ANNUAL REPORT 2012

PAZA

Peace Airshed Zone Association

Take a deep breath.

Go ahead. We'll wait.

Got it? Now let it out.

You might not taste it, and you can't really see it, but it's all around us every second of every day, sustaining both our own lives and the ecosystem we all depend on.

Of course we're talking about air, which is something we do a lot of at PAZA, but we're also talking about community, common ground, and protecting something that affects all of us.

We believe people in the Peace region deserve the best air quality data possible, and we bring diverse stakeholders together to make sure they get it.

The Peace Airshed Zone Association

PAZA is a not for profit, multi-stakeholder organization that conducts ambient air quality monitoring in northwestern Alberta. PAZA is an unbiased, open and transparent organization, and our members collaborate to provide local solutions to local air quality concerns. As an independent third-party, PAZA has invested over a decade in building trust among members of the public, industry, government and non-governmental organizations.

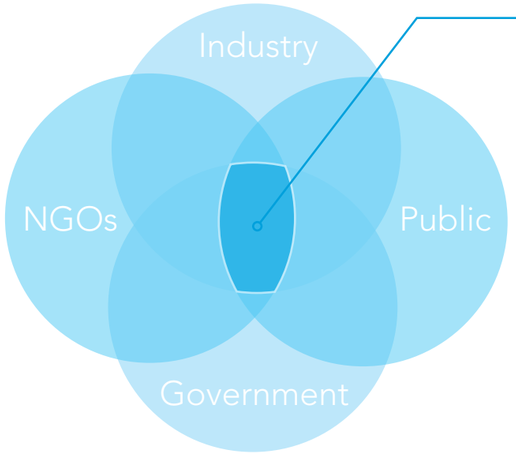
We want you to know more about the quality of the air you breathe. Here at PAZA, we work hard to deliver unbiased, open and transparent, scientifically credible data to allow all stakeholders; you included, to make informed decisions regarding air quality in our region. This data is collected and shared on the PAZA website, as well as submitted to stakeholders so we can all work together to care for our air.

PAZA's multi-stakeholder Board of Directors governs through a consensus based decision-making process. Consensus is widely defined as a general agreement, ensuring everyone involved can live with the outcome of the decision. Stakeholders may not achieve all their goals, but the objective is to find the optimal solution that meets 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 or top-down hierarchy.

PAZA has been a recognized airshed by the Clean Air Strategic Alliance (CASA) since 2003.

OUR VISION

All people living, working and playing in the PAZA region will have the best possible air quality data.



PAZA
Peace Airshed Zone Association

OUR MISSION

The Peace Airshed Zone Association operates an ambient air quality monitoring network to collect and preserve relevant, credible, transparent and accessible data to allow our stakeholders to make informed decisions regarding air quality in our region.

Blaine Crocker/PAZA Photo Contest

A Message from the Board

I am very excited to share with you the many happenings of PAZA over this past year. We had a very successful implementation of our new funding formula which allows PAZA to operate with a sustainable income. This gives us confidence to move forward with continued network operation, plans to replace old equipment and introduce new technologies which help us monitor our air more efficiently and precisely.

Our Board is made up of industry, municipal and provincial governments, non-governmental agencies, and public members. Our unbiased, collaborative approach to reach consensus based decisions ensures that we are all working together toward one common goal. We want you to feel confident that the information we provide is the best possible, scientifically credible, air quality data.

We have experienced changes within our organization through the loss of our long-time, valuable staff member, but we have gained a new perspective with the hiring of a new Administrator. Our Program Manager has accepted the role of Executive Director and we are excited to see where we go from here. We are growing our network with the addition of new technologies in our Rover and Henry Pirker stations, as well as taking on a monitoring station partnership with one of our industry members in the community of Falher.

As we continue to work with the Alberta Airsheds Council, the Clean Air Strategic Alliance, and the Government of Alberta we anticipate great changes as Alberta's new environmental monitoring system moves forward. We see the importance of remaining engaged to ensure that we are clearly communicating the value of Airsheds, and our multi-stakeholders' value in the current system. We want to continue to develop local solutions for local air quality concerns.

As a member of PAZA for many years, I am convinced that we all need to care about the air we breathe. We can all make a difference. The photos you see displayed in this report are the beautiful reflections of the diversity and beauty we enjoy in our region. I encourage you to stop for a moment and enjoy the view.

I hope you enjoy reading through these pages to discover all the wonderful things that we have been working on. As we move into 2013, one thing we know for sure...

Change is in the air...

Sharon Nelson
PAZA Board Chairperson

This is PAZA country.

PAZA operates a network of seven continuous monitoring stations and 46 passive monitoring stations that collectively monitor air quality across the Peace region.

The PAZA boundary encompasses approximately 38,000 square kilometres, with a population of approximately 100,000 people living and working in the region.

Lloyd Dykstra/PAZA Photo Contest

Another Year of Growth for PAZA

The past 12 months were a year of reflection and growth for PAZA. Changes came in the form of loss and new development. We said good-bye to a valued, long-time staff member and greeted a new administrator. We took time this year to look at how we get things done and how we can adapt to keep ourselves moving with forward momentum. PAZA recognizes the air quality monitoring needs of our region are continually changing and we must grow and adapt to remain effective.

New Funding Model Improves Financial Sustainability

PAZA began the year in a position of strength. The previously approved, new funding model was implemented for the 2012 budget year. This new model focuses on equitable and fair funding from all PAZA members who rely on the network operation. This model successfully secured funding from industry, municipalities, and other contributing members to deliver and enhance existing operations, and allowed PAZA to set aside a contingency fund which enables us to plan for the future.

Our Priority is Providing Quality Air Monitoring Data

The conclusion of PAZA's Air Quality Monitoring Objectives review brought to light the continued priority of producing credible air quality monitoring data, while ensuring the needs of our stakeholders are met. Our new objectives focus on our desire to balance cost effective data collection and maintain network operation with integrity.

Unfortunately, the much anticipated Network Assessment was postponed to allow time for additional fundraising for this initiative. Plans to conduct this complete external review have been revived and we look forward to receiving the results in the coming year. This review reinforces PAZA's role as we move into the future, continuing to implement Alberta's enhanced Air Quality Management System.

