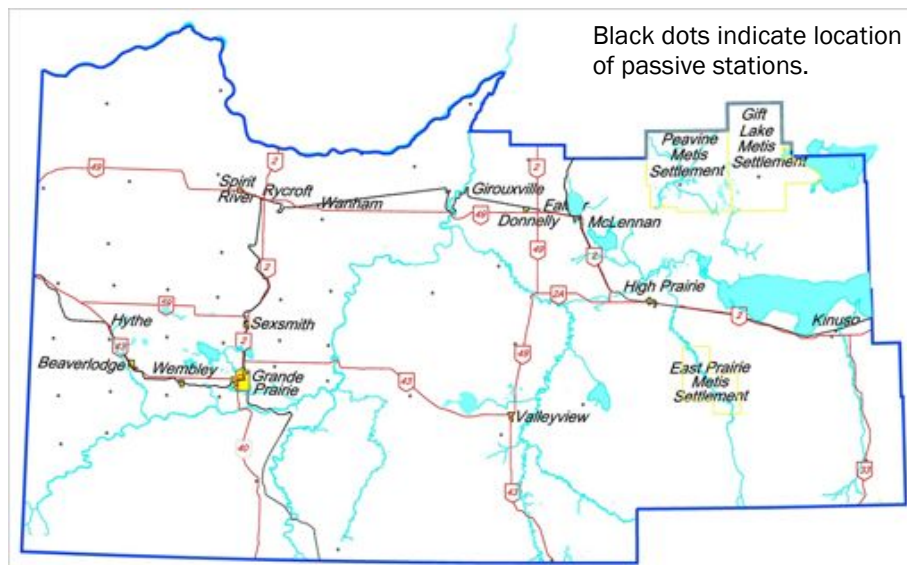
Dawn Ewan's role as Administrator included keeping accurate financial records, administrative support and managing the day-to-day operations of the association.

Focus Corporation has worked as PASZA's operations contractor since PASZA's inception. Focus operated and maintained the continuous monitoring stations and provided additional administrative support for report preparation, data analysis and invoicing.


The operations and maintenance of the passive air quality monitoring network were contracted to Gene Lesoway of Gene's Maintenance Services in Leduc.

Analysis of the passive samples was contracted to Maxxam Analytics Inc. of Edmonton. Linda Lin MSC supervised the Air Laboratory Services Department.

Map of PASZA Boundaries



3.2 Executive



Robert Cameron—Chair—Public

Bob Cameron is a 1973 graduate of Renewable Resources from the Kelsey Institute in Saskatoon. For 7 years Bob filled many roles as a government employee including fisheries technician, timber cruiser and forestry towerman. Twenty-five years ago Bob began operating his one man portable sawmill from his wood lot in Debolt manufacturing poles and fence posts. Bob's experience with consensus based multi-stakeholder decision making began in the early 1990's with the Alberta Pacific Forest Management Task Force. Bob has served a three year term on the Clean Air Strategic Alliance Board and is currently an Environmental Non-Government Organization alternate on the Alberta Water Council. Bob was elected PASZA Chair in October 2008 after six years of service on the PASZA Board of Directors.

Mike Weeks—Vice Chair—Saddle Hills Awareness Committee

Mike Weeks has 25 years experience in power generation and the petroleum industry. Formerly he was the superintendent for the Hythe and Sexsmith Gas Plants and surrounding areas. Mike spent many years working in Africa in the petroleum industry where he built and managed large oil and gas projects. He now works in Sexsmith with his wife in the ATM industry and also runs a small oilfield training software company.

Sharon Nelson—Treasurer—County of Grande Prairie

Sharon Nelson was elected to the Grande Prairie County Council in 2007 as representative for the Clairmont area. Sharon has been active in many community groups including the Clairmont School and Wellington Resource Center, 2010 Arctic Winter Games, 4-H, Curling Clubs and Agricultural Societies. Sharon and husband Don have owned and operated the Clairmont Corner Store for the past twenty years. Together they have raised four children. Sharon enjoys spending time with her grandkids.



Gerald Feschuk—Secretary—Alberta Environment

Gerald Feschuk was born and raised in the Peace Country of Alberta and BC, and lives in Grande Prairie with his wife and two children. Gerald is a professional engineer with over 25 years experience, within both the private and public sectors. He currently works for Alberta Environment, responsible for assessing large industrial sites. Gerald has extensive environmental and emergency response planning consulting experience, has been a founder in several successful business ventures, and is an active member of the community. Gerald was at the very first formational meeting for PASZA and has been involved ever since as industry representative, consultant and now Board Member representing the Provincial Government.

3.3 Board of Directors

Dan Crowley—Suncor Energy

Dan Crowley is the Northern Operations Manager for Suncor. His thirty year career in the industry spans drilling operations to plant production. Dan has lived and raised his family in Grande Prairie since 1984.



Dale Gervais—Municipal District of Greenview

Dale Gervais is a Councilor for the MD of Greenview. He lives on a farm in the Little Smoky area with his wife Denise. They have two daughters and four grandchildren. Dale owned and operated a trucking company for over twenty years before selling in 2000 to pursue other interests. "I enjoy PASZA because of the diverse groups that work together to monitor the air quality in our area. Everyone brings their own expertise to the table and it makes it a very interesting board to participate in."

Drennen Hallett—Golden Sheep Power Inc.

Drennen Hallett is currently the CEO of Golden Sheep Power and is an industry representative on the Board of Directors. Golden Sheep Power is an energy solutions company based in Grande Prairie, AB. During the past 2 years Drennen has focused the company's energy on public education, municipal policy and regulation in direct conjunction with renewable energy and renewable energy systems.



Ed Lamy—Weyerhaeuser Canada

Ed Lamy began working with the Procter & Gamble pulp mill in Grande Prairie in 1973 (currently Weyerhaeuser). Ed has worked in several roles and departments as a manager and team leader over the years. His most recent and longest assignment has been in the environmental department. He holds an Honours Diploma in Research Chemistry which fits well in the environmental role. Ed was involved in PASZA's early developmental years as a Weyerhaeuser representative. Ed and his wife Lucille have raised a family in Grande Prairie and enjoy the outdoors of the Peace Country.

Brian Lieverse—EnCana

Brian Lieverse has worked with EnCana for over 20 years. He began his career as an operator and later moved to coordinator and currently Community Relations Advisor. Brian is married with three children. In his spare time he plays, coaches and referees hockey. In the summer Brian enjoys spending time with family golfing and fishing.

Jim Meagher—Alberta Health Services

Jim Meagher attended the very first PASZA meeting in 1999 and has filled many roles including PASZA Chair, Vice Chair and Secretary. Jim has worked in the field of Environmental Public Health for the past twenty nine years, both as an Environmental Public Health Practitioner and administrator with regional health authorities in Northern Alberta. In 1990, Jim was awarded the L.E. Stewart Award, which is presented annually to an individual who displays outstanding dedication and service to the field of Environmental Health. Jim and wife Cindy have been married for thirty years raising two children.



Bill Nalder—Canadian Natural Resources Ltd.

Bill Nalder is a Field Environmental Coordinator with Canadian Natural Resources Limited. Mr. Nalder attended Grande Prairie Regional College on route to attaining his Bachelor of Science at the University of Lethbridge. Along with his oil and gas experience, Mr. Nalder has worked extensively in the mining sector and as an environmental consultant. In addition to his work with PASZA, Mr. Nalder is the Chairman of the Western Canadian Spill Co-op, as well as a Steering Committee Member with the CAPP Species Management Committee and the Foothills Landscape Forum. Mr. Nalder is a Registered Professional Biologist in British Columbia. In his spare time, Mr. Nalder enjoys spending time with his family, which includes biking, hiking, camping and other outdoor pursuits. Bill presently resides in Grande Prairie with his wife and two children.

Barb Ringle—Public

Barb Ringle is a recent addition to the Board of Directors joining in the fall of 2008. A retired school teacher, Barb has always been active in the community serving on various boards including the Peace River Milk Producers Association, Debolt Library Board, Debolt United Church Board, Edson Trail Pastoral Charge Board and 4H. Barb is married with two daughters and three grandkids. She became involved with PASZA because of an interest in the effects of confined feeding operations and oil and gas development on air quality.



Denis Sauvageau—Friends of an Unpolluted Lifestyle

Denis Sauvageau is a full time agricultural producer in Smoky River MD. He has been active in air quality issues since the expansion of the Confined Feeding Operations (CFO) near Girouxville. Denis was a member of the Clean Air Strategic Alliance CFO Project Team which was assembled in an effort to address air quality issues surrounding CFO's in Alberta. Denis is involved with various boards including Alberta Environment Network, Peace River Environmental Society and Society for Environmentally Responsible Livestock Operations. Denis is also connected with National Environmental Network. "It's been a bumpy ride but in the end I believe that we are moving in the right direction with air quality."

Bob Savage—Talisman

Bob Savage began working in the oil & gas industry with Halliburton Services in Grande Prairie. After five years he moved to the Energy Resources Conservation Board then later to Talisman. Bob was at the initial PASZA formation meeting in 1999 and has been involved ever since as a representative for government and currently industry. Bob has seen many changes over the years in PASZA and is encouraged to see the co-operation between the stakeholders.



Tim Stone—Saddle Hills County

Tim Stone is the Acting Reeve for the Saddle Hills County. Tim and his wife Debbie have operated a mixed farm near Savanna since 1980 where they raised four children. Tim is a strong supporter of the Peace Country and is active with various community groups. Tim represents Rural Alberta on the Federation of Canadian Municipalities Board of Directors. Tim joined PASZA in October 2008.

3.4 Members

The following individuals represented various stakeholder groups and were an integral part of PASZA's achievements in 2008. Members attended meetings and provided PASZA with access to valuable experience and view points. PASZA thanks all members for the donation of their time, knowledge and other resources.

Adrian Smestad—Golden Sheep Power Inc.

Len Salacki—Grande Prairie Generation

Andy Trudeau—MD of Smoky River

Miles Sherris—Kereco

Brian Boyle—BP Canada

Neil Guay—AltaGas

Doug Beddome—NRCB

Nichole Belcourt—County of Grande Prairie

Isak Skjaveland—Town of Sexsmith

Richard Harpe—County of Grande Prairie

Jamie Hallett—ERCB

Teresa von Tiesenhausen—Public

Jennifer Keturakis—AENV

Tina Hronek—ERCB

Jim Terpsma—Kereco

Tracy Hunt—Devon

Ken Matthews—MD of Big Lakes

Troy Kilback—TAQA

Leanne Chartrand—ERCB

Uli Wolf—Aquatera



Photo Credit: Allen Gervais

3.5 Funding Members

In 2008 PASZA received support from numerous organizations, governments and industry members. Financial support from the following members was critical to the success of PASZA in 2008.

Industry

Advanced Flush Systems Inc.	EnCana Oil & Gas Partnership	Penn West Petroleum Ltd.
Advantage Oil & Gas Ltd.	Enermark Inc.	Primewest Energy Inc.
AltaGas Operating Partnership	Enerplus Resources Corp.	Progress Energy Ltd.
Arcan Resources Ltd	Enterra Energy Corp.	Reber Exploration Ltd.
Arclin (Dynea)	Fairborne Energy Ltd.	Response Energy Corp.
Artek Exploration Ltd.	Flow-Back Oil & Gas Ltd.	Seeker Petroleum Ltd.
ATCO Electric	Galleon Energy Inc.	Spectra Energy Corporation
Baytex	Grande Prairie Generation	Standard Energy Inc.
Bonavista Petroleum	Great Plains Exploration Inc.	Suncor
BP Canada Energy Company	Grey Wolf Exploration Inc.	Sure Energy Inc.
Cadence Partnership	High Pine Oil & Gas	Talisman Energy Inc.
Canadian Natural Resources Ltd.	Hunt Oil Company of Canada Inc.	Trilogy Blue Mountain Ltd.
Compton Petroleum Corporation	Kinuso Mercantile Ltd.	Tristar Oil & Gas Ltd.
Conoco Phillips Canada Energy Partnership	Koch Exploration	Twin Butte Energy Ltd.
Crescent Point Resources Ltd.	Masters Energy Inc.	Vaquero Resources Ltd.
Dark Energy Ltd.	Paramount Resources Ltd.	Vermillion Resources Ltd.
Devon Canada	Pearl E & P Canada Inc	Western Canada Energy Ltd.
Duvernay Oil Corp		Weyerhaeuser Canada

Government & Municipalities and NGOs

Alberta Environment	Municipal District of Big Lakes	Saddle Hills County
Alberta Health Services	Municipal District of Green View	Town of Sexsmith
Birch Hills County	Municipal District of Smoky River	Town of Valleyview
County of Grande Prairie	Municipal District of Spirit River	Village of Hythe
Energy Resources Conservation Board	Natural Resources Conservation Board	Friends of an Unpolluted Lifestyle (FOUL)



Photo Credit: Erin Akins

4.0 Financial Report

Peace Air Shed Zone Association		
Statement of Operations		
(Unaudited)		
For the year ended December 31	2008	2007
Income		
Members' contributions	\$ 526,762	\$ 614,911
Government grants	82,500	100,000
	<u>609,262</u>	<u>714,911</u>
Expenses		
Advertising and promotion	1,131	-
Amortization	59,092	70,664
Bank charges and interest	123	1,085
Contract administration	56,668	65,520
Honoraria and travel	1,164	1,167
Insurance	10,263	10,262
Memberships and licences	1,354	-
Monitoring contracts	519,862	441,836
Office	1,618	533
Professional fees	6,363	8,095
Program management fees	44,753	43,151
Rent	-	1,269
	<u>702,391</u>	<u>643,582</u>
Income (loss) before the undernoted	(93,129)	71,329
Other income		
Interest income	719	-
Net income (loss) for the year	\$ (92,410)	\$ 71,329

5.0 Year in Review

In 2008 PASZA undertook several significant projects and organizational changes. A brief summary of these events are listed below:

Boundary Expansion Feasibility Study

In 2006 PASZA partnered with Alberta Environment to determine the feasibility of expanding PASZA's existing boundaries both north and south. During the study PASZA installed twelve passive monitoring stations to gather air quality data outside PASZA's boundaries. These stations determine if the proposed expansion air quality was similar to PASZA's current monitoring area. The twelve stations operated from the summer of 2007 until December 31, 2008.

Girouxville Confined Feeding Operation Monitoring Program

Alberta Environment worked with PASZA to outfit the Portable Air Monitoring Lab (PAML-3) in response to air quality concerns around confined feeding operations (CFOs) near Girouxville. PAML-3 was operated by PASZA from September 19, 2007 until October 22, 2008. The station measured compounds appropriate to CFOs such as ammonia, hydrogen sulphide and total reduced sulphur compounds. PASZA continues to operate six passive hydrogen sulphide stations in the area. PASZA will have a report of the findings available on our web page in 2009.

Staffing Addition

In mid July PASZA hired an Administrator to help with the day-to-day operations of the organization. Dawn Ewan filled the position and began working diligently to provide front desk support, accurate financial records as well as starting and maintaining other programs under the direction of the Board.

Bylaw Review

In October PASZA reviewed the bylaws of the society. Director Jim Meagher, PASZA Program Manager Michael Bisaga and contractor Iris English worked initially to redraft the original bylaws. Members made additional changes then moved to accept the amended document. The bylaws will formally be filed with Alberta Registries along with the 2009 societies registration.

Portable Monitoring Station

The goal of the mobile station is to improve understanding of regional issues where monitoring gaps exist. The Rover Continuous Station completed a year of monitoring in the Spirit River area. The Spirit River location was selected as no previous long-term air quality monitoring had occurred in the area. Data collected at the Spirit River Station is discussed throughout the technical portion of this report. The Rover has been relocated to the Kinuso area in 2009.

Community Outreach

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

Web Page - The web page was redesigned to provide visitors with a user friendly layout to access information. The web page is now being used to notify members of meetings and to promote events that PASZA will be attending.

Photo Contest - PASZA recognized a need for new photographs of the area as well as the people who live and play within the boundaries. PASZA developed a photo contest that was supported by various contractors and members. Thank you to everyone who entered photographs—the calibre of photographers and scenery in the Peace Region is astounding. The winning photographers will be recognized at the 2009 Annual General Meeting and their work is featured throughout this report.

Radio Advertising - PASZA worked with four local radio stations to develop radio advertisements. The thirty second announcements featured an environmental message to promote better air quality as well as thanked members for supporting PASZA.

Looking Forward

In 2009 PASZA will maintain its focus of producing scientifically credible data across the entire monitoring network. In addition, PASZA plans to take a more active role in the community by participating in various exhibitions, trade shows and community events. PASZA hopes to reach a broader audience to promote the PASZA organization and vision.

6.0 PASZA Air Quality Monitoring Program



PASZA initiated the development of a Regional Air Quality Monitoring Program (AQM Program) in 1999. The design of the monitoring program was the consensus of two years of work by PASZA's first Multi-Stakeholder Technical Committee. The Committee consulted with the Clean Air Strategic Alliance Stakeholder Groups (Ambient Air Quality Monitoring Project Team and Ecological Effects Monitoring Group) and several other stakeholder groups.

Boundaries for the PASZA air quality zone were established considering the overall size and provincial boundaries as well as community and industry interest in the airshed. The zone area is 38,500 square kilometers and approximately extends North to the Peace River, South to Township 65, West to the British Columbia Border and East to the Eastern Boundary of Range 8 West of the Fifth Meridian. A map of the zone is located on page 6.

PASZA uses two types of air quality monitoring methods; passive and continuous. The Passive Monitoring Network (passive method) monitors for a one month period. The Continuous Monitoring Network (continuous method) provides near instantaneous data. Both are described further in later sections.

The PASZA Technical Committee utilized a grid system to establish the Passive Air Quality Network. The benefit of a grid system is it reduces biases in site selection and provides a simple cost effective method of locating passive monitors. The passive network consists of forty three stations located throughout the zone.

Continuous Monitoring produces data that is versatile and provides the greatest resolution. Compounds measured by the continuous monitoring network were selected to coincide with *A Strategic Plan for Air Quality Monitoring in Alberta* written for the Clean Air Strategic Alliance in 1995 and updated in 2001.

The Continuous Monitoring Network was

developed using a "Hot Spot" selection process. Continuous stations were selected because Passive Network Monitoring Results indicated areas of higher than average concentrations of ozone, sulphur dioxide or nitrogen dioxide. The Hot Spot method selected areas where a higher resolution of air quality data would increase understanding of air quality in the region.

All data collected in PASZA's AQM Program is compared against Alberta Ambient Air Quality Objectives (AAAQO) as defined in the Alberta Environment Protection and Enhancement Act. The AAAQO are intended to provide protection of the environment and human health. Any exceedences of AAAQO are reported to Alberta Environment.



Photo Credit: Nicole Holway

6.1 Continuous Monitoring

Continuous Monitoring Stations collect data by continually drawing ambient air through a commercial analyzer. A benefit of continuous analyzers is that they measure air quality constantly and provide nearly instantaneous measurements of several chemical pollutants. A disadvantage of Continuous Monitoring Stations is that capital and operating costs are high.

Compounds Monitored Continuously:

- Sulphur dioxide (SO₂)
- Total reduced sulphur (TRS)
- Hydrogen sulphide (H₂S)
- Oxides of nitrogen (NO₂, NO and NO_x),
- Carbon monoxide (CO)
- Total hydrocarbons (THC)
- Ozone (O₃)
- Fine particulate matter (PM_{2.5})

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

These parameters include:

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

The Continuous Monitoring Stations are operated according to *Alberta's Air Monitoring Directive* published in 1989. This document sets out the manner in which monitoring and reporting is performed by air quality stations. In addition PASZA has developed a quality assurance and quality control program that monitors each station and includes:

- Daily equipment calibration checks
- Monthly multi-point calibrations
- Government audits
- Review of data for variances and trends

The data produced by continuous stations is used to calculate Air Quality Index (AQI). AQIs are a simple system developed so the public can easily assess air quality conditions. See section 6.1.1 for more information about AQIs.

The table below lists the parameters monitored at each of the Continuous Air Quality Monitoring Stations in the PASZA network and summarizes the percentage of time each instrument was in operation for 2008. PASZA monitors uptime to ensure proper operation of the network and strives to achieve a minimum of 95% operational uptime; above the 90% guideline set out in the Air Monitoring Directive.

In 2008 the sensor for outdoor temperature and relative humidity was removed for maintenance resulting in an operating efficiency of 84.8%.

PASZA Continuous AQM Station Operating Efficiency (%)

Parameter	Henry Pirker	Evergreen Park	Smoky Heights	Beaverlodge	Valleyview	Portable - Spirit River
Sulphur Dioxide	99.8	100.0	99.9	99.1	99.8	97.6
Total Reduced Sulphurs	99.8	98.5	99.9	NM	NM	97.7
Hydrogen Sulphide	NM	NM	NM	NM	99.6	NM
Oxides of Nitrogen (NO ₂ , NO and NO _x)	99.7	NM	NM	99.0	NM	96.7
Carbon Monoxide	99.8	NM	NM	NM	NM	NM
Total Hydrocarbons	98.4	NM	NM	NM	NM	NM
Ozone	99.8	NM	NM	99.1	NM	97.7
Fine Particulate Matter	97.2	97.7	97.7	98.5	NM	NM
Wind Speed	98.5	99.7	98.8	98.3	99.7	95.8
Wind Direction	98.5	99.7	98.8	98.3	99.7	95.8
Solar Radiation	99.9	NM	NM	NM	NM	NM
Outdoor Temperature	84.8	94.0	99.9	98.9	99.7	97.7
Relative Humidity	84.8	NM	NM	99.1	99.7	97.7

* NM - Not Monitored

6.1.1 Air Quality Index

The Air Quality Index was developed to provide the public with a meaningful measure of outdoor air quality.

Five parameters are used to establish a rating. These parameters are:

- Fine Particulate Matter (PM2.5)
- Nitrogen dioxide
- Ozone
- Sulphur dioxide
- Carbon monoxide

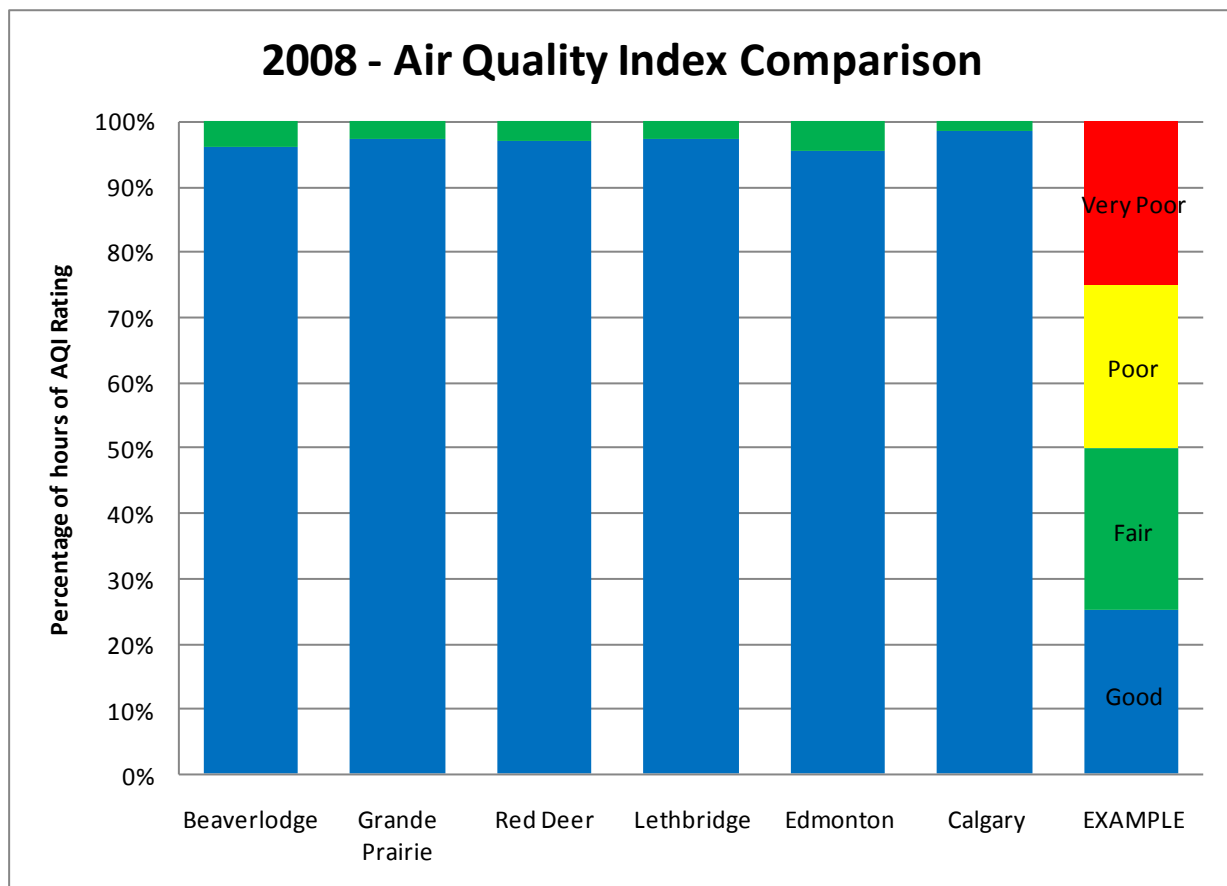
When calculating the AQI a minimum of four parameters are required. To learn more about how the AQI is calculated please visit the Alberta Environment website www.environment.alberta.ca.

The AQI System uses the following rating system:

- Good 0-25**
- Fair 26-50**
- Poor 51-100**
- Very Poor 100+**

The Henry Pirker (Grande Prairie) and Beaverlodge Stations are equipped to calculate AQI ratings. The figure below summarizes the AQI ratings for selected stations in Alberta including Grande Prairie and Beaverlodge. The bars depict the percentage of hours in 2008 that each station observed good, fair, poor or very poor AQI ratings. The stations showed a similar percentage of hours for good and fair ratings. None of the cities illustrated below had Poor or Very Poor AQI ratings in 2008.

AQI ratings are available on the PASZA web page.



6.1.2 PASZA Continuous Monitoring Stations

Henry Pirker Station



The Henry Pirker Continuous Monitoring Station, located in Muskoseepi Park Grande Prairie, has been operational since February 2004. The location provides data that can be used to compile information about air quality within Grande Prairie. Henry Pirker Station is part of the National Air Pollution Surveillance Program (NAPS). NAPS monitors and assesses the quality of outdoor air in populated regions of Canada. To learn more about NAPS visit www.etc-cte.ec.gc.ca/NAPS. Henry Pirker produces Air Quality Indexes hourly. The station monitors for sulphur dioxide, total reduced sulphur, oxides of nitrogen, carbon monoxide, total hydrocarbons, ozone, fine particulate matter, wind speed, wind direction, solar radiation, outdoor temperature and relative humidity.

Evergreen Park Station

The Evergreen Park Continuous Monitoring Station is located along Resources Road, Southeast Boundary of Grande Prairie. The station has been operational since March 2005. Evergreen Park Station provides data that helps PASZA understand the levels of emissions entering and leaving the City of Grande Prairie. This station is configured to measure sulphur dioxide, total reduced sulphur, fine particulate matter, wind speed, wind direction and outdoor temperature.



Smoky Heights Station



The Smoky Heights Station is located East of Teepee Creek near the banks of the Smoky River. The station was installed in March of 2005. This location was chosen to provide more detailed information about the air quality in the area because passive monitoring indicated slightly higher annual average ground-level sulphur dioxide than other areas within the PASZA zone. This station monitors for sulphur dioxide, total reduced sulphur, fine particulate matter, wind speed, wind direction and outdoor temperature.

Beaverlodge Station



The Beaverlodge Monitoring Station is located on the Agriculture Canada Research Farm near Beaverlodge. The location allows PASZA to measure levels of emissions entering from British Columbia. Alberta Environment installed this station November 1, 1997 and it has been in operation since. PASZA took over responsibility of the station in April 2005. Beaverlodge is a designated National Air Pollution Surveillance Station. A building upgrade is scheduled in 2009. The station monitors for wind speed, wind direction, relative humidity, trace level sulphur dioxide, ozone, fine particulate matter and oxides of nitrogen.

Spirit River—Rover Station

The Rover Station is a portable trailer equipped to monitor sulphur dioxide, total reduced sulphur, oxides of nitrogen, ozone, wind speed, wind direction, outdoor temperature and relative humidity. The station was moved from Falher to the Spirit River area on September 20, 2007 and operated until March 30, 2009. The location was chosen because no long term air quality data had been collected for this area.



Valleyview Station

The Valleyview Station is located approximately 14 km southeast of Valleyview. PASZA took over operations of the station from the South Sturgeon Plant in September 2006. The station monitors for sulphur dioxide, hydrogen sulphide, wind speed, wind direction, outdoor temperature and relative humidity. PASZA plans to upgrade the station building when funds are available.



Girouxville—Confined Feeding Monitoring

Alberta Environment worked with PASZA to equip the Portable Air Monitoring Lab-3 (PAML-3) in response to air quality concerns around confined feeding operations (CFO's) near Girouxville. PAML-3 was operated by PASZA from September 19, 2007 until October 22, 2008. The station measured compounds appropriate to those found near CFO's including ammonia, sulphur dioxide, total reduced sulphur, hydrogen sulphide. It also measure meteorological parameters including wind speed, wind direction and ambient temperature.

6.2 Passive Air Quality Monitoring

The PASZA AQM Program includes a network of passive samplers to collect air quality data over the entire zone (38,500 square kilometers). Passive samplers rely on the principles of permeation and diffusion to physically uptake the specific compound being sampled. The advantages of passive samplers are:

- Accuracy
- Low detectable limits
- Simple design
- Ease of use
- Cost effectiveness
- Do not require electricity
- Can be located in remote areas

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

The Passive Monitoring Network forms the backbone of the PASZA AQM Program and provides data that is used to:

- Assess the spatial variation of nitrogen dioxide, ozone and sulphur dioxide
- Identify long-term air quality trends
- Qualify data in relation to Alberta's Air Quality Guidelines

A grid system was used to establish the passive network in July 2002. The benefit of a grid system is it

reduces biases in site selection and provides a simple cost effective method of locating passive monitors. Within the County of Grande Prairie sites were initially located every 200 square miles. After eight months of monitoring six locations were decommissioned because results were redundant with neighboring stations. Outside the County of Grande Prairie stations were located every 300 square miles except where there is limited access.

Quality assurance procedures include the rotation of duplicate samples through 10% of the sites and the analysis of 10% field blanks. Lab analysis on all samples is done "blind" meaning that samples are analyzed with no knowledge of where the samples were located.

The 2008 Passive Monitoring Network consisted of forty-two permanent stations configured to monitor SO₂, NO₂ and O₃. In April 2007 38—Karr Creek was removed because of construction in the area and no alternative location was established. The Station was relocated in 2009.

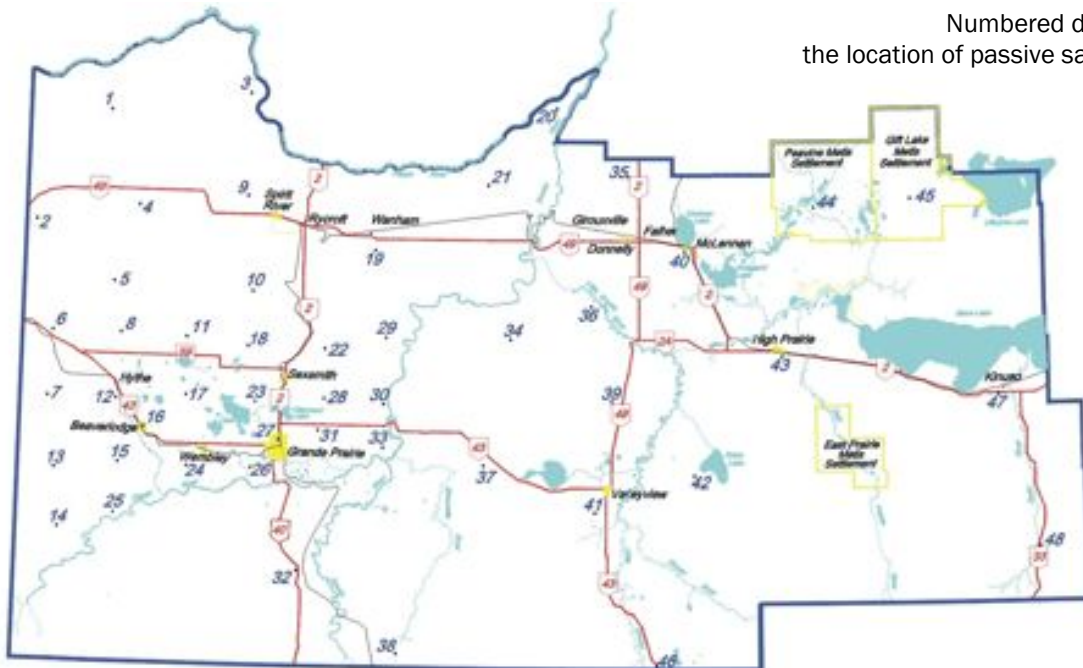
In addition to the Main Passive Monitoring Network PASZA operated two smaller passive networks. Twelve monitors were installed outside PASZA's borders to collect data for the boundary expansion study and six H₂S stations collected data around CFOs near Girouxville. Results from these studies will be provided in 2009.