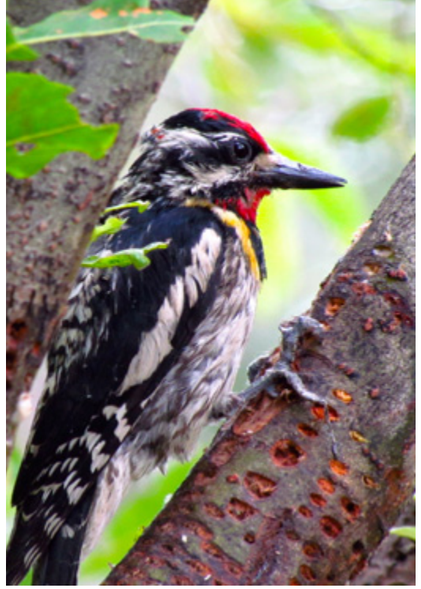
Another Exciting and Successful Photo Contest

As you read through this report you are enjoying a sample of the many photos that have been submitted through the annual PAZA photo contest. Over 100 entries were submitted (the most ever!) and as you can see, the calibre of entries is outstanding.

We want to acknowledge the Bonanza School technology class for their enthusiastic participation in this year's contest. We are delighted to see how all participants embrace the beauty and diversity within our region.

Networks Enhancements

We are excited to report other new developments in our air quality monitoring network. A new station trailer has been installed at our Smoky Heights location. The Henry Pirker continuous monitoring station also received a fine particulate matter analyzer upgrade. The installation of this new technology gives us even more data on the quality of air you are breathing. This new analyzer improves data stability and minimizes operational downtime.



PHOTOS THIS SPREAD

Our annual photo contest generates dozens of local entries per year.

The talent on this spread is thanks to (top row, left to right) Holly Handfield, Theresa Simmonds, (middle row, left to right) Sheldon Nordell, Lloyd Dykstra, (bottom row, left to right) Corry Heinricks, Cassidy Hutchinson.

Thank you to all who entered!

Earth Day in the Park

Additional initiatives designed to reach out and connect with you, our community, included participation in the annual Earth Day celebrations at Muskoseepi Park in Grande Prairie. Volunteers shared information and activities about air quality across our region.

"Making It Clear" information sheets have been developed for general distribution, sharing what we know about air quality and how it impacts you. Thanks to our colleagues over at Fort Air Partnership, and Alberta Environment and Sustainable Resource Development for their partnership in the development of these documents.

GPRC Students Station Tour

We were once again invited to a Grande Prairie Regional College science class to do a presentation on who PAZA is, and what PAZA does. We are always happy to share our vision and tell our region why air quality matters. The presentation concluded with a tour of the Henry Pirker Station.

Grande Prairie's First Ever Vehicle Emissions Clinic

The early months of 2012 were spent planning and organizing Grande Prairie's first ever Emissions Clinic. This event was held over a two day period (June 5-6) where we saw over 100 vehicles evaluated at the clinic. A detailed summary report is available on our website. There was much to learn in our efforts to educate and engage the public in understanding and taking action to improve air quality in the Grande Prairie area. PAZA thanks Alberta Environment and Sustainable Resource Development for their grant support of this valuable project, the City of Grande Prairie for their donation and participation, and Canfor for hosting the event.

FACES AND PLACES

It's been a busy year for PAZA in the community. PAZA participated in Earth Day celebrations at Muskoseepi Park (top), were once again invited to share our work with GPRC science students (2010 class pictured at middle) and held our first ever Vehicle Emissions Clinic (bottom).

Air Quality Monitoring Expanded to the Communities of Sunset House and Falher

The portable air monitoring station (Rover station) complements PAZA's network and allows us to collect air quality data in areas where data gaps exist or where there are local air quality concerns. The Rover station was located in the community of Sunset House with an additional parameter measurement for fine particulate matter. PAZA hopes to expand Rover station monitoring to include total hydrocarbons and commence hourly reporting of the AQHI early in 2013. PAZA continues to promote public awareness of Alberta's Air Quality Health Index (AQHI).

PAZA was approached by one of our industry members, Long Run Exploration Ltd., to partner with them in the design, construction and installation of a new air quality monitoring station in the community of Falher. This is a proactive and voluntary initiative in the vicinity of an area that is currently experiencing public distrust of industry action and development. This is an excellent example of multi-stakeholder collaboration. As part of this initiative, PAZA also participated in an Open House in the area to raise awareness of Air Quality and our role in it. Residents in this area of the Peace River Oil Sands Development continue to contact PAZA for information and advice on responding to and understanding air quality concerns.

Change is in the "Air"

Looking outward, PAZA participates in conversations across the Province of Alberta regarding implementation of new strategies in air monitoring and management. PAZA continues to be engaged in the Joint Canada/Alberta Implementation Plan for Oil Sands Monitoring and Alberta's enhanced Air Quality Management System (AQMS).

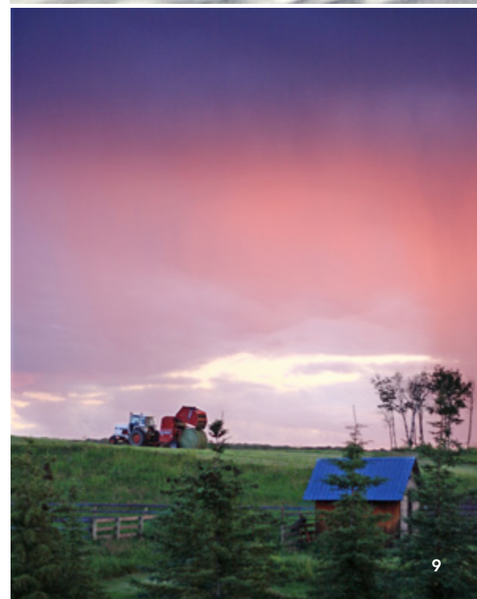
Clean Air Strategic Alliance (CASA) and the Alberta Airsheds Council (AAC) Joint Standing Committee commissioned the development of the Roles, Responsibilities and Relationships in Alberta`s Air Quality Management System discussion paper in 2012. The Government of Alberta has defined the Air Zone boundaries across the province, and as they continue to implement an enhanced Air Quality Management System, we hope this discussion paper informs those important decisions.

PHOTOS THIS PAGE

Our annual photo contest generates dozens of local entries per year.

The talent on this page is thanks to Corry Heinricks (top) Lesley Vandemark (middle), and Pam Dana (bottom).

Thank you to all who entered!



in the ZONE

Feature Stories by Erika Sherk

A Time for Action

"There were days when I'd step out the door and it was like walking into a septic tank," says **DENIS SAUVAGEAU**. "We had headaches; others were having respiratory issues, bloody noses, nausea, dizziness..."

Sauvageau, who lives on a cereals and forage seeds farm southwest of Falher, is recalling the 'country air' he and his family used to breathe.