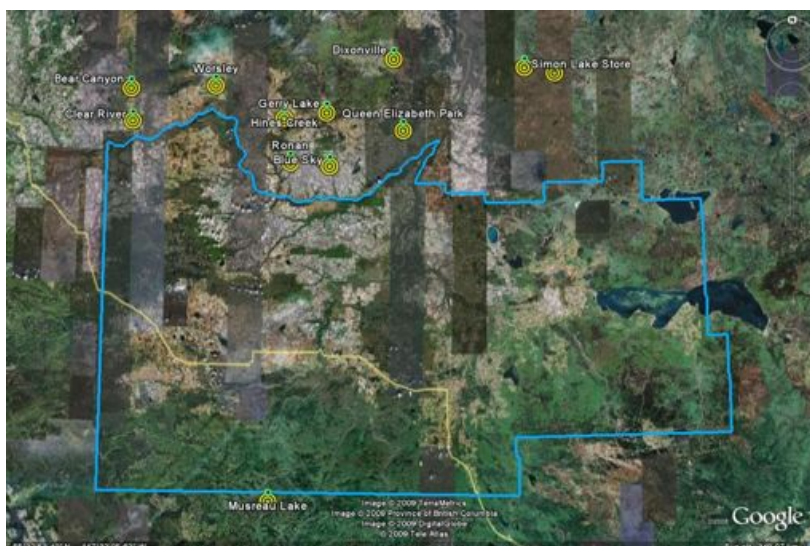
Passive sampler located at Station 32-Gold Creek

Location of Passive Monitoring Stations in 2008

Numbered dots give the location of passive samplers.



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



The 2008 Passive Air Quality Monitoring Network included twelve additional passive stations. These stations were established to monitor air quality in the proposed expansion area. Eleven stations were located north and one station was located south of the PASZA boundary.

The map at left illustrates locations of the Expansion Network Passive Stations.

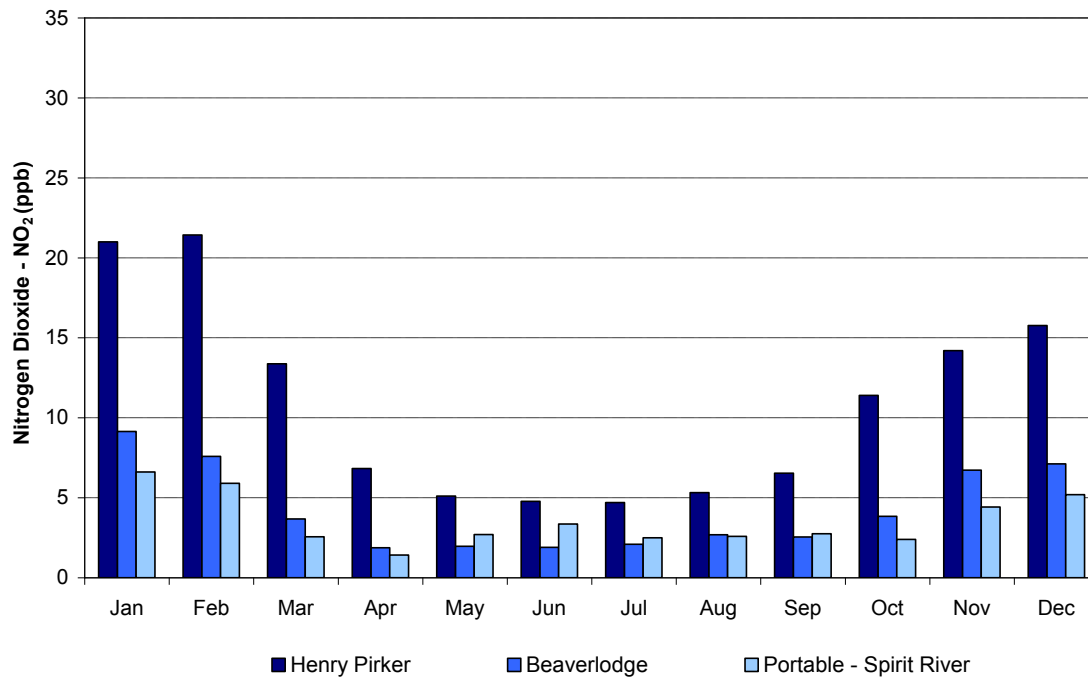
7.0 Nitrogen Oxides

Nitrogen dioxide (NO₂) and nitric oxide (NO) are known collectively as oxides of nitrogen (NO_x). In Alberta, transportation (automobiles, locomotives and aircraft) is the major source of NO_x. Other major sources include the oil and gas industries and power plants. NO₂ along with volatile organic compounds play a major role in the formation of ground level ozone. Both NO and NO₂ may be emitted by high temperature combustion processes. NO is readily oxidized in the atmosphere into NO₂.

Alberta Ambient Air Quality Objective Nitrogen Dioxide (NO ₂)	
1-hour average:	212 parts per billion
24-hour average:	106 parts per billion
Annual average:	32 parts per billion

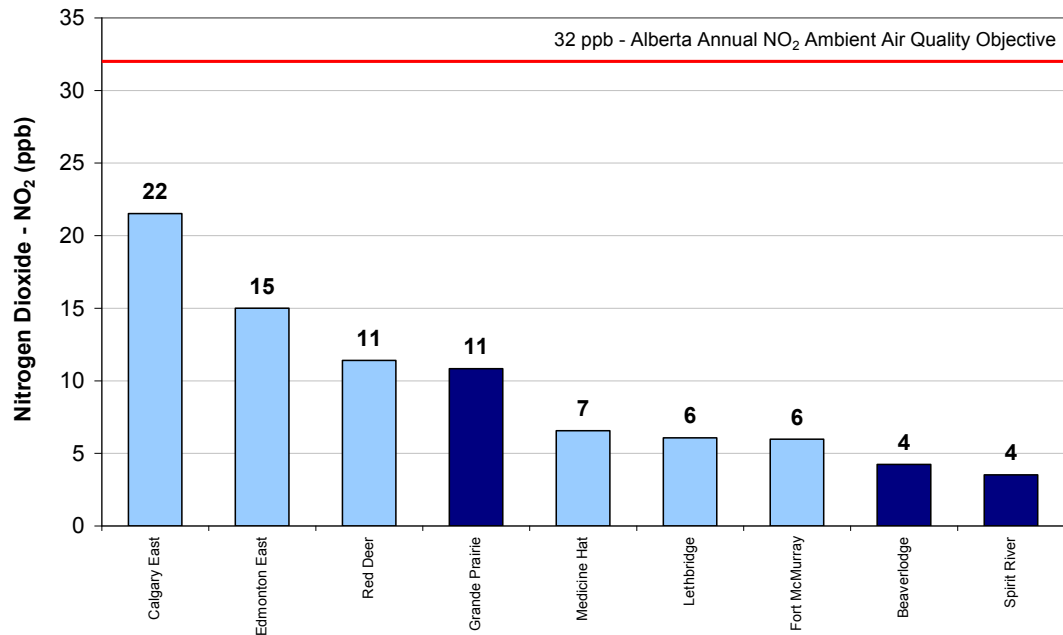
In 2008 PASZA Air Quality Monitoring Stations observed no exceedences of the Alberta Ambient Air Quality Objective (AAAQO) for Nitrogen Dioxide.

PASZA - 2008 Monthly Average Nitrogen Dioxide (NO₂)



The above figure illustrates the higher concentrations of NO₂ observed at the Henry Piker Station located in Grande Prairie, Alberta in 2008. The higher observed NO₂ levels may be attributed to the higher concentration of sources including vehicle traffic and home heating as compared to the smaller centres of Beaverlodge and Spirit River. It should be noted that in addition to being less populated, Beaverlodge and Spirit River Stations were located outside the town boundaries and this may have contributed to the lower concentrations. The figure also shows the higher levels of NO₂ during the winter months due to increased emissions from home heating and vehicle idling.

Nitrogen Dioxide (NO₂) - 2008 Annual Averages



In 2008 the annual average NO₂ concentration for the Henry Pirker Station was 11 ppb. This was lower than concentrations observed in the larger centers of Edmonton and Calgary and higher than the cities of Medicine Hat and Lethbridge. Beaverlodge and Spirit River Stations had the lowest annual average concentrations.



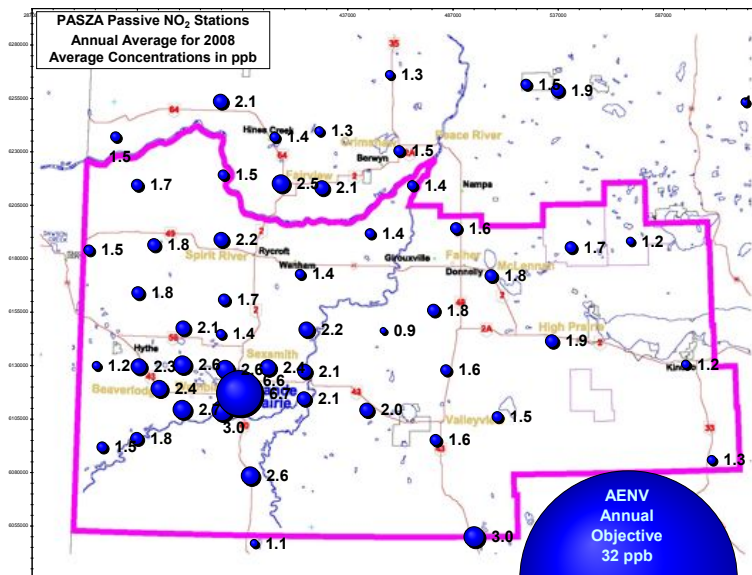
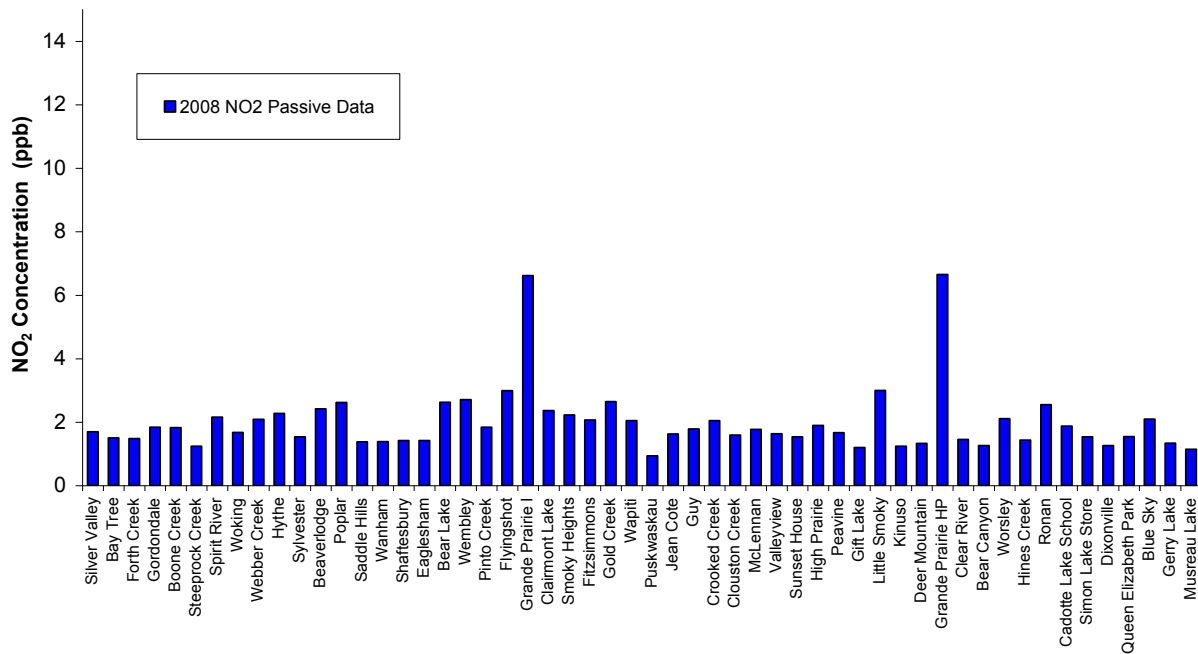
Continuous Monitoring Equipment inside Henry Pirker Station (Grande Prairie).

7.1 Nitrogen Dioxide—Passive Monitoring

The Passive Network annual results for NO₂ concentrations in 2008 are summarized in the following two figures. The two passive stations located within the

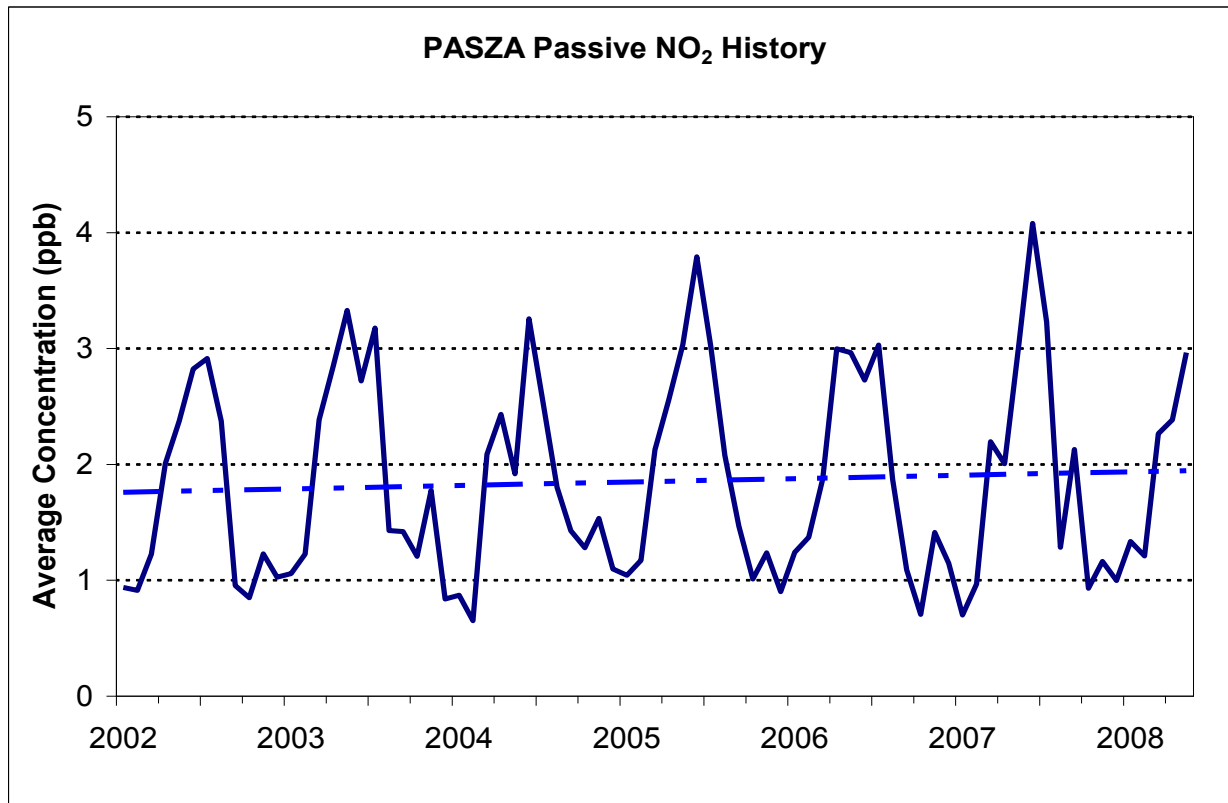
City of Grande Prairie show the highest levels of NO₂. The lowest levels were observed at the Puskwaskau station located north of Debolt, Alberta.

Alberta Ambient Air Quality Objective - Annual NO₂ Objective is 32 ppb



Passive NO₂ monitoring results show higher annual average concentrations within the City of Grande Prairie.

7.2 Nitrogen Dioxide—History



The above figure plots average monthly data results for all PASZA's passive monitoring stations from 2002 to 2008 with the dark blue line. The dashed trend line indicates average NO₂ concentrations across the entire network have been increasing since 2002. However, average levels are far below the AAAQO of 32 ppb.