"It pretty much took your breath away," he says, "sort of like household ammonia mixed with gases coming from a septic tank. It made you want to gag. And you couldn't really do anything about it because it was everywhere around you."

One day it would be fine and the next – without warning – it would be almost too much to bear. The possible source of the odours was thought to be the neighbouring intensive livestock operations.

In 2004, he and other concerned neighbours formed a group, Friends of an Unpolluted Lifestyle, to do something about it. After a year and a half of lobbying, protesting, writing letters to the editor and speaking with the media, Sauvageau discovered PAZA in 2006.

"I ended up at one of their meetings and did a presentation about our concerns to the board, requesting air monitoring. We ended up getting 24/7 air monitoring for the issues that we had." PAZA ensured a portable air monitoring station was duly set up nearby. It recorded data showing concentrations of hydrogen sulphide and ammonia.

Having the data clarified the situation for everyone, according to Sauvageau, and encouraged the industry to correct their practices, he says. "Since we had the monitoring and elevated the profile of our concerns with government and media, we have experienced few long term air quality events."

After some major changes made to the management of the livestock operation, Sauvageau says the air today is vastly improved – generally fresh and clean-smelling.

It wasn't that he and his neighbours couldn't handle the occasional wafts of unpleasant smell, that's all a part of rural living. "I think it's acceptable that once in a while you're going to get some odour or some emissions from livestock operations, you've got to accept that," he says. When the air quality began deteriorating, however, he says, it was time to take action.

Today, Sauvageau has been a PAZA board member for six years. There's no doubting that it's a subject close to his heart. "Quality of life starts with air," he says. "If we

continued...

Aerial photo (facing page): Chris Beauchamp/Beauchamp Photography

Photo this page: Lori Brough/Pure Photography

continued from previous page...

don't have good air, it's going to impact us for sure, mentally and physically."

He says there are several things he respects about the organization. First, its non-partisan approach. "Data is our tool and it's what we do. It's important that we don't get involved in the politics of it."

Second, its consensus approach. "As a public member or an NGO member, I like the fact that I have a voice at the table as strong as anybody else's voice. All the stakeholders are on a level playing field."

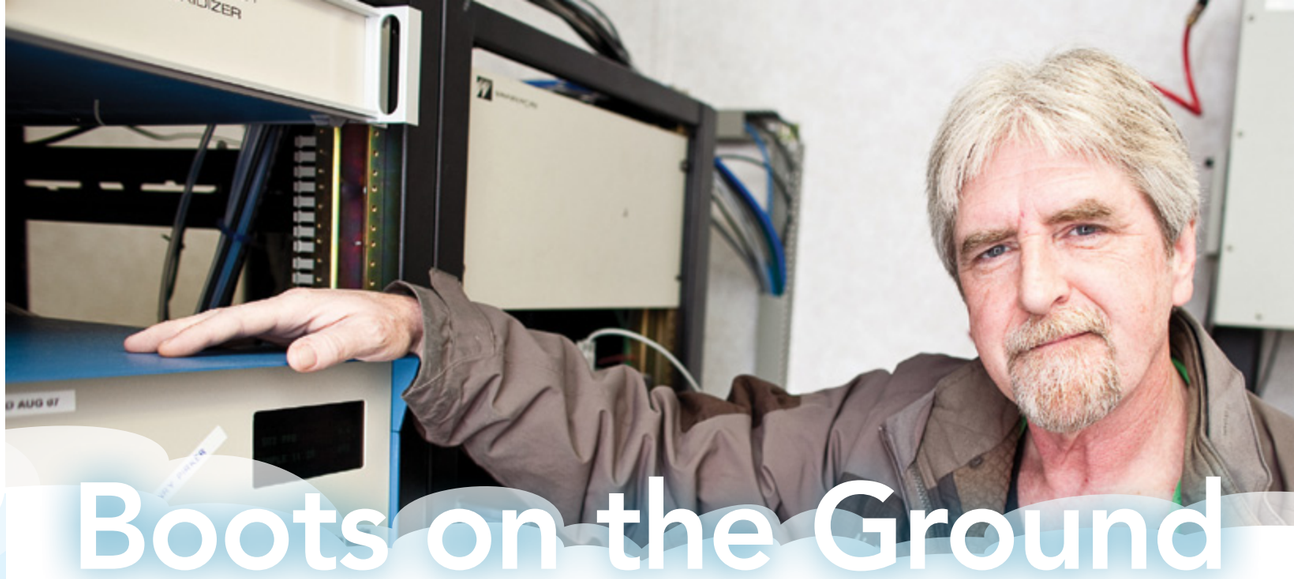
Third, that the data produced is transparent. "It hasn't been directly paid for by industry or government and so there is no dictating what the outcome should be."

And finally, its accessibility. "I think it's important that the data's available to anyone at any time. We don't have to go through Freedom of Information to get it."

Despite his own success story, Sauvageau says his fears that air quality could become an issue again in his area keep him closely involved with air monitoring. "The main reason why I'm still working on improving air quality is so that other people don't have to go through our struggles in the years ahead. If a person can land on the moon, we surely have the capacity to mange air emissions in a way that allows people, industry and wildlife to live side by side without incident." However, when he steps outside today, it is instant evidence that he's made headway. "It smells like a nice spring day. The way it should."

BOARD OF DIRECTORS (back row, left to right) Bob Cameron, Brian Lieverse, Elmer Spilchen, Dan Crowley, Denis Sauvageau (front row, left to right) Andy Trudeau, Sharon Nelson, Michelle LaTrace, Mike Krawetz.
Missing: Drennen Hallett, Jamie Hallett, Greg Smith, Ken Matthews, Leanne Chartrand, and Leo Forseille.

Board of Directors photo: Lori Brough/Pure Photography



Boots on the Ground

At PAZA'S air monitoring station near Beaverlodge, GROVER CHRISTIANSEN moves with the mien of an experienced veteran as he finishes up for the day.

He's earned it, having spent nearly three decades collecting data on air quality and five years as PAZA's lead technician.

"Basically my job entails calibrating, repairing and ensuring the analytical equipment that PAZA's running is accurate, according to Government standards," he says, squinting into the spring sunshine. "I really like being a part of it," he says of the organization's overarching vision of providing the best possible air quality data for everyone.

Christiansen is the boots-on-the-ground technician that keeps all of PAZA's continuous monitoring stations running. He collects the data, fixes the equipment, and puts hundreds of kilometres on his truck each month, driving to the stations, ensuring that they're working smoothly and steadily churning out accurate information. PAZA covers a territory of 38,000 sq. km. so it's not a small undertaking.