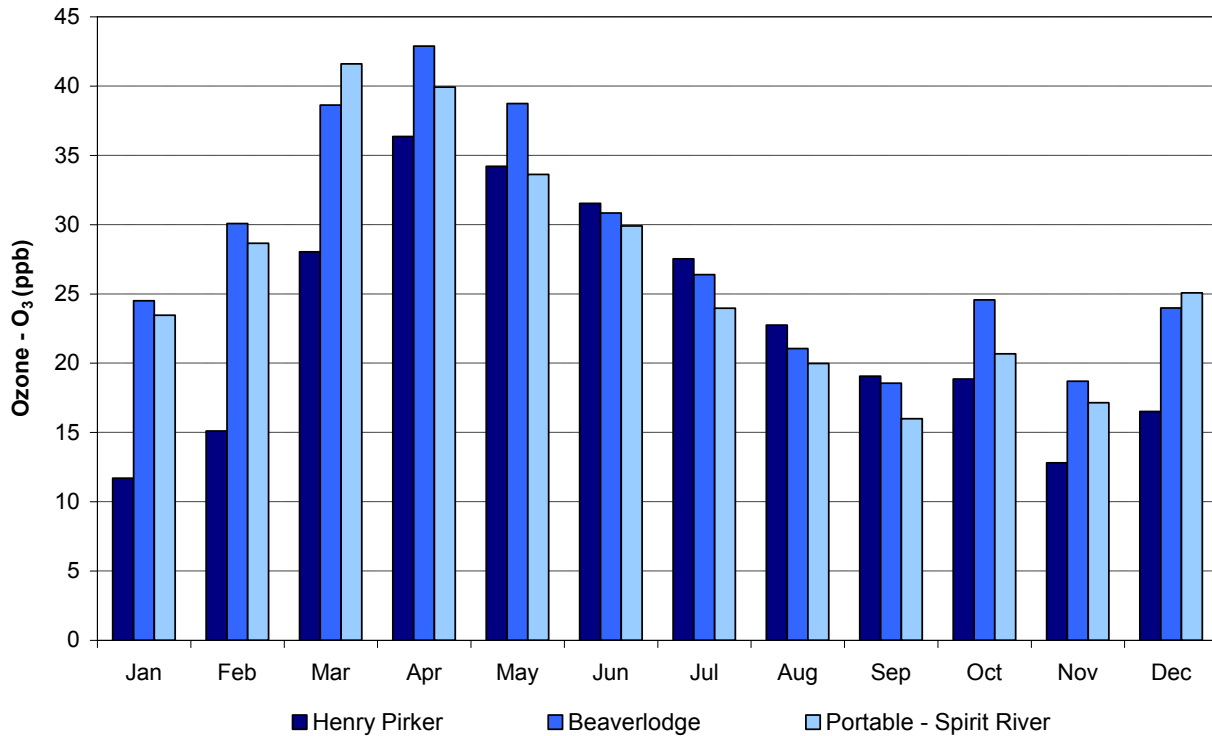
8.0 Ozone

Ozone (O₃), unlike other pollutants is not emitted directly by human activities, but is produced by a complex set of lower atmosphere chemical reactions. O₃ is also transported to the ground from the O₃ rich upper atmosphere by weather and can be carried from upwind urban centres and industrial complexes. At normal outdoor concentrations, O₃ is a colourless and odourless gas, but can have a sharp odour at very high concentrations during lightning storms.

Alberta Ambient Air Quality Objective
Ozone (O₃)
 1-hour average: 82 parts per billion

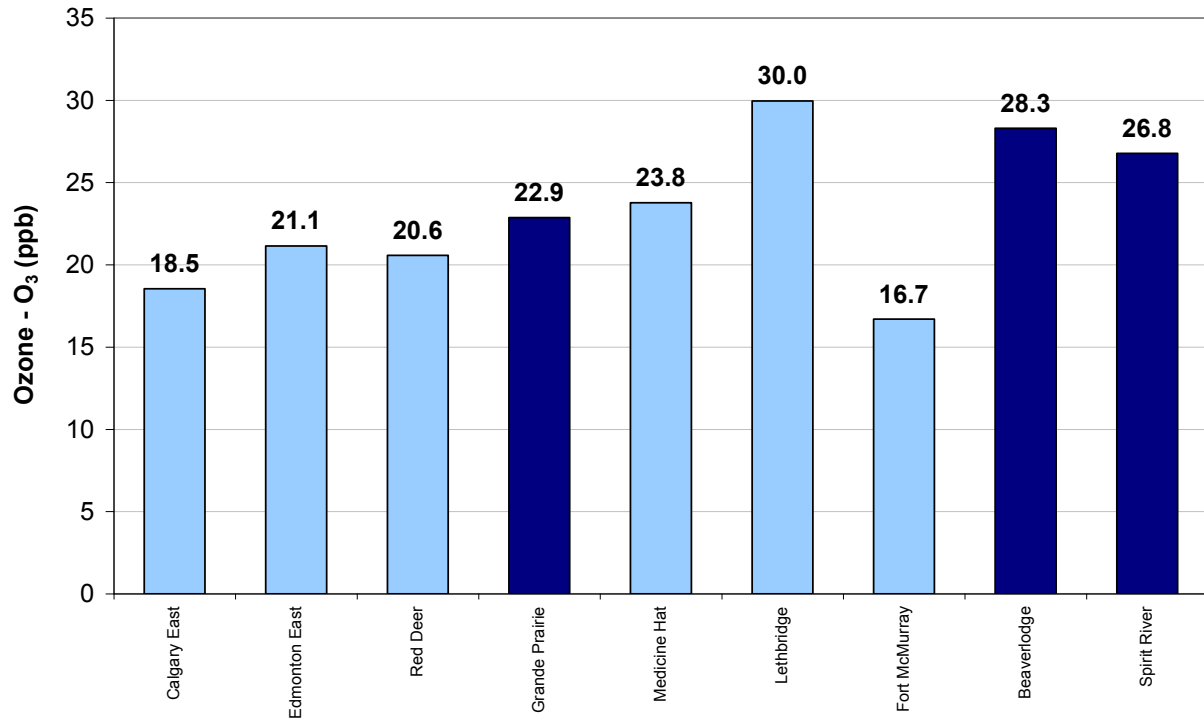
Ozone was monitored at Henry Pirker, Beaverlodge and Spirit River Continuous Monitoring Stations. There were no exceedences of the ozone AAAQO observed at the monitoring stations in 2008.

PASZA - 2008 Monthly Average Ozone (O₃)



The above graph depicts typical ozone values for the region based on data collected since 2003. The ozone values are highest in spring and early summer when ozone production at ground level is at a maximum because of higher levels of sunlight. Higher ozone values during the winter months may be caused by various dynamic atmospheric processes.

Ozone (O₃) - 2008 Annual Averages

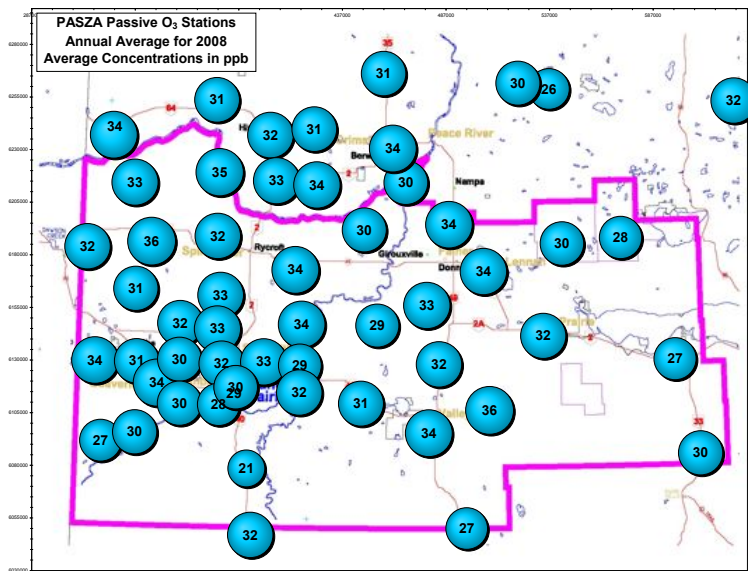
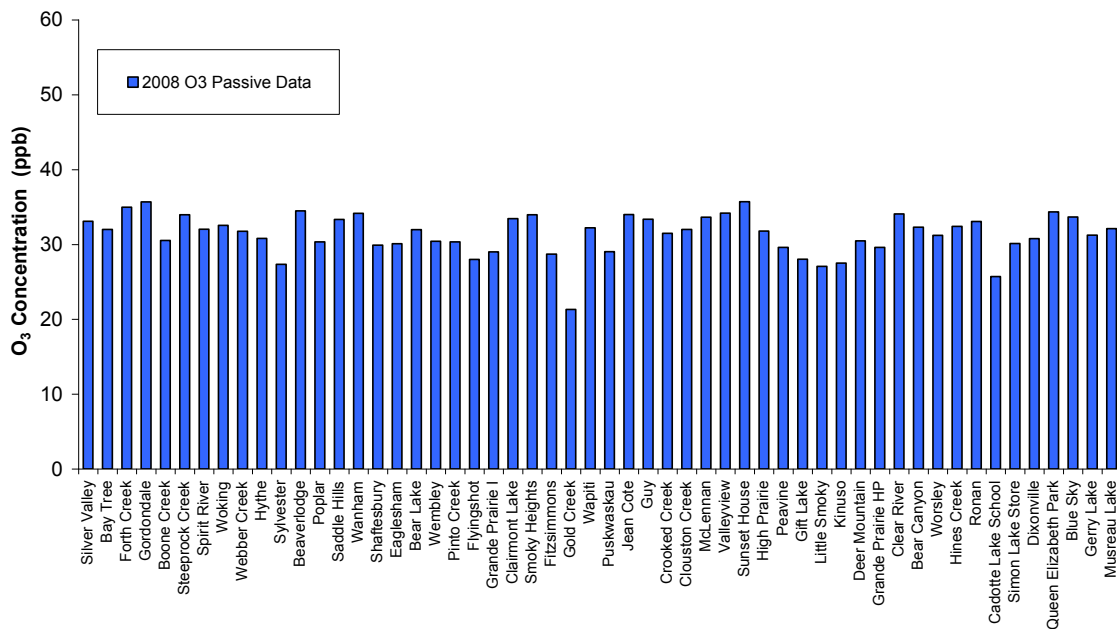


The figure above compares 2008 ozone levels in various Alberta cities. In general, the larger the city, the larger volume of traffic and other associated emissions of nitric oxide thus producing the lower annual average levels of ozone. Higher levels of ozone are noted at the Beaverlodge and Spirit River locations, both locations are rural where expected nitric oxide emissions are lower.

8.1 Ozone—Passive Monitoring

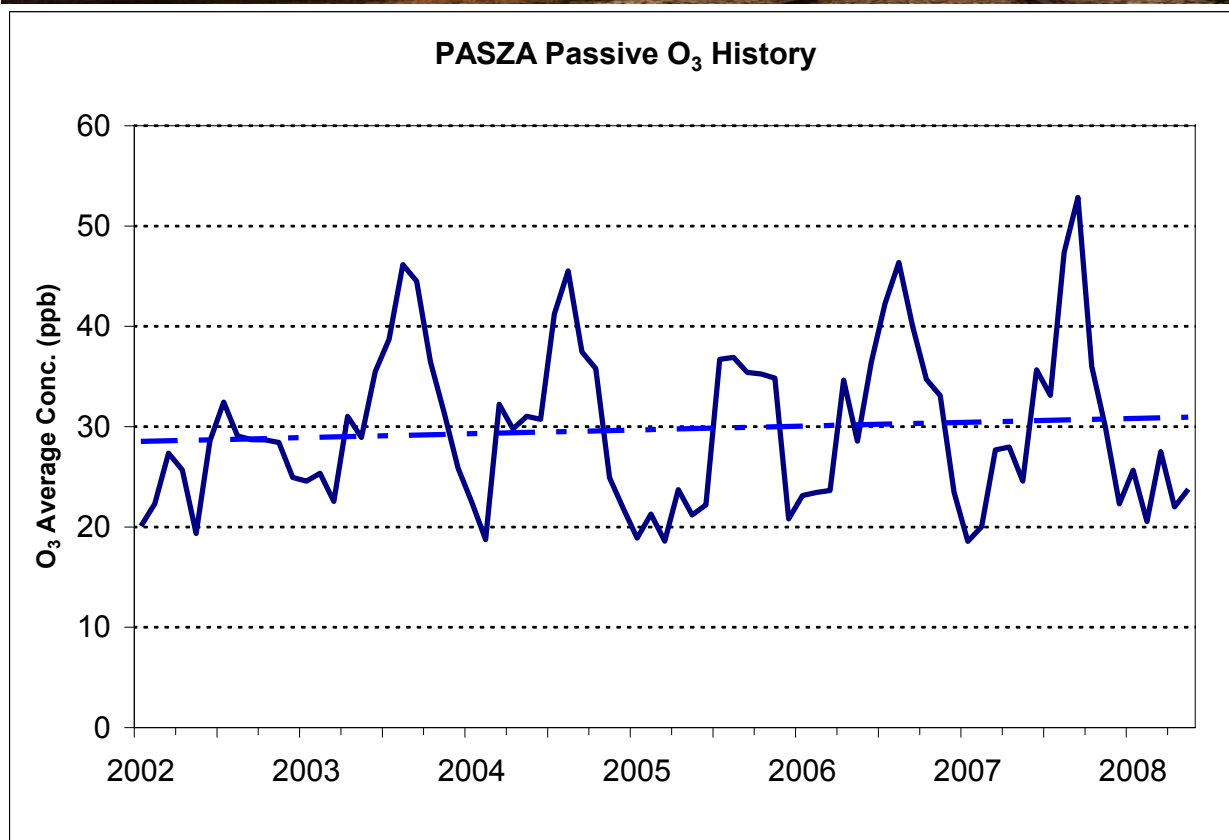
The average ozone (O₃) concentration for the entire passive monitoring network during 2008 was 31.4 ppb. Gold Creek passive monitoring station observed the lowest annual average concentrations of ozone during 2006, 2007 and 2008. This site is located near the zone’s southern boundary along Highway 40 approximately 45 km south of Grande Prairie. Sunset House passive monitoring station has observed the highest annual average concentrations of ozone through 2006, 2007 and 2008. This site is located just east of Sunset House.

Alberta Ambient Air Quality Objective - No Annual O₃ Objective



The bubble map at left shows the relatively homogenous levels of ozone throughout the PASZA region.

8.2 Ozone—History



The figure above shows the ozone concentrations over the entire passive network from 2002 until 2008. The dark blue line indicates the average monthly concentrations in parts per billion for all passive ozone monitors. The dashed trend line indicates a slight increase in ozone concentrations across the PASZA network.

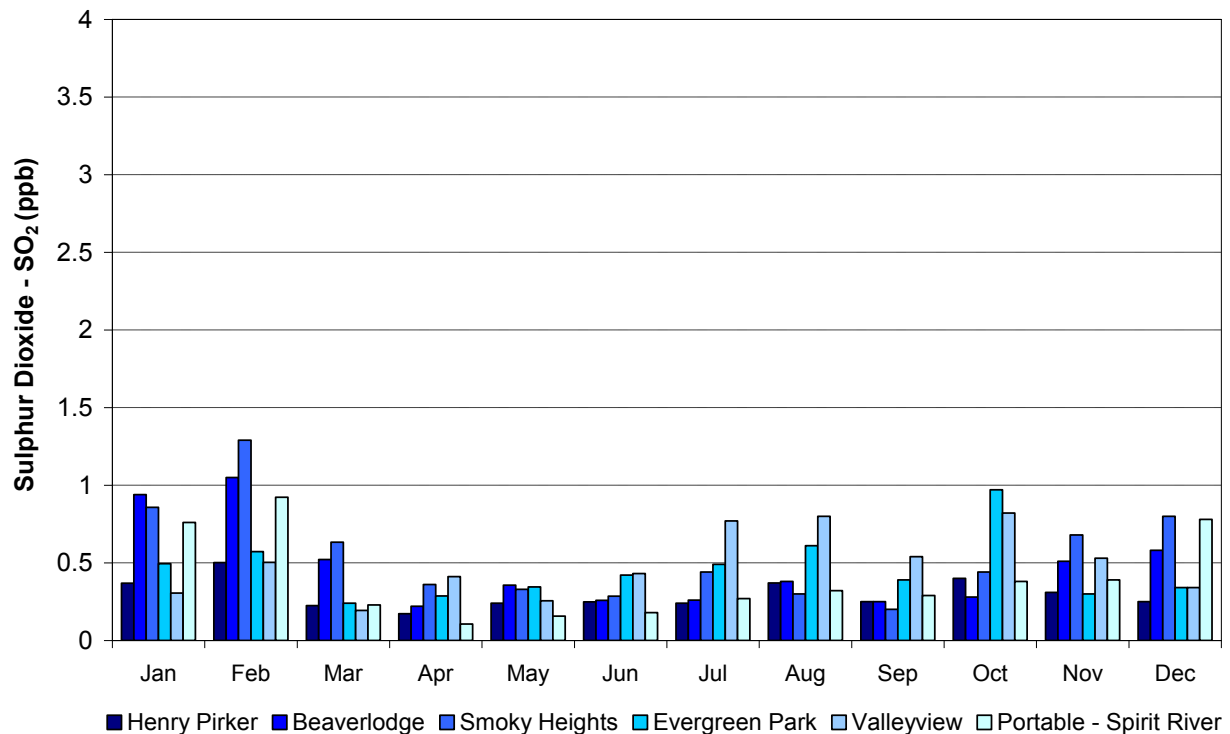
9.0 Sulphur Dioxide

Sulphur dioxide (SO₂) is a colourless gas with a pungent odour. 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.

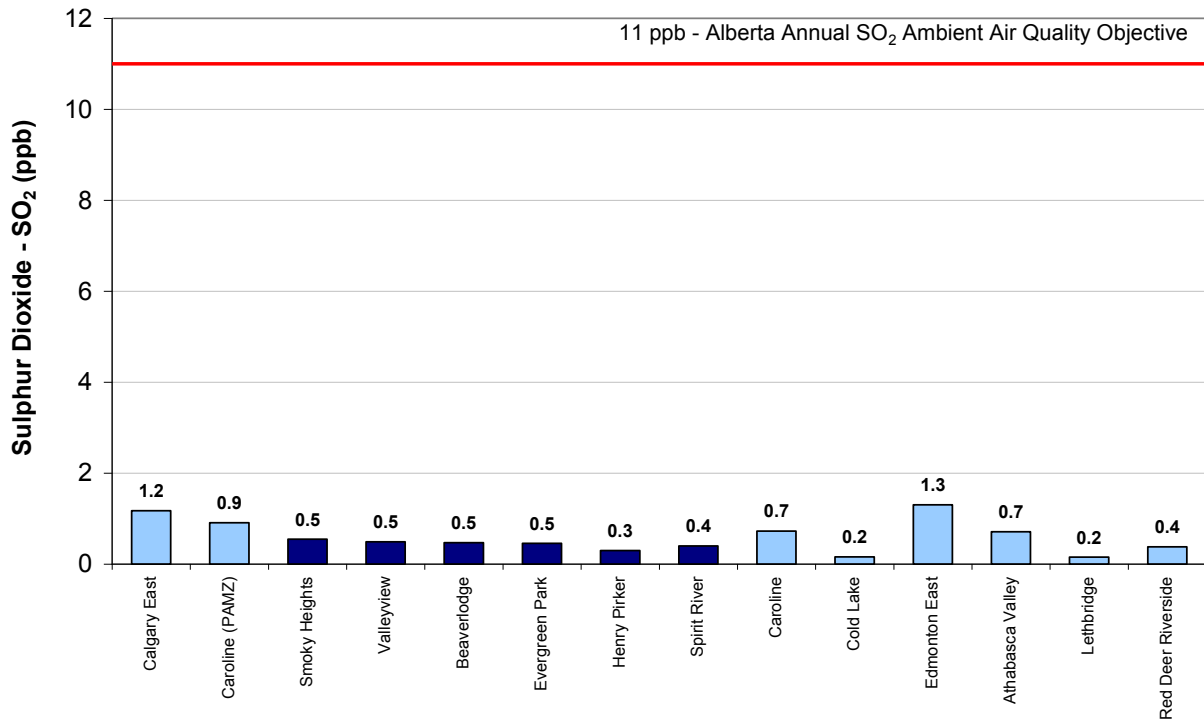
Alberta Ambient Air Quality Objective Sulphur Dioxide (SO ₂)	
1-hour average:	172 parts per billion
24-hour average:	57 parts per billion
Annual average:	11 parts per billion

No AAAQO's were exceeded in 2008 for sulphur dioxide at the PASZA Continuous Monitoring Stations.

PASZA - 2008 Monthly Average Sulphur Dioxide (SO₂)

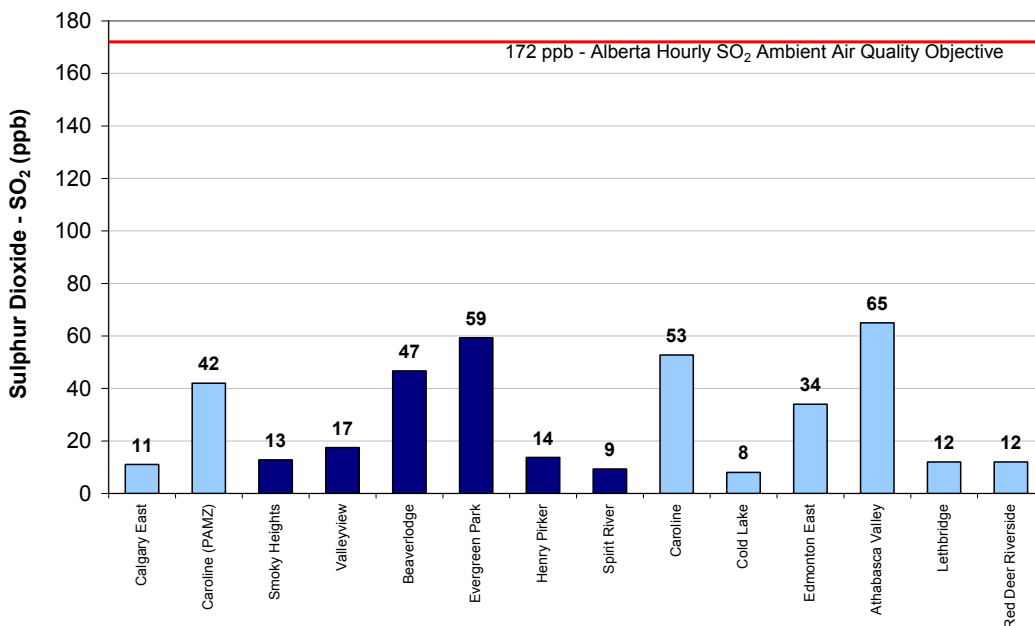


Sulphur Dioxide (SO₂) - 2008 Annual Averages



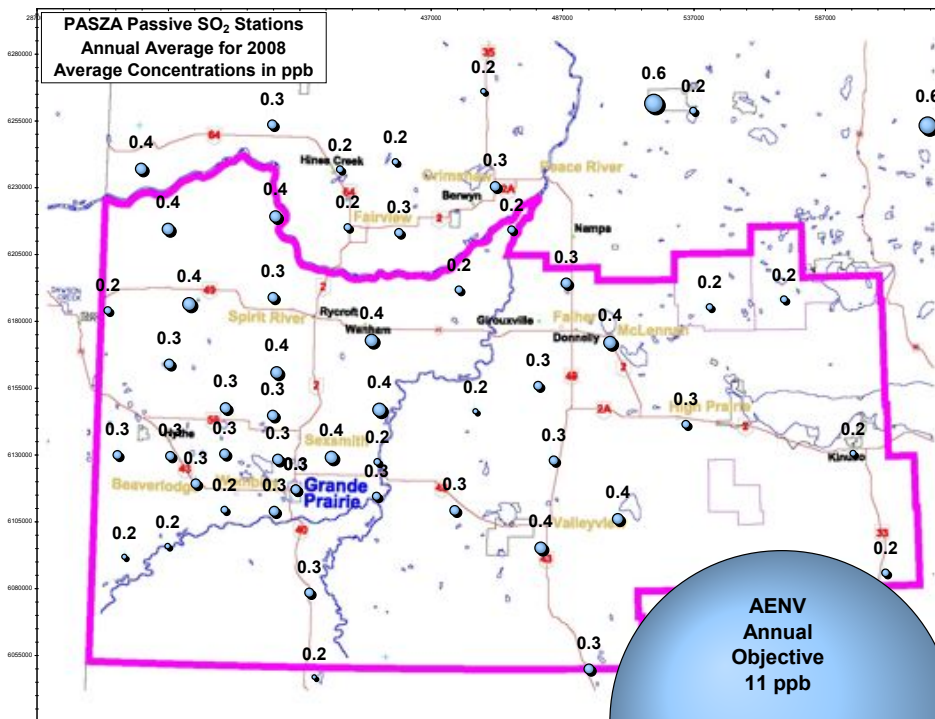
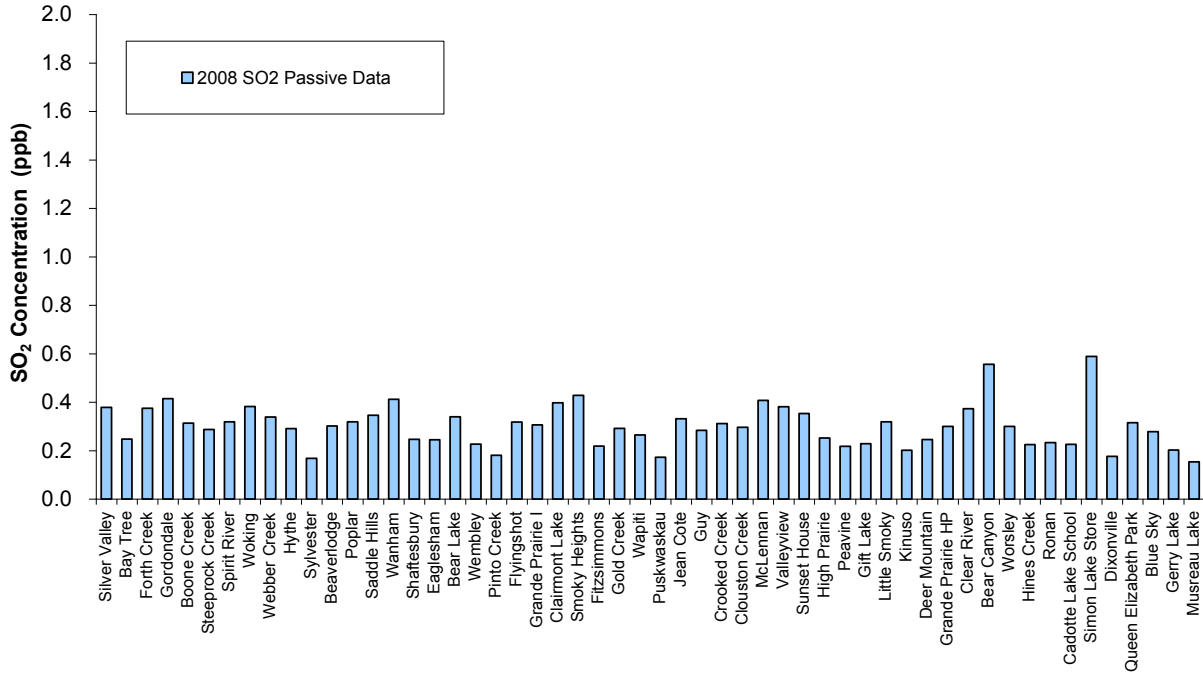
The above chart compares PASZA 2008 annual sulphur dioxide levels to other stations in Alberta. All stations within the network are well below the Alberta Annual Ambient Air Quality Objective in 2008. The chart below evaluates PASZA maximum hourly averages of sulphur dioxide against other monitoring stations in Alberta. The maximum values depict only the highest hourly concentrations measured for 2008.

Sulphur Dioxide (SO₂) - 2008 Maximum Hourly Averages



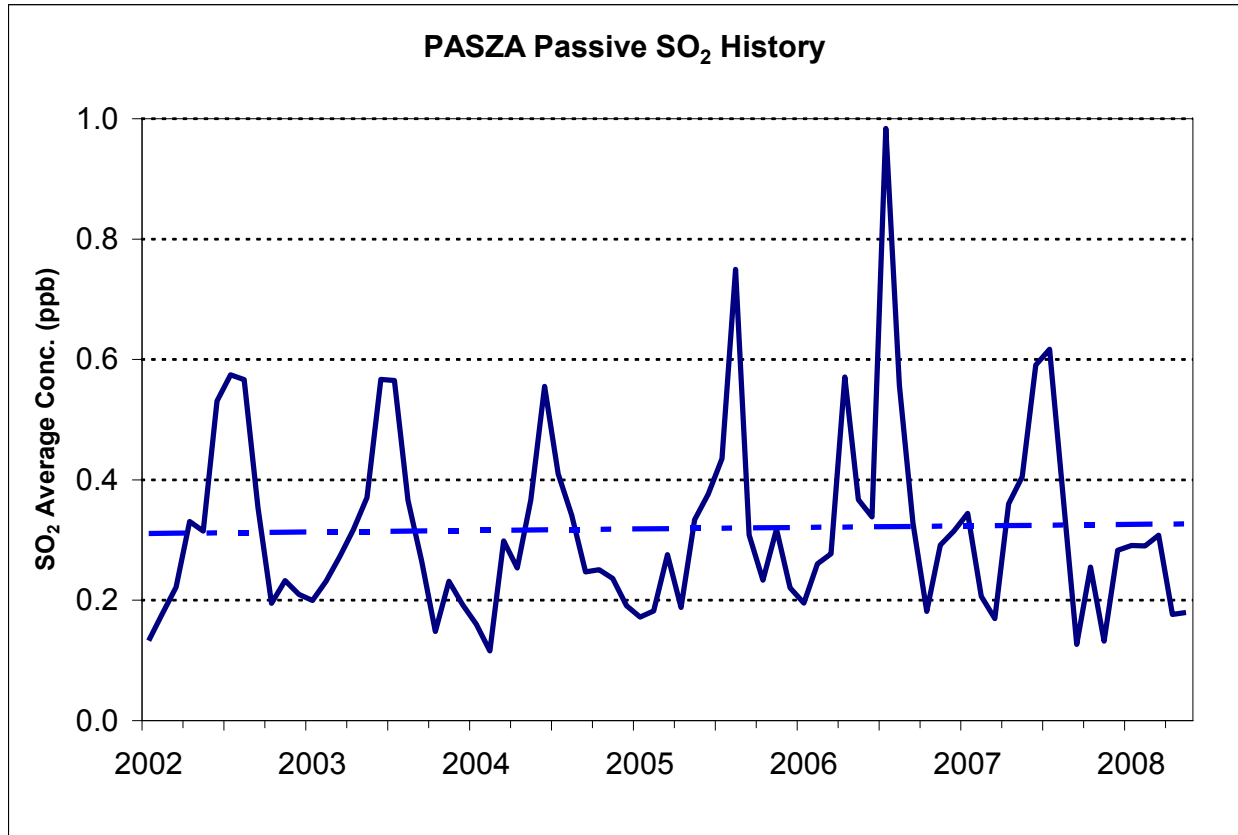
9.1 Sulphur Dioxide—Passive Monitoring

Alberta Ambient Air Quality Objective - Annual SO₂ Objective is 11 ppb



The average concentration for the passive monitoring network for 2008 was 0.3 ppb. This concentration is slightly lower than the concentrations observed in 2006 (0.4 ppb) and 2007 (0.4 ppb).

9.2 Sulphur Dioxide—History



Since the initiation of the passive network in 2002, PASZA has observed stable annual average SO₂ concentrations. Increased activity and development in the area should have resulted in increased SO₂ emissions, however improvements to technology and legislative changes have kept SO₂ levels constant throughout the zone.