As human beings, we all have a stake in clean air, Christiansen says, watching his wind speed monitor spin. "As a member of the public I would want to know as much as I could about what I'm breathing in. And if there's an organization watching it 24/7 and keeping an eye on it, well, I'm just happier knowing that exists."

The data Christiansen collects is steadily updated to the Government of Alberta where it is compiled into an easy-to-understand website for the public: the Government of Alberta's Air Quality Health Index (AQHI.) The AQHI is a tool for people to learn what the air quality around them means to their health and PAZA's data makes this available in our region. Having this information so easily accessible can make a big difference for people, he says.

It's not just the pollutants or particles in the air that he monitors, most sites include wind speed, wind direction, ambient temperature and relative humidity. "That type of information is really helpful to determine a lot of things for the public," he says. "Which direction is it coming from, how fast is it moving, what are the concentrations? A person can actually go on the AQHI website and see what the levels are and check potential health effects."

It goes far beyond individual health concerns, he adds. With industrial growth, urban development and today's rapidly altering global environment, it's vital to have the ability to track what's happening in the air. "How would we know what was going on, otherwise?" he asks.

Photo this page: Chris Beauchamp/Beauchamp Photography

Industry Lives Here Too

Government regulations... the desire to be ethical users of natural resources...

These are major motivations, but **BRIAN LIEVERSE** says there is another reason for industry to value air quality: they're breathing it too.

"It's important for us to always know what, if any, effect industry is having on the environment," says Lieverse, who has been involved with PAZA since 2006. "Yes, we represent industry but this is also our home. It's where our employees and families live."

When Lieverse, a community relations advisor with Encana Corporation, started working with PAZA, he says he saw multiple advantages to being part of the organization. "Some of our plants are regulated to be part of PAZA, but it was also an opportunity for us to see what we might possibly be doing to have an effect on the air quality in the area."

Encana, an oil and gas company operates a sour gas plant near Sexsmith as well as numerous gas wells in the Peace Region.

It's crucial to keep a close eye on air quality when it comes to oil and gas activity, Lieverse says. Though a lot of work goes into ensuring it doesn't happen, the potential is always there for an adverse effect on air. However, when it is so closely monitored, any abnormalities can be picked up almost immediately and action taken to reverse any negative effects. "We've been able to identify that the air quality in the Peace is very good," Lieverse says, "but as industry, we're always looking for changes in air quality, looking for changes in patterns. And then, working out what may have affected that air quality."

Industry can't operate in a bubble, he says, and part of what he appreciates about PAZA is the way it connects him to a broad base of individuals representing a great range of perspectives. "We have the general public, we have Alberta Health Services, we have industry – and not just oil and gas, we also have the forestry industry at the table, municipalities have representatives there ... all providing input for PAZA. We put away all our differences when we come to the table. We're all equal and we're all working for the benefit of the whole area."

The grassroots nature of the team is crucial, Lieverse believes. "We're so closely involved in it because this is our area, we're the ones that are living here and breathing the air. Too often, people try to push this kind of thing farther away; I think it's important to keep it close."

Photo this page: Lori Brough/Pure Photography
Opposite page: Sheldon Nordell/PAZA Photo Contest

It Begins with Awareness...

Your new baby suddenly stops breathing. It's a terrifying thing to imagine, but it was reality for **SHARON NELSON** when one of her sons had an unexpected asthma attack at four months old.

Suddenly she was very, very aware of the air – and the dangers that can lurk within it for a child with respiratory issues.

"That was my introduction to how important clean air is," Nelson says. "He was allergic to so many different things that were airborne. It opened up a whole world of 'what exactly is in our air?'"

Decades later, it was a major part of her platform when she ran for election to Grande Prairie County Council. "It didn't seem to be the priority that it should be when making decisions. I was concerned," Nelson says.

Upon election in 2007, she was asked to join PAZA's board. It was her first encounter with the group and she was immediately impressed. "What struck me with PAZA was that it was an organization that I could trust," she says. "I knew it wasn't swayed by industry, it wasn't swayed by the politics of the day. It is a truly unbiased organization and they strive to keep it that way."

Nelson says she liked the fact that she could bring PAZA's air quality data to Council meetings, confident that it was accurate, and use her knowledge to ensure that decisions made factored in the protection of the air's quality. With the advantage of PAZA's data, she says, "there definitely is more of an awareness of what we're doing, how we're impacting the quality of air in our decision-making."

Her now nearly six years with the organization have also increased the depth and breadth of her understanding of air quality issues, by virtue of its consensus format.

"All the stakeholders are there and represented. Everybody has a voice at the PAZA table," she says. "It's really neat to sit across from a farmer or another municipal councillor or a representative from the oil and gas industry and to be able to discuss and share and come out with a really good solution, one that works for everybody."

Nelson, who was appointed Chair of the board in 2012, says she has learned a lot from PAZA's style of operation. The board, though its directors come from a wide range of perspectives – from industry to government to environmentalist – believes that finding common ground is of crucial importance.

After all, they share a goal: to ultimately benefit all 100,000 people in the organization's territory.

"We're all human, we all basically believe the same things, and it's the things we share - the air, the water, the land - to survive. Whether we come from a different faith or a different political stripe, we basically all feel the same way about clean air."