10.0 Total Reduced Sulphur

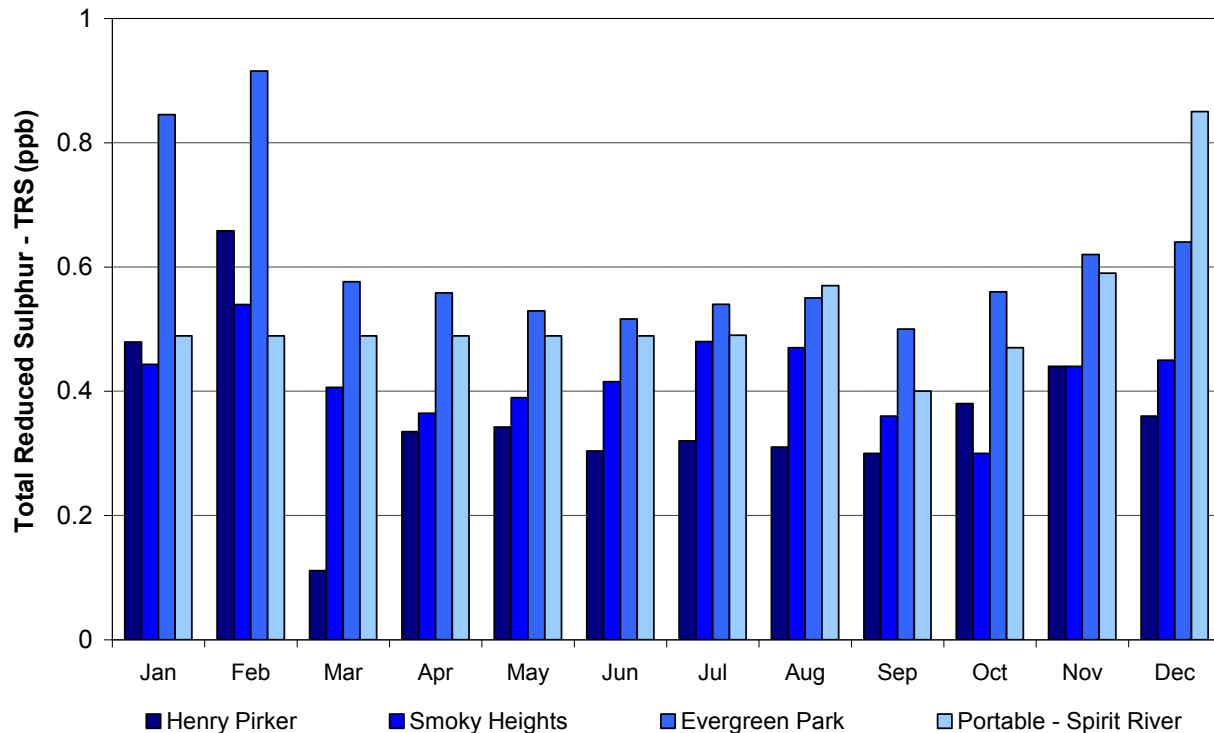
Total reduced sulphur (TRS) includes hydrogen sulphide (H₂S), mercaptans, dimethyl sulphide, dimethyl disulphide and other sulphur compounds. The major industrial sources of H₂S and TRS are petroleum refineries, tank farms for unrefined petroleum products, natural gas plants, petrochemical plants, oil sands plants, sewage treatment facilities, pulp and paper plants that use the Kraft pulping process, and animal feedlots. Sulphur dioxide is not a reduced sulphur.

Alberta Ambient Air Quality Objective
Total Reduced Sulphur (TRS)

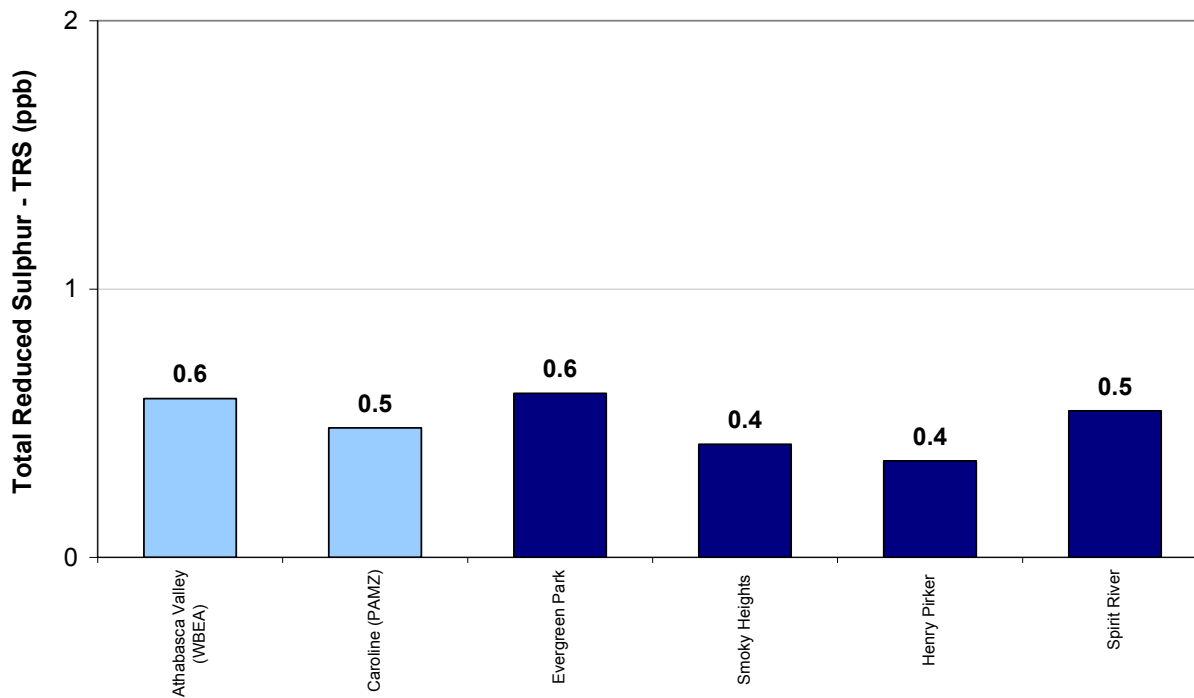
No Current AAAQO for TRS

Currently there is no AAAQO for TRS. In 2008 PASZA did not report TRS under the Hydrogen sulphide AAAQO.

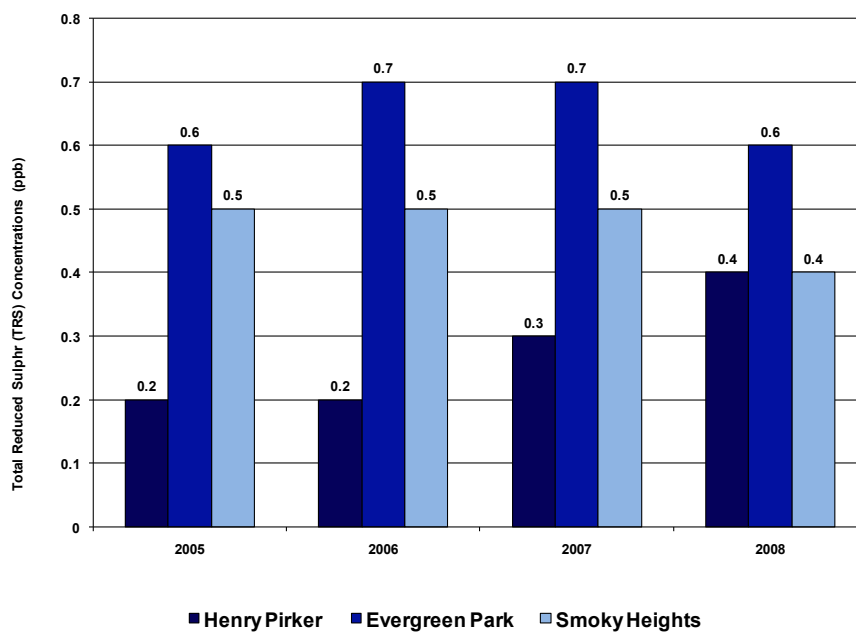
PASZA - 2008 Monthly Average Total Reduced Sulphur (TRS)



Total Reduced Sulphur (TRS) - 2008 Annual Averages



PASZA - Total Reduced Sulphur Concentrations 2005 - 2008



PASZA has monitored levels of TRS continuously since 2005 at the Henry Pirker, Evergreen Park and Smoky Heights Stations. This chart illustrates the annual average TRS observed at each station from 2005 to 2008.

11.0 Hydrogen Sulphide

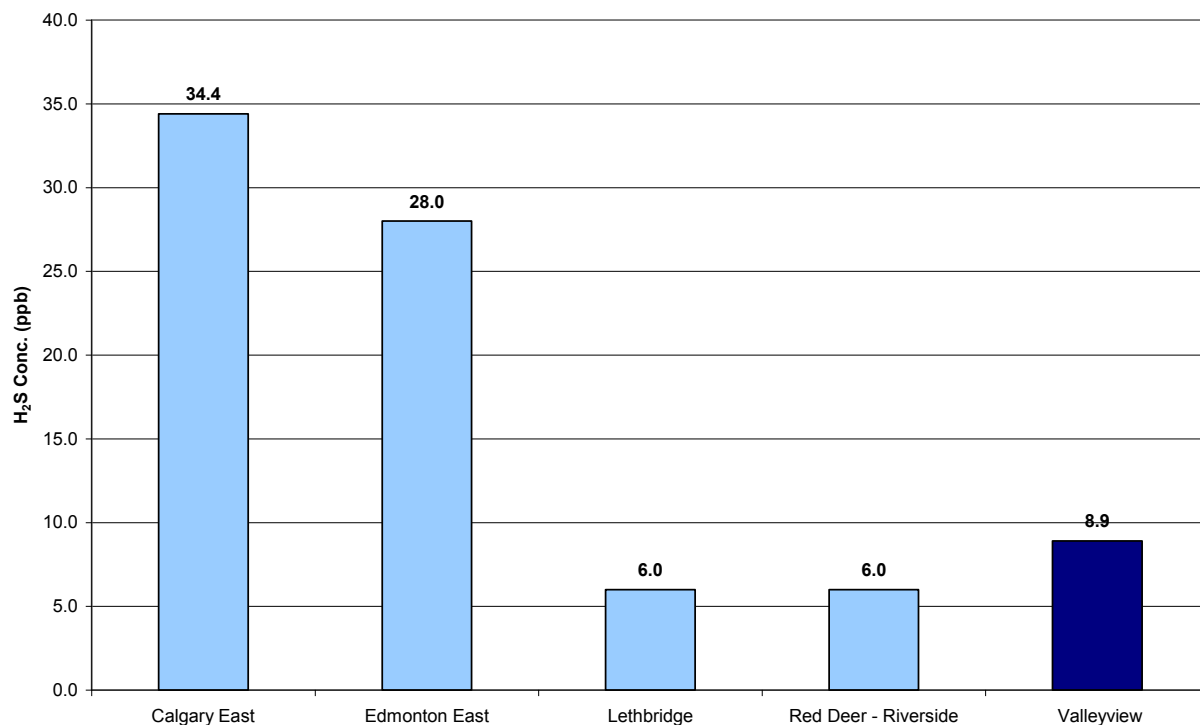
Hydrogen sulphide (H₂S) is a highly toxic colourless gas with an offensive odour often compared to rotten eggs. Sources of hydrogen sulphide include fugitive emissions from petroleum refineries, sewage treatment facilities, pulp and paper mills that use Kraft pulping processes, petrochemical plants, iron smelters and food processing plants. H₂S can occur naturally in crude petroleum, natural gas, sour gases, springs, stagnant water bodies and animal waste.

Alberta Ambient Air Quality Objective
Hydrogen sulphide (H₂S)

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

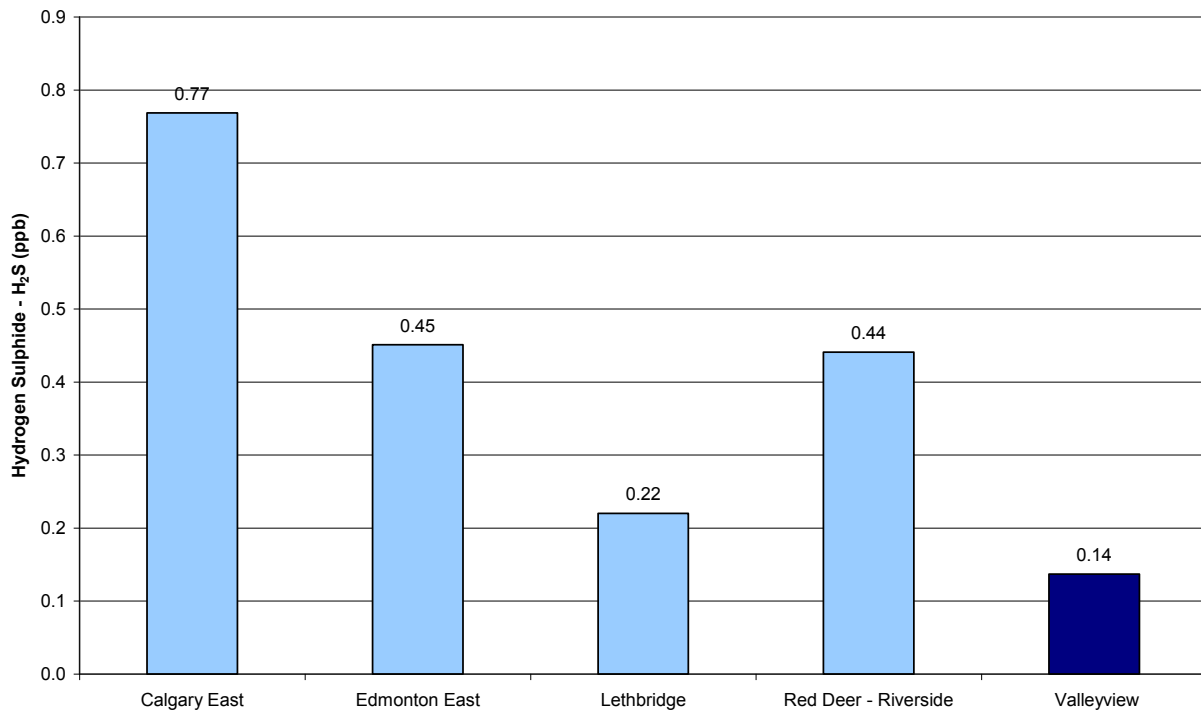
Hydrogen sulphide is monitored at the Valleyview Continuous Air Quality Monitoring Station and no AAAQO exceedences were observed in 2008.

Hydrogen Sulphide (H₂S) - 2008 Maximum Hourly Averages



H₂S is monitored continuously at the Valleyview Station. The highest maximum hourly average reading at the Valleyview Station was 8.9 ppb.

Hydrogen Sulphide (H₂S) - 2008 Annual Averages



The chart above illustrates the low annual average levels of hydrogen sulphide observed at the Valleyview Continuous Monitoring Station in 2008. Over the last two years of operation annual average has remained constant at 0.1 ppb since 2007.

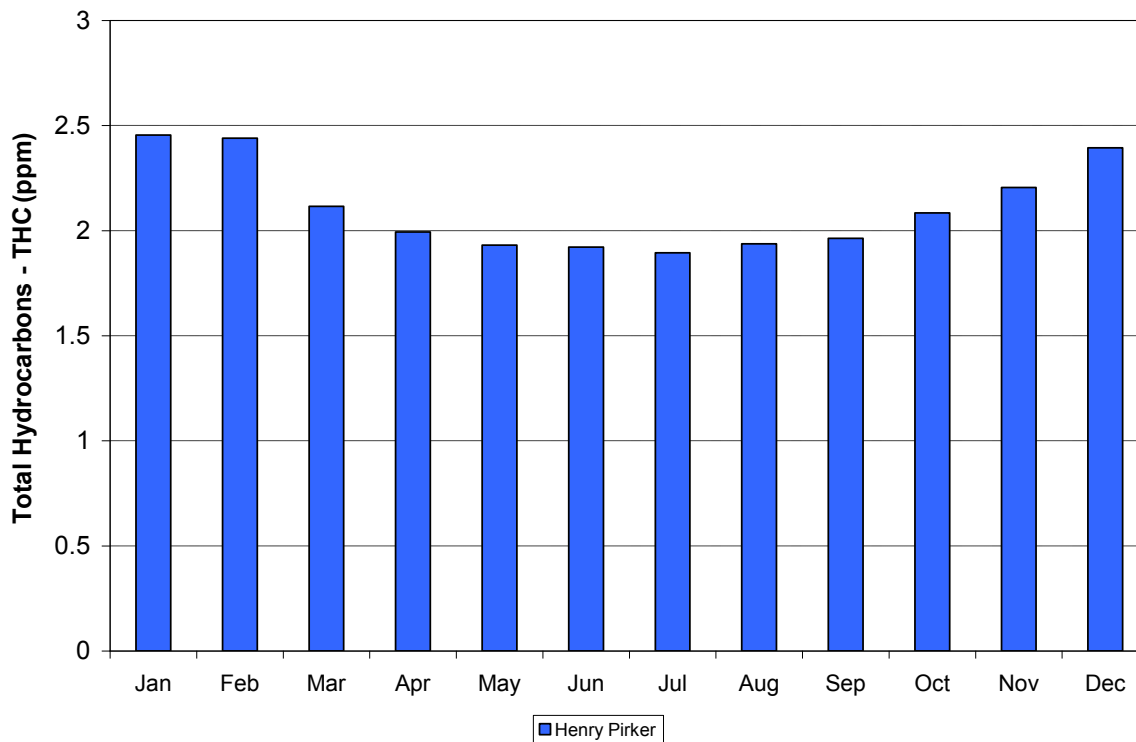
12.0 Total Hydrocarbons

The term “total hydrocarbons” (THC) refers to a broad family of chemicals that contain carbon and hydrogen atoms. Methane is the most common hydrocarbon in the earth’s atmosphere. As a result, for most rural measurements around Alberta, concentrations of THC and methane are equivalent, and the typical background concentration is about 2 ppm. Reactive hydrocarbons form the remaining fraction of THC. The 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.

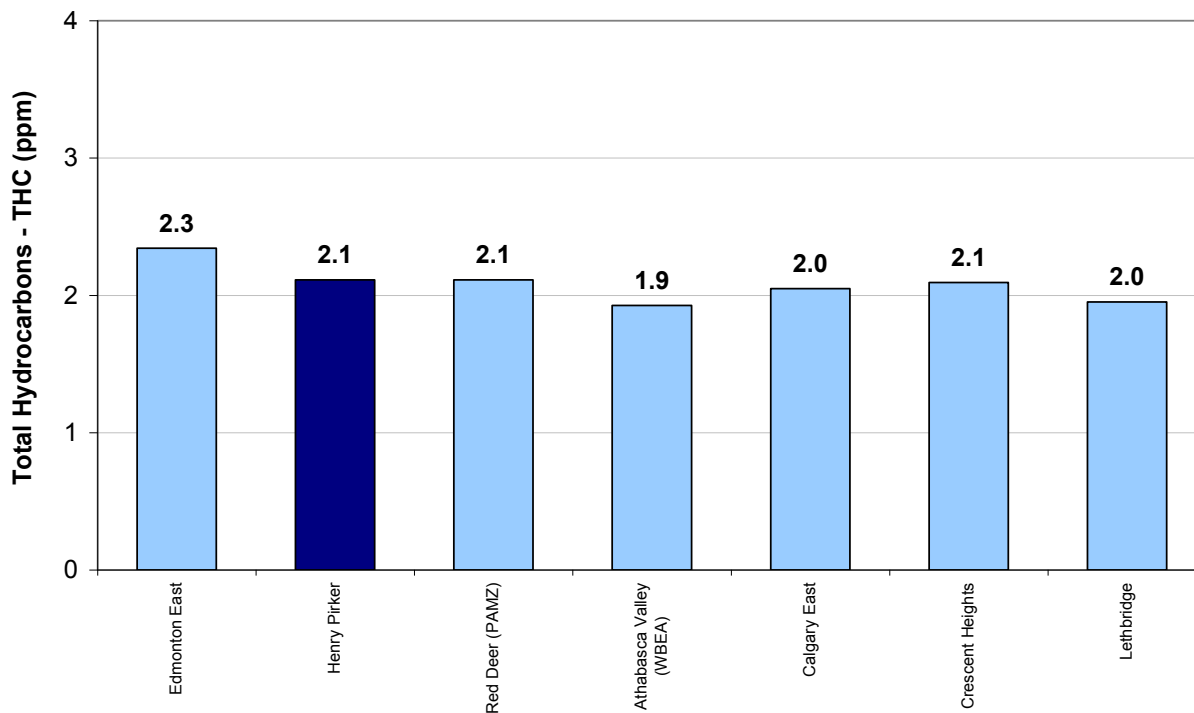
Alberta Ambient Air Quality Objective
Total Hydrocarbons (THC)

No Current AAAQO for THC

PASZA - 2008 Monthly Average Total Hydrocarbons (THC)

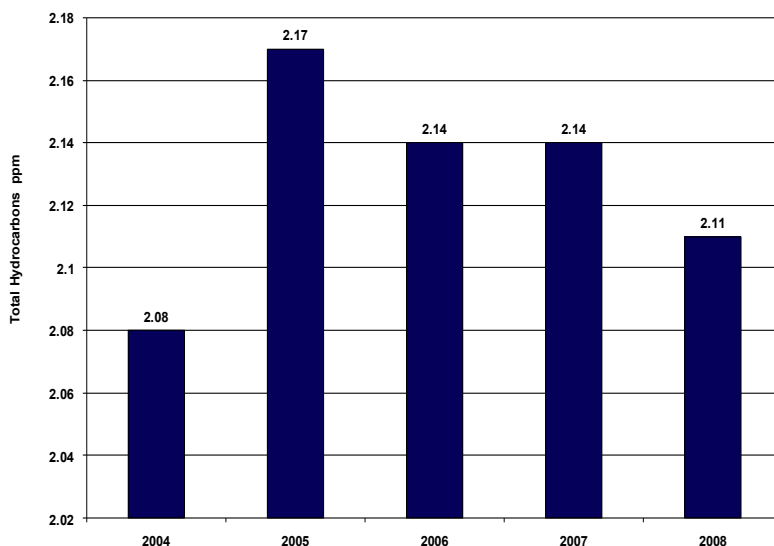


Total Hydrocarbons (THC) - 2008 Annual Averages



Total hydrocarbons in the PASZA zone are monitored at the Henry Pirker station located in Grande Prairie. The annual average total hydrocarbon concentration was 2.11 ppm in 2008. This value is similar to the averages observed in all cities listed in the graph above. The maximum one-hour average THC concentration observed at the Henry Pirker Station was 4.4 ppm; similar to other maximums observed throughout Alberta.

Henry Pirker - Total Hydrocarbons History



Total Hydrocarbons have been measured at the Henry Pirker Station since 2004. After an initial increase in THC concentrations in 2005, yearly averages indicate that levels of THC are decreasing.

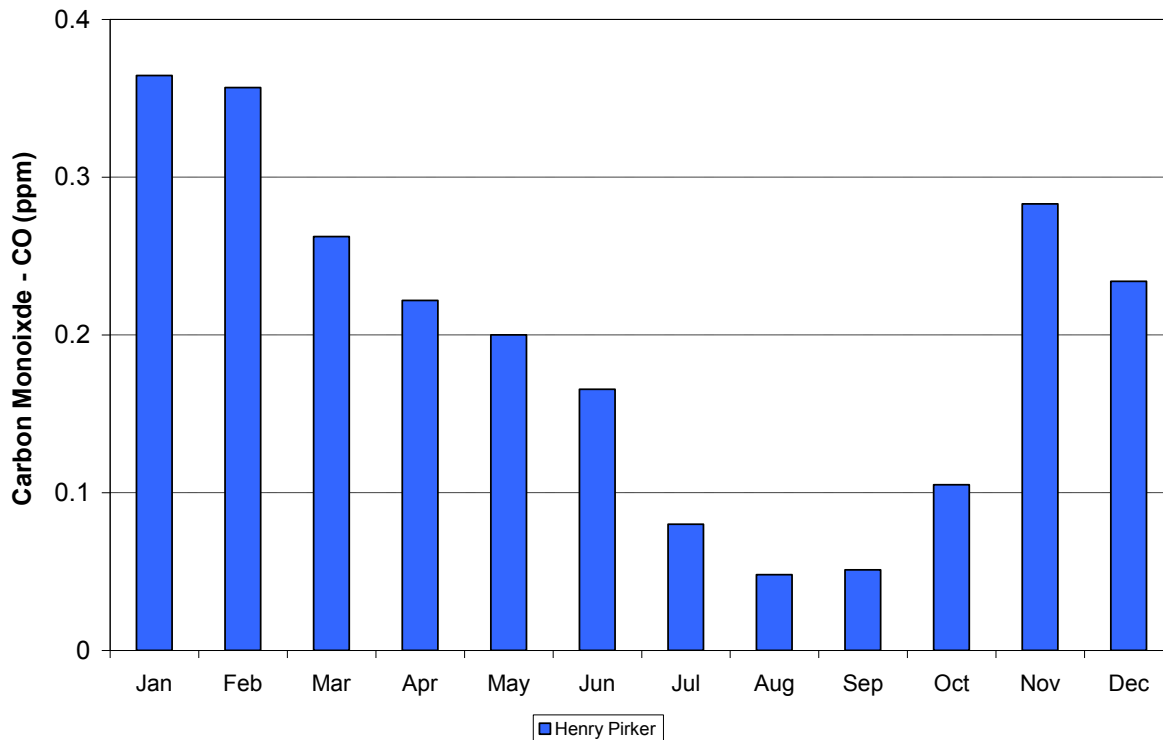
13.0 Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless gas formed after the incomplete combustion of carbon-based fuels such as gasoline, oil, and wood. CO 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.

No AAAQO's were exceeded in 2008 for carbon monoxide at the PASZA Continuous Monitoring Stations.

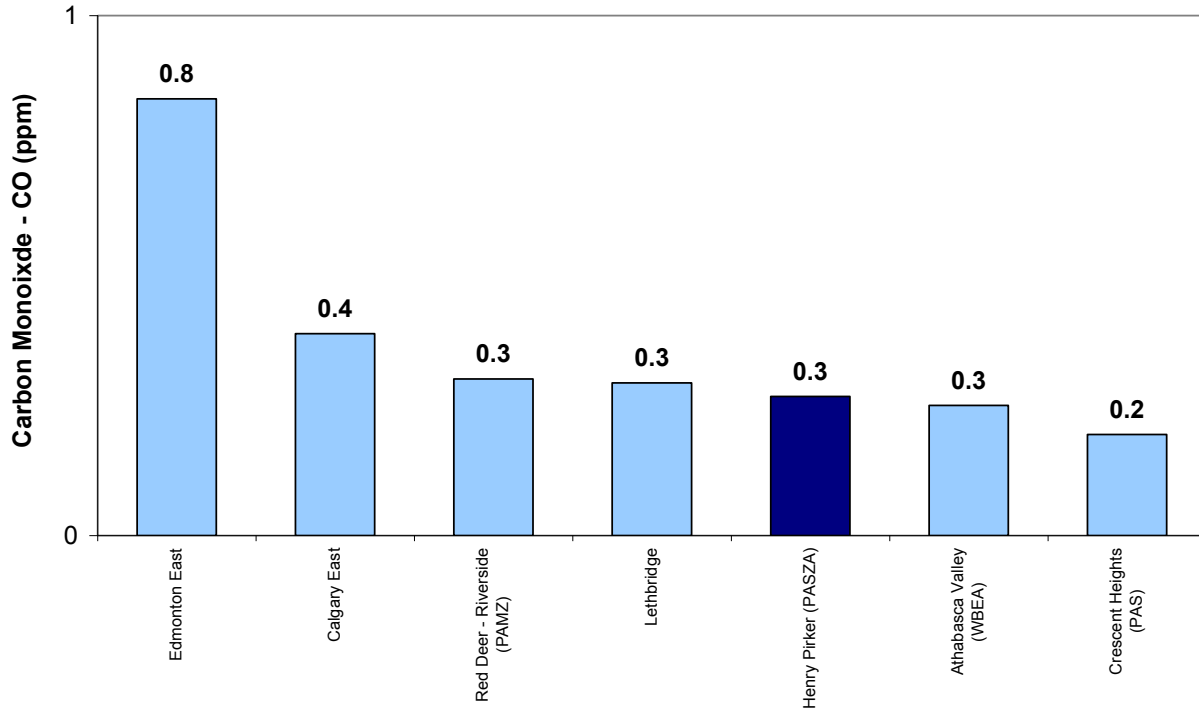
Alberta Ambient Air Quality Objective	
Carbon monoxide (CO)	
1-hour average:	13 parts per million
24-hour average:	5 parts per million

PASZA - 2008 Monthly Average Carbon Monoxide (CO)

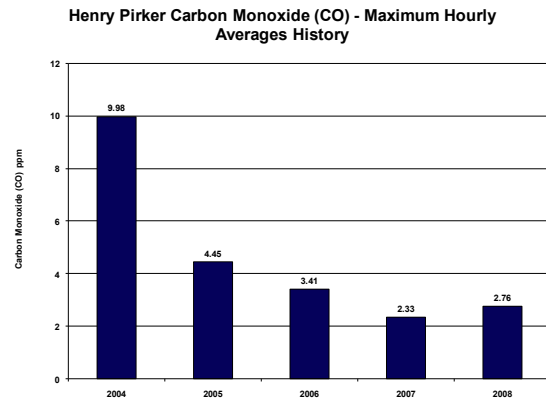
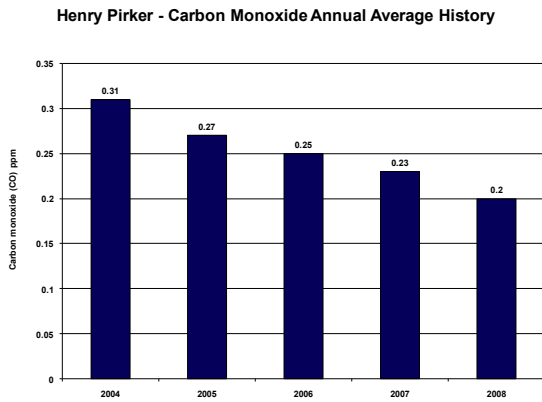


Carbon monoxide is monitored continuously at the Henry Pirker Monitoring Station. The major source of carbon monoxide at this location is vehicle emissions. The above chart indicates higher concentrations of carbon monoxide during the colder months with the lowest levels occurring during the summer.

Carbon Monoxide (CO) - 2008 Annual Averages



The annual average carbon monoxide concentration measured at the Henry Pirker station in 2008 was 0.3 ppm. This value was slightly lower than those measured in Red Deer and Calgary. The maximum hourly concentration measured at the Henry Pirker station was 2.3 ppm. This value is well below the Hourly AAAQO of 13 ppm.



Annual average carbon monoxide concentrations and maximum hourly averages have been trending lower since PASZA began monitoring levels in 2004.

14.0 Fine Particulate Matter

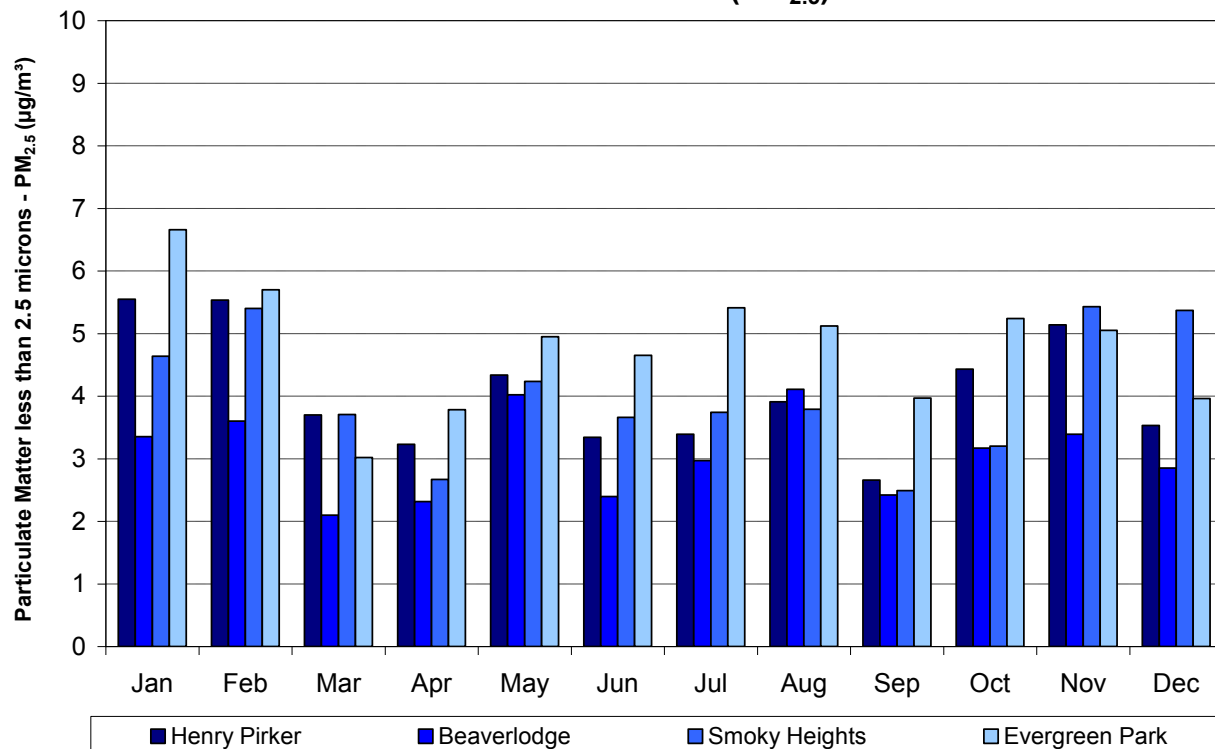
Inhalable particulates are particulate matter less than 10 micrometres (μm) in aerodynamic diameter (PM_{10}). These particulates can be inhaled into the nose and throat. Sources of PM_{10} include soil dust, road dust, agricultural dust (e.g. harvest), smoke from forest fires and wood burning, vehicle exhaust and industrial emissions. Respirable particulates are those particulate matter less than 2.5 μm ($\text{PM}_{2.5}$) in aerodynamic diameter. Fine Particulate Matter ($\text{PM}_{2.5}$) may form in the atmosphere and/or arise from combustion sources such as vehicle exhaust emissions, industrial emissions and wood burning. PASZA Continuous Air Quality Monitoring Stations measure $\text{PM}_{2.5}$.