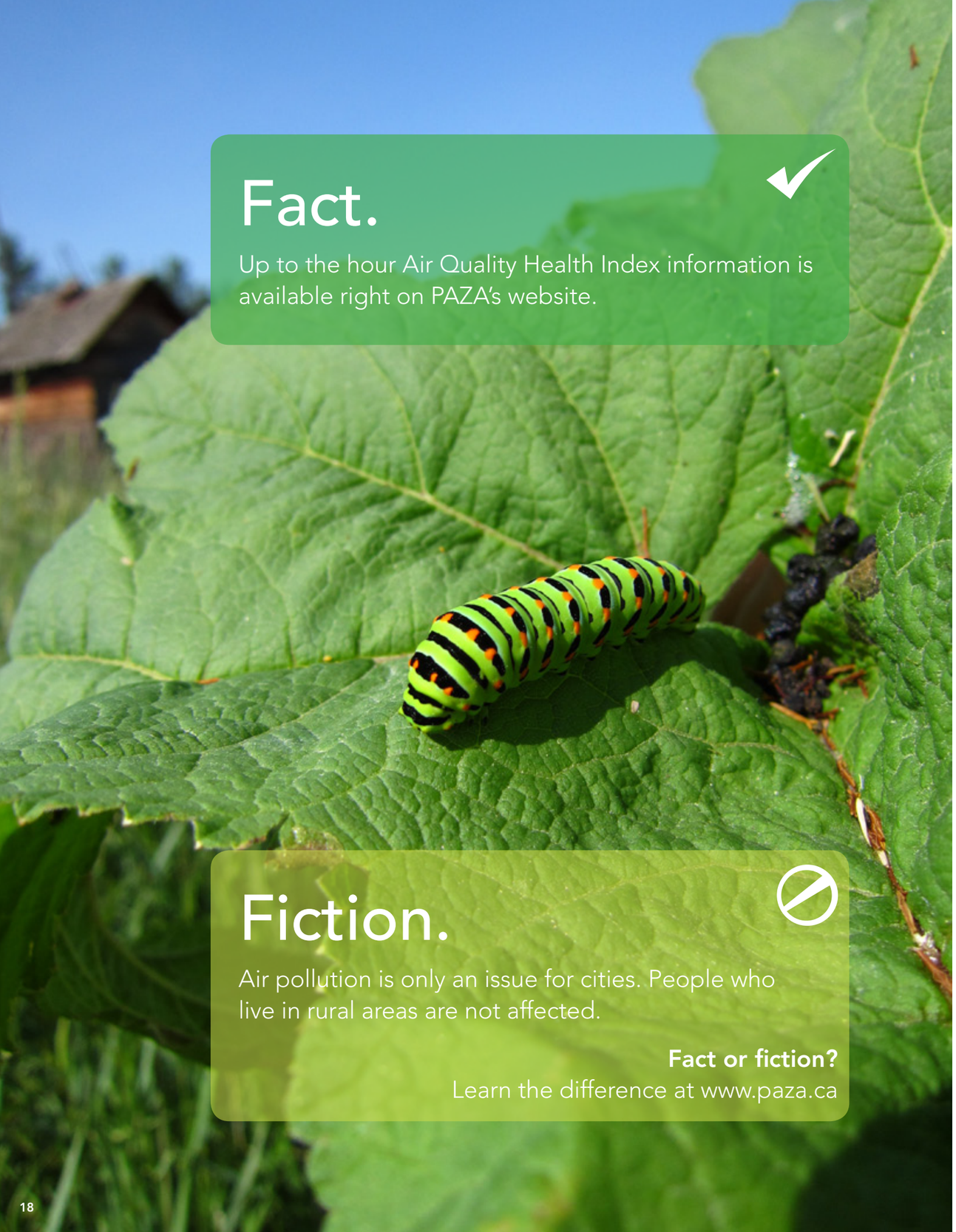
Despite the universality of this desire, she says, most people seem to be unaware that there is a non-profit organization meticulously monitoring it. "I'd like people to know that if they are worried about the air they're breathing, their concerns will be heard, that they will be passed onto the proper channels, and that the data we release is accurate." If a community is concerned, PAZA can investigate the potential for putting in an air monitoring station – temporary or otherwise.

Sometimes, she adds, it can be a simple case of setting fears at ease. "You can get this perception that because we're so busy with development, with oil and gas, we must have problems with air quality," she says, "I was quite concerned when I started out and now I recognize that, you know what, we do usually have good quality of air here."

It's something the PAZA board is collectively passionate about, in a very local sense, says Nelson. "It's a group that operates from the ground roots up. To me, that's extremely important. Everybody lives here; everybody has a stake in the air."

And despite the fact that years have passed since her first terrible encounter with air quality issues, she declares her passion for PAZA's work undiminished. I will support it as long as it exists," she says, "Whether I'm the Chair or a municipal representative, or as a public member, I'll be supporting it one way or the other."

Landscape photo this spread: Lloyd Dykstra/PAZA Photo Contest
Portrait this page: Lori Brough/Pure Photography



PAZA Ambient Air Quality Monitoring Network

The regional ambient air quality monitoring program commenced operation in 2002, developed in accordance with Alberta's Clean Air Strategy.

The goal of the monitoring program is to collect reliable, representative, scientifically credible data in an efficient and economically sustainable manner. The monitoring program design provides the ability to respond to local and regional air quality issues and concerns. PAZA ensures all data is publicly available.

What happens to the data?

PAZA does not set the standards for air quality. The data we collect is compared against Alberta Ambient Air Quality Objectives (AAAQO) set by Alberta Environment and Sustainable Resource Development. The AAAQO are intended to provide protection of the environment and human health. PAZA reports any exceedances of AAAQO to Alberta Environment and Sustainable Resource Development immediately.

PAZA also provides near instantaneous air quality data for public viewing online. For the calculation of the Air Quality Health Index (AQHI) measurements, PAZA submits up to the hour data to Alberta Environment and Sustainable Resource Development. The AQHI is updated hourly, 24-hours-a-day, and can be viewed on our website.

If the index indicates higher levels of risk to public health, Alberta Health Services may issue a public health advisory.

Validated data, suitable for use in scientific data analysis and air quality management planning, is submitted to Alberta Environment and Sustainable Resource Development monthly and annually and is archived at the Clean Air Strategic Alliance Data Warehouse (www.casadata.org). Annual data summaries, like this one, are compiled for the PAZA community.

All data reports are available for viewing on our website.

How is PAZA's data used?

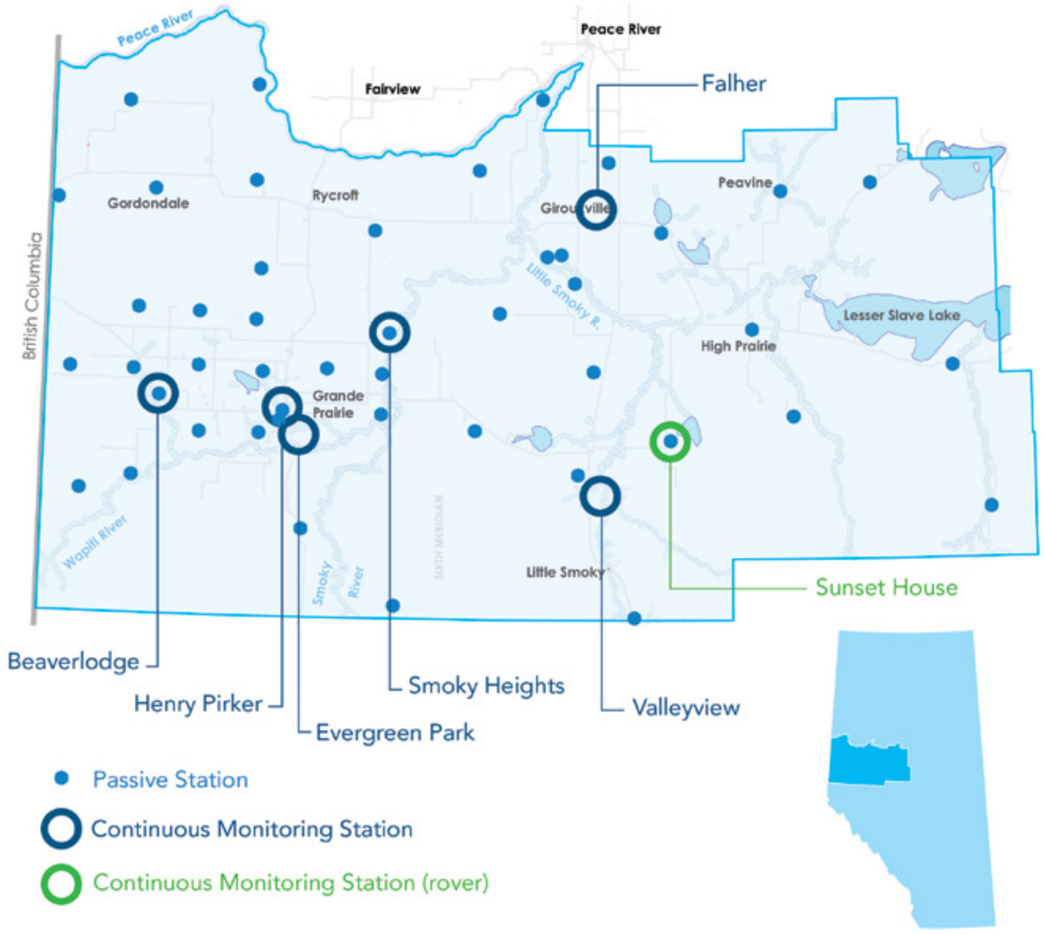
- To learn which pollutants are impacting our air quality
- To measure short and long terms air quality trends
- To compare our air quality to other regions
- To learn what the air quality means to you and your health using the Air Quality Health Index
- For education and outreach
- For policy development and management planning

WE DEAL IN DATA

Data from all PAZA stations is compared against Alberta Ambient Air Quality Objectives (AAAQO) as defined in the Alberta Environmental Protection and Enhancement Act, and any exceedances of AAAQO are reported.

PAZA also submits monthly and annual air quality monitoring reports to Alberta Environment and Sustainable Resource Development.

Moira McRann/PAZA Photo Contest;
Fact or Fiction Source: Environment Canada
http://www.ec.gc.ca/Publications/9E2991C8-3A47-4AB2-9003-F97DBE1F8BA1/AQHILearningStations.pdf



PAZA'S NETWORK MONITORING OBJECTIVES

1. Monitor to ensure compliance for Environmental Protection and Enhancement Act (EPEA) Approvals
2. Measure and assess air quality relevant to Alberta Ambient Air Quality Objectives (AAAQO) and Canadian Wide Standards (CWS)
3. Understand the spatial distribution of monitored pollutants in the region.
4. Identify regional air quality trends and emerging issues.
5. Characterize specific geographic locations or sources.
6. Provide information required to understand potential population impacts to ambient air quality.
7. Provide information required to understand potential air quality impacts on the environment and population.
8. Improve the ability to identify and apportion pollutant sources for purposes of air quality management.
9. Provide adequate input and validation information for dispersion modeling.
10. Monitoring will be conducted using best available technology economically achievable.

PAZA Boundary and Monitoring Stations

PAZA operates a network of seven continuous monitoring stations and 46 passive monitoring stations that collectively monitor the air quality across the region. The PAZA boundary encompasses approximately 38,000 square kilometres, with a population of approximately 100,000 people living and working in the region.

The Rover monitoring station is relocated on a yearly basis to areas where new or additional air quality monitoring is required. Enhancements to this station included the addition of fine particulate matter measurement. PAZA hopes to add total hydrocarbon and hourly AQHI reporting to this station in 2013.

The continuous monitoring stations are constantly measuring parameters and provide near instantaneous readings, while passive monitoring stations collect samples that are sent to a laboratory for analysis providing a monthly average. In the PAZA network passive stations are intended to gather information over a broad spatial area and measure trends over time. They are set up on a grid system to provide comparative air quality throughout the zone.

The monitoring stations are operated in accordance with Alberta's Air Monitoring Directive. All data is verified through a rigorous quality assurance program, including daily equipment checks, monthly multipoint calibrations, annual third party audits and frequent data reviews for variances and trends.

In addition, the Grande Prairie Henry Pirker and Beaverlodge stations are part of the National Air Pollution Surveillance Program, which monitors and assesses the quality of outdoor air in populated regions of Canada.

NEVER STOP LEARNING

Our new Making It Clear fact sheet series available online can provide you with detailed information on how air quality is monitored and regulated in Alberta, how air quality pollutants can impact your health and other related topics.

Visit paza.ca for more information.

PASSIVE vs. CONTINUOUS

There are seven continuous (left) and 46 passive monitoring stations (above) located throughout the PAZA region.

What affects air quality?

We all affect air quality. Air quality can be impacted by many sources both through human activity and natural phenomenon.

- **Point Sources:** industrial facilities, power plants, home and business heating and cooling
- **Mobile Sources:** transportation, vehicles, aircraft
- **Natural Sources:** trees, vegetation, wetlands, gas seeps, forest fires, lightening
- **Area Sources:** small sources, BBQs, firepits, drycleaners, pesticide use

In addition to wind speed and direction and important meteorological parameters that affect the transport and dispersion of air, monitoring at the stations is based on what is expected to be present in an area and available technology. For example, monitoring stations in urban centres typically measure for nitrogen oxides, carbon monoxide, particulate matter, hydrocarbons, and ozone, the parameters commonly associated with vehicle emissions and home heating and cooling. In an industrial area we may monitor for sulphur dioxide, total reduced sulphurs, hydrogen sulphides, hydrocarbons, or fine particulate matter, depending on the industry. In rural areas we may monitor for particulate matter, ozone, or nitrogen oxides.

24/7 MONITORING

PAZA technicians like Grover Christiansen perform regular calibration and maintenance to ensure PAZA's seven continuous monitoring stations operate day in and day out, year-round.

Our network's average instrument uptime was 99.4% during 2012.

What does PAZA monitor?