Smoky Heights Continuous Monitoring station. The events were observed on February 24th, March 19th and November 19th, 2008. The wind direction was coming from the NNE with speeds of 14.7, 9.1 and 9.1 km/hr respectively. The exceedences were attributed to a wood burning boiler located just north of the Smoky Heights Station.

Canada Wide Standard
Fine Particulate Matter ($\text{PM}_{2.5}$)
 1-hour sampling period: 80 micrograms/ m^3
 24-hour sampling period: 30 micrograms/ m^3

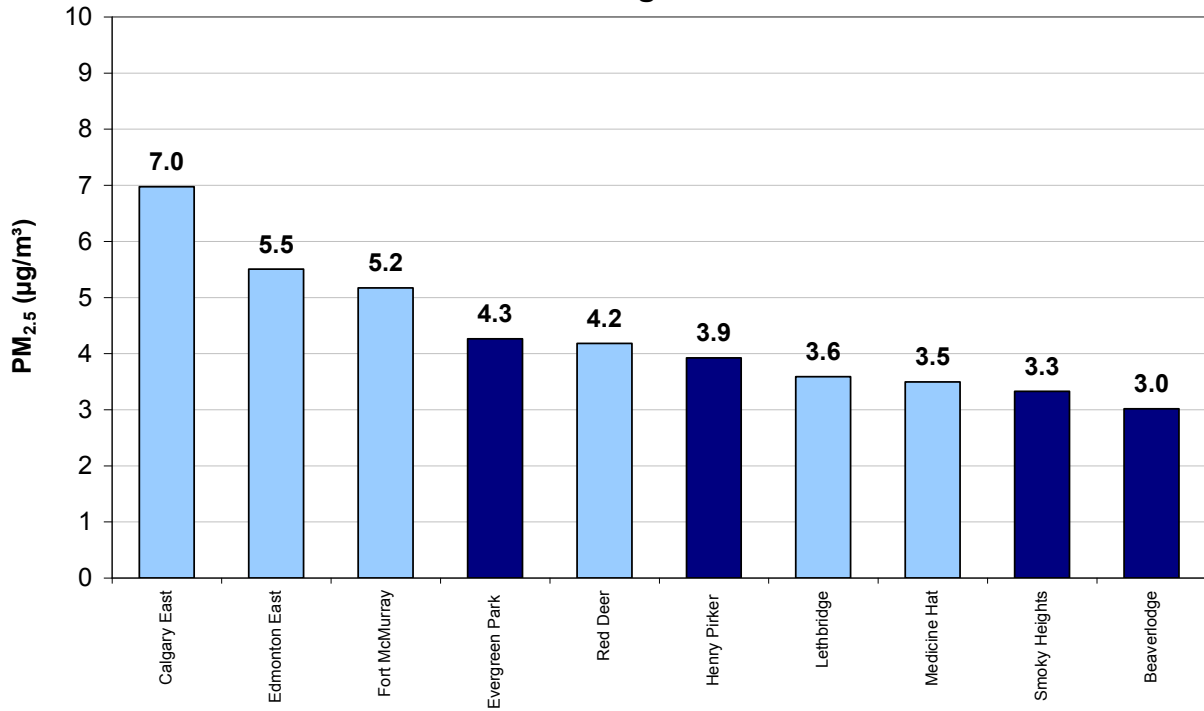
In 2008 there were three exceedences of the Hourly AAAQO for $\text{PM}_{2.5}$. All three were observed at the

PASZA - 2008 Monthly Average Particulate Matter less than 2.5 microns ($\text{PM}_{2.5}$)

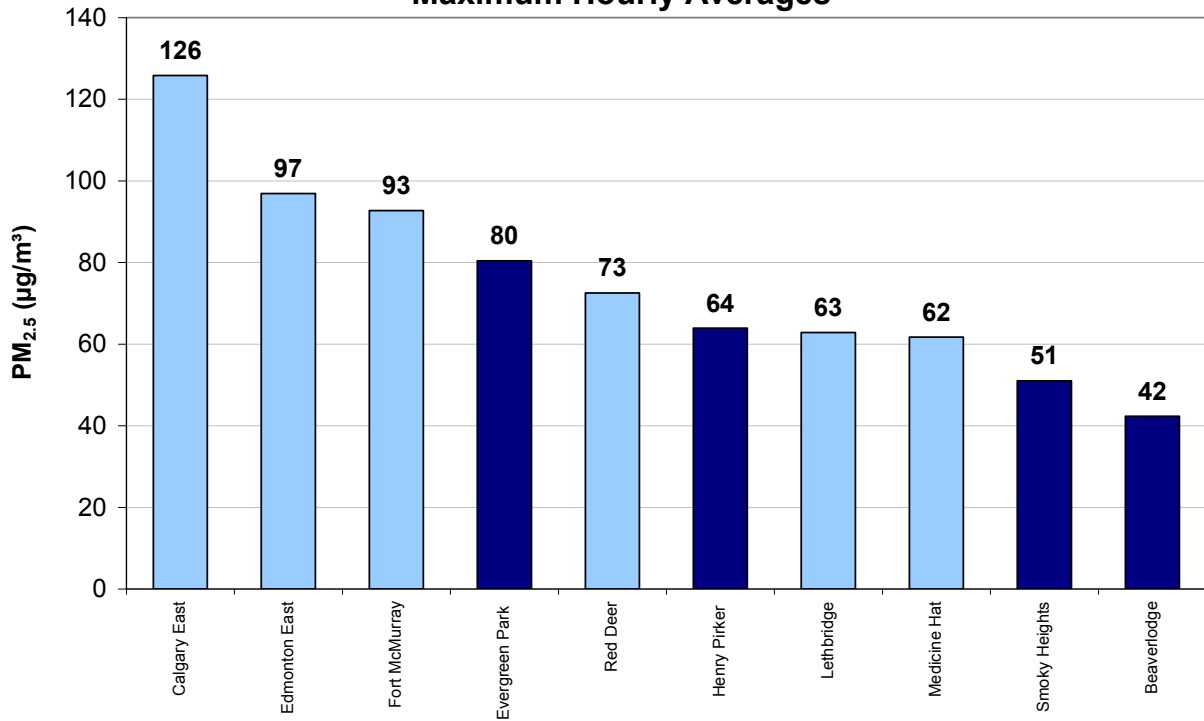


Fine Particulate Matter measured in the Peace Airshed Zone was highest at the Evergreen Park Station.

Particulate Matter less than 2.5 microns (PM_{2.5}) - 2008 Annual Averages



Particulate Matter less than 2.5 microns (PM_{2.5}) - 2008 Maximum Hourly Averages



15.0 AAAQO Exceedences

The table below summarizes exceedences of the AAAQO observed at PASZA Continuous Air Quality Monitoring Stations from 2004 through 2008. Exceedences of the AAAQO are reported to Alberta Environment.

PASZA AAAQO Exceedences						
Parameter	AAAQO	2004	2005	2006	2007	2008
SO₂	1 hour	0	0	0	0	0
	8 hour	0	0	0	0	0
	Annual	0	0	0	0	0
H₂S	1 hour	0	3	3	1	0
	24 hour	0	0	1	0	0
CO	1 hour	0	0	0	0	0
	3 hour	0	0	0	0	0
NO₂	1 hour	0	0	0	0	0
	24 hour	0	0	0	0	0
	Annual	0	0	0	0	0
PM_{2.5}	1 hour	NM	NM	NM	4	3
	24 hour	NM	NM	NM	0	0
* NM indicates not monitored.						

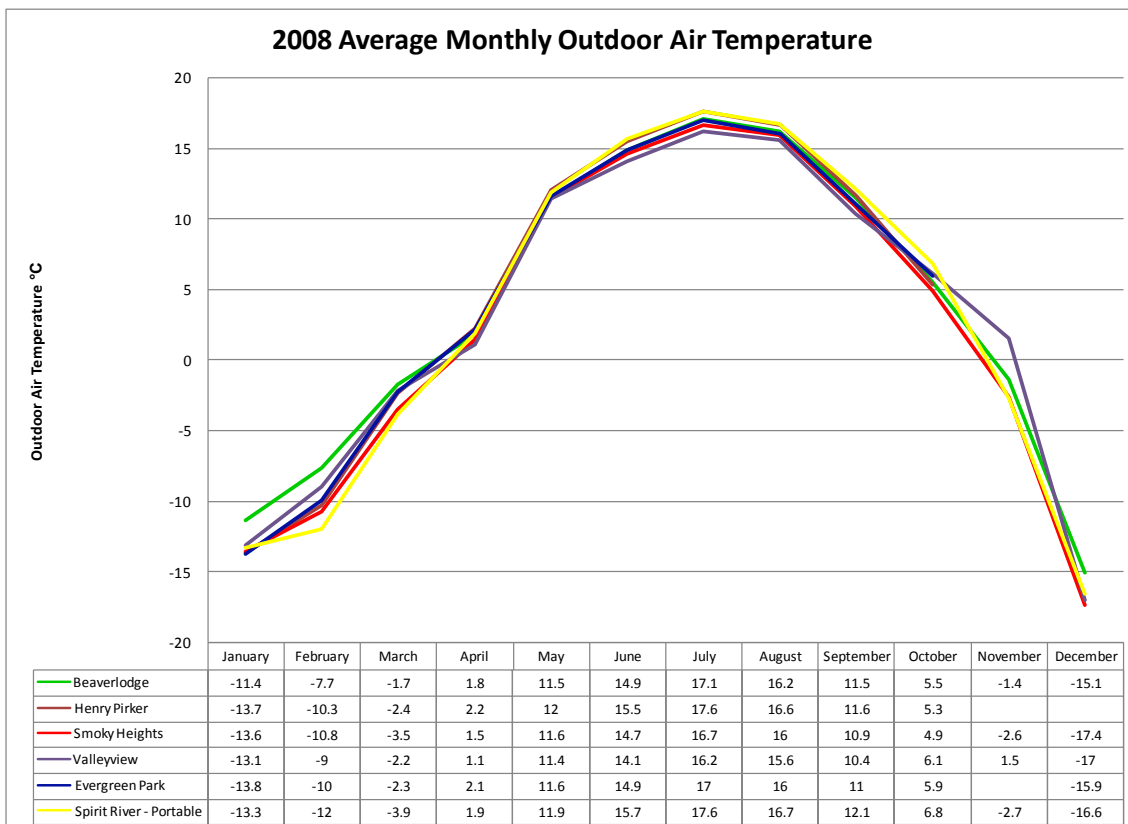
16.0 Meteorology

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, 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



17.0 Alberta Airshed Zones

West Central Airshed Society (WCAS) - www.wcas.ca

WCAS is located approximately 80 km south of PASZA's southern boundary and includes the towns of Hinton, Edson, and Drayton Valley. In 2008, WCAS operated a regional air quality monitoring network consisting of twelve continuous and fourteen passive monitoring stations.

Wood Buffalo Zone - www.wbea.org

The Wood Buffalo Airshed, 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 twenty seven passive monitoring stations as well as an extensive terrestrial effects monitoring program.

Fort Air Partnership (FAP) - www.fortair.org

The Fort Air Partnership Zone located northeast of Edmonton covers approximately 4,500 square kilometers. It includes Elk Island Park and the communities of Fort Saskatchewan, Gibbons, Bon Accord, Bruderheim, Lamont, Redwater, Waskatenau and Thornhill. The partnership operates a regional air quality monitoring network consisting of eight permanent continuous, one temporary continuous and fifty-six passive monitoring stations.

Parkland Airshed Management Zone (PAMZ) - www.pamz.org

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

Palliser Airshed (PAS) - www.paliserairshed.org

Palliser Airshed (PAS) includes the City of Medicine Hat and Town of Redcliff. Its air quality monitoring network consists of one continuous and six passive monitoring stations.

Lakeland Industry Community Association (LICA) - www.lica.ca

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.

Calgary Region Airshed Zone (CRAZ) - www.craz.ca

CRAZ is an emerging airshed in Alberta operating around the City of Calgary. CRAZ expects to receive accreditation from CASA in 2009. In 2008 CRAZ operated three continuous air quality monitoring stations.

Alberta Capital Airshed Alliance (ACAA) - www.capitalairshed.ca

ACAA was established in 2006 to monitor air quality within the City of Edmonton. ACAA is developing the various components of a successful airshed.



18.0 Air Quality Organizations in Alberta

PASZA is a member of the following organizations relating to air quality in Alberta: Clean Air Strategic Alliance and Alberta Airsheds Council. These organizations are a valuable resource and support the efforts of PASZA by providing forums to discuss all things relevant to airsheds.

Clean Air Strategic Alliance (CASA) - www.casahome.org

The Clean Air Strategic Alliance is a multi-stakeholder partnership, composed of representatives selected by industry, government and non-government organizations which recommend strategies to assess and improve air quality in Alberta.

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 contributes data to the CASA data warehouse on a monthly basis. This information is available to the public at their website.

Alberta Airsheds Council (AAC) - www.albertairshedsCouncil.ca

Through Alberta Airsheds Council 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. Information about the Alberta Airsheds Council can be viewed at their website.



Photo credit: Emalee Steinke

19.0 What YOU Can Do About Air Quality

Learn Get involved Get ACTIVE

Some say “How can I make a difference?” The truth is that everybody has the power to make small changes to improve air quality.

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

- 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

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 to join. PASZA holds regular meetings and the schedule is posted on our web page. You can contact PASZA Board Members, Program Manager or Administrator for additional information about PASZA at www.pasza.ca or 780.833.4343.

Get Active—There are numerous things that you can do to improve air quality.

- Don't idle your vehicle
- Maintain your cars 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

20.0 Acknowledgements



The Peace Airshed Zone Association acknowledges the hard work and contributions of all stakeholders of the association. The dedication of members has moved PASZA forward as it works towards its vision “People living and working in the Peace Region will have the best possible air quality”. Members have provided valuable experience, opinions, direction, hours, and financial support to PASZA. The combined effort will ensure that PASZA continues to operate with integrity and produce valuable, scientifically defensible air quality data.

Focus Corporation—Gary Cross, Kelly Baragar, Sharon Whiteley and Barb Johnson continued to provide exemplary service to PASZA in operating and maintaining the air quality monitoring network. These individuals provide years of experience that are highly valuable to PASZA. Thank you to Conor Whiteley, local Focus Technician for his dedication to the network over the past year. PASZA also welcomes Grover Christiansen as a replacement for Conor. Grover has over twenty years of experience as a Field Technician in British Columbia.

PASZA acknowledges the work of Michael Bisaga of OTONABEE Consulting as PASZA’s Program Manager. Michael managed the operations of the network and implemented a review of the PASZA bylaws in 2008.

Dawn Ewan, contracted as PASZA Administrator, worked with PASZA to maintain the day to day operations of the association. Dawn’s enthusiasm for the organization has led to increased attendance at meetings and creation of new programs including the radio advertising campaign.

Special thanks are due to past members Richard Harpe, Uli Wolf Teresa von Tiesenhausen and Nichole Belcourt. These individuals made significant contributions of their time and spirit. They have been valuable resources for PASZA during the past year.

Thank you to Ana Bustamante of Zeta Byte for her hard work and professionalism in redesigning and maintaining the PASZA web page.

Local Radio Stations Big Country, Rock 97.7, Free FM and YL Country have all assisted PASZA by promoting PASZA meetings and events on their community calendars. Thank you for supporting PASZA’s efforts to promote PASZA’s mandate and vision. In addition, special thanks to Rock 97.7 and The Grande Prairie Daily Herald Tribune for attending past Annual General Meetings and providing news coverage on various events.

BP Canada and Devon Canada supported the trial run of the PASZA radio advertising campaign. Thank you to these companies for supporting new initiatives.

Thank you to land owners Shaun Gervais (Falher), Sylvianne Tardif (Girouxville) and Marcel Dufour (Spirit River) for allowing PASZA to locate the rover air quality monitoring station on their property.

Thank you to EVERYONE who has made contributions to PASZA in 2008. Looking forward, PASZA can build on this hard work and dedication.



Photo Credit: Garry and Karri Fraser

21.0 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 colourless, odourless 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 (H₂S): A colourless, flammable, poisonous compound having a characteristic rotten-egg odour. About one third of the natural gas produced in Alberta contains H₂S.

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, NO₂, and nitrate; nitric oxide is usually emitted from combustion processes. Nitric oxide is converted to nitrogen dioxide (NO₂) 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 (NO₂), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO₂ 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 (O₃): 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

Respirable or Fine Particulate Matter (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 (SO₂): A strong smelling, colourless 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 SO₂. SO₂ 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 odour, and some examples include gasoline, alcohol, and the solvents used in paints.



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