Passively monitored parameters:

- Sulphur dioxide
- Nitrogen dioxide
- Ozone
- Hydrogen sulphide

Meteorological parameters (that affect the transportation and dispersion of compounds):

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

Continuously monitored parameters:

- 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 ($PM_{2.5}$)

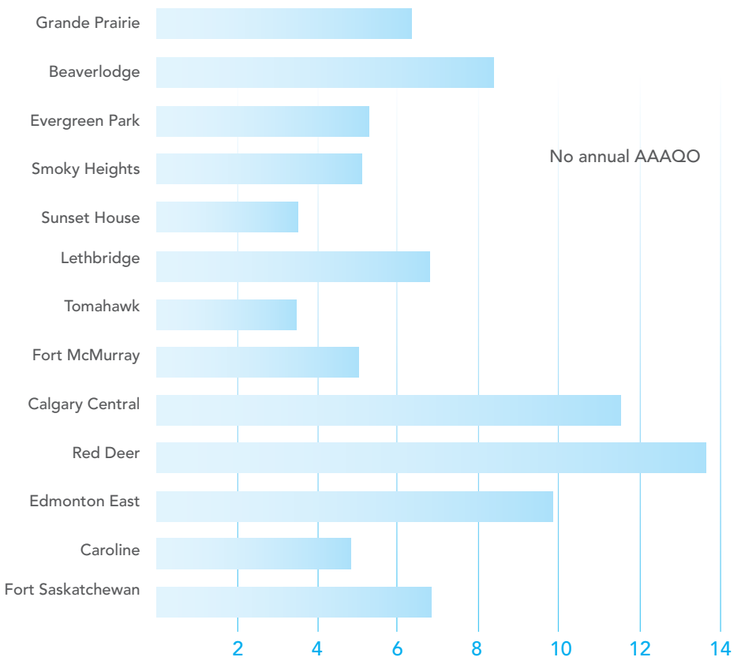
Gone with the wind...

Air is always in motion. It moves dynamically across the face of the earth, interacting with the landscape.

In other words, emissions within the region disperse using the topography of the area. Air flows through the many hills, valleys, forests, and cities we inhabit. When the land provides a barrier to the flow, it gets redirected. This can impact the air quality of the area by increasing chemical concentrations trapped by topography. Understanding these dynamics is crucial in predicting dispersion patterns and siting emission sources.

Marilyn Grubb/PAZA Photo Contest

Fine Particulate Matter in ug/m³ (2012 Average by Community)



Fine Particulate Matter ($PM_{2.5}$)

Fine particulate matter ($PM_{2.5}$) is an important parameter to monitor because of the potential health impacts associated with $PM_{2.5}$. Particles are tiny, orders of magnitude smaller than a single human hair. Particles can become trapped in the lung and cause irreparable respiratory damage.

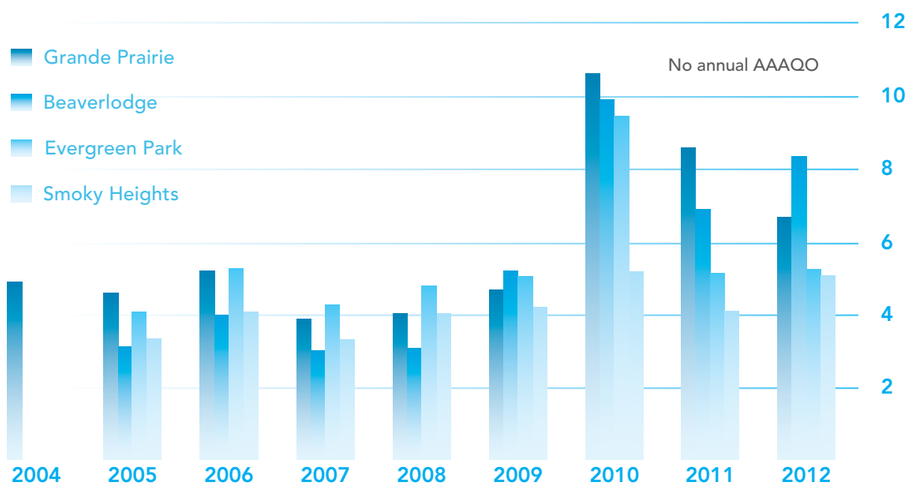
The PAZA zone has observed increased levels of fine particulate matter from 2010 through 2012 (see graph below) mainly due to wildfires burning in northern Alberta and British Columbia.

$PM_{2.5}$ can also be a significant problem in rural areas, due to controlled wood burning.

PAZA measured twelve 24-hour and 44 one-hour Alberta Ambient Air Quality Objective exceedances for $PM_{2.5}$ in 2012.

The highest maximum hourly average concentration in our network was approximately 153 µg/m³ at Smoky Heights (compared to 337 µg/m³ in 2011). Despite the fact that northern Alberta communities experienced increased $PM_{2.5}$ readings from wildfires, overall annual average concentrations were less than those measured in large urban centres across the province, as evidenced in the graph at left.

Fine Particulate Matter in ug/m³ (Average by Year)

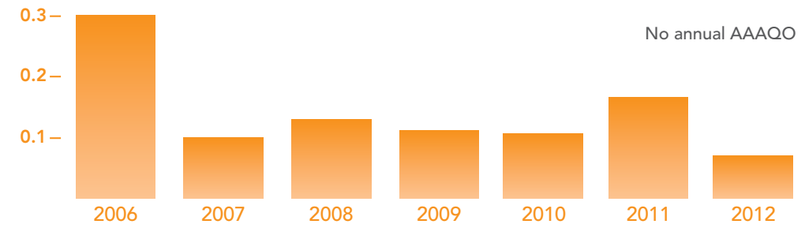


So what did the data tell us in 2012?

The data PAZA collects is compared to the Alberta Ambient Air Quality Objectives set by Alberta Environment and Sustainable Resource Development.

In 2012, there were a total of 13 exceedances of the 24-hour AAAQO and 45 exceedances of the one-hour AAAQO. Of this, one one-hour (>10 ppb) and one 24-hour (>3 ppb) exceedance of hydrogen sulphide was recorded at the Valleyview station in October. Local industry representatives were notified immediately and the source was determined to be a leaking thief hatch at a nearby facility. Despite this exceedance, hydrogen sulphide annual average concentrations at the Valleyview station were the lowest historically recorded, as evidenced in the graph below.

Hydrogen Sulphide (H_2S) Historical Annual Average (in ppb) - Valleyview



The remaining exceedances were fine particulate matter (>30µg/m³) 24-hour average and (>80µg/m³) one-hour average. In the months of July, September, and October, wildfires burning in northwestern Alberta contributed to all twelve of the 24-hour and 37 of the 44 one-hour particulate matter exceedances. These exceedances were measured at all stations in the network measuring fine particulate matter. Regional air quality advisories were issued by Alberta Health Services during these periods. During these events, PAZA monitored the air quality very closely and provided timely news updates and advisories on our website and Twitter account. Strategies for reducing exposure during these conditions were released by Alberta Health and made available on our website.

The seven remaining fine particulate matter exceedances were observed at the Evergreen Park, Smoky Heights and Beaverlodge stations throughout the year and were attributed to local area sources.

The technical data included here provides a brief summary of the air quality monitoring results for 2012. If you would like to review more extensive air quality summaries across our zone please visit our website. The provincial data comparisons outside of PAZA's zone are compiled using validated continuous data accessed from the Clean Air Strategic Alliance Data Warehouse.

LONG ACRONYM, SIMPLE CONCEPT

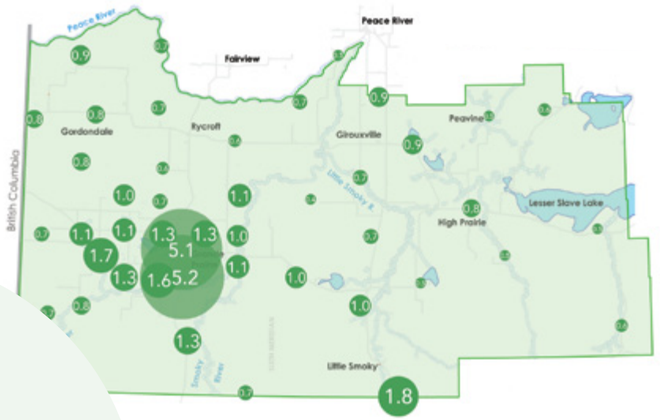
Alberta Ambient Air Quality Objectives (AAAQOs) are established by Alberta Environment and Sustainable Resource Development to define the maximum acceptable concentration.

These objectives are based on evaluation of scientific, social, technical and economic factors and developed in consultation with government departments, the scientific community, environmental organizations, industry and the general public.

A NOTE ON PPB

Data is reported in parts per billion (ppb). One part per billion is roughly equivalent to 3 seconds out of every 100 years or like adding a pinch of salt to a 10,000 kg bag of potato chips.

NOTE: Graphs and other graphic representations of data in this report were created for illustration only, based on official 2012 data. Values represented are approximate. For official audited data, including full reports, please visit our website.



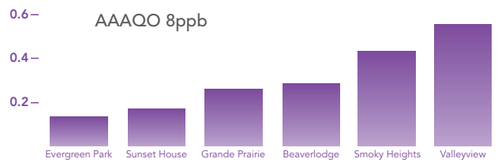
Nitrogen Dioxide Concentrations in ppb (Annual Average by Passive Station)

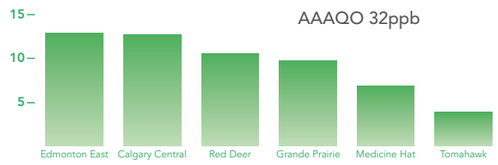
This circle represents the approximate diameter of the Annual Alberta Air Quality Objective (32 ppb) relative to the bubbles on the map above. As you can see, annual averages are well within AAAQO parameters.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide emissions across the zone are highest along major transportation routes and urban centres. This is visible in the passive annual average bubble map at left, and explains why major cities such as Edmonton and Calgary experience much higher overall emissions (as indicated in the graph below).

Increases in NO_2 emissions are observed during colder ambient temperatures when there is increased vehicle idling and residential/commercial heating. At the same time, weather conditions inhibit mixing and dispersion of air and air pollutants and temperature inversions trap stagnant air close to ground level.





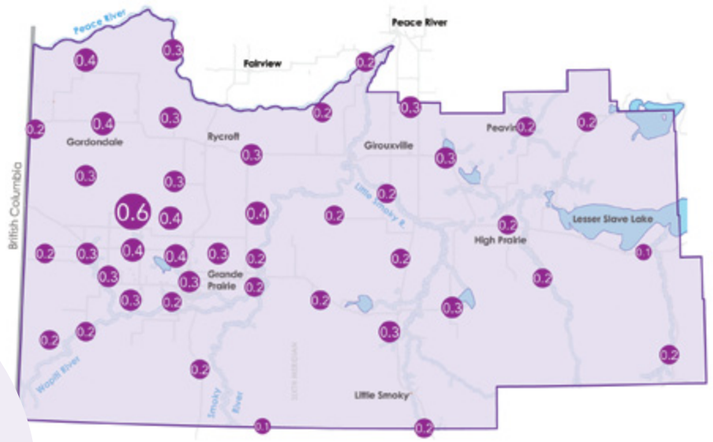
Nitrogen Dioxide Emissions in ppb (2012 Annual Averages)

Sulphur Dioxide Concentrations in ppb (2012 Annual Averages)

Sulphur Dioxide (SO_2)

Sulphur dioxide concentrations tend to increase during colder ambient temperatures when weather conditions inhibit mixing and dispersion of air and air pollutants. Sulphur dioxide concentrations tend to be higher at the stations located in areas where industrial facilities involve the burning of fossil fuels, as indicated on the map at right, and in the graph above.

This circle represents the approximate diameter of the Annual Alberta Air Quality Objective (8 ppb) relative to the bubbles on the map. As you can see, annual averages are well within AAAQO parameters.



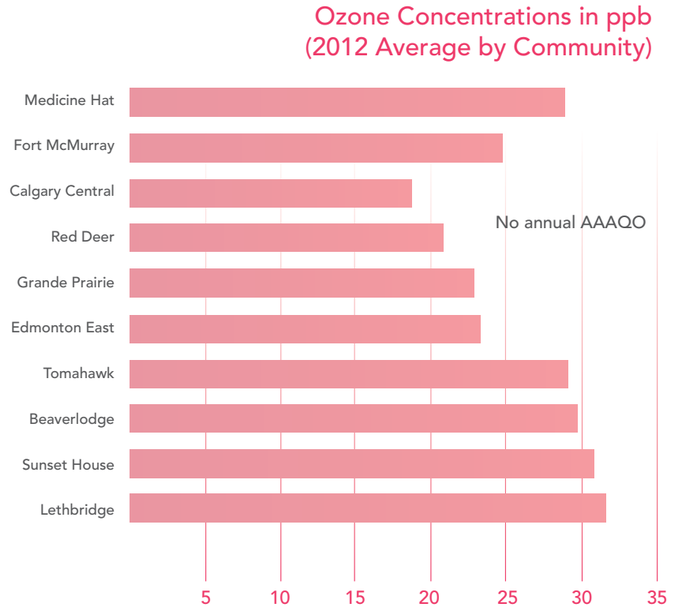
Sulphur Dioxide Concentrations in ppb (Annual Average by Passive Station)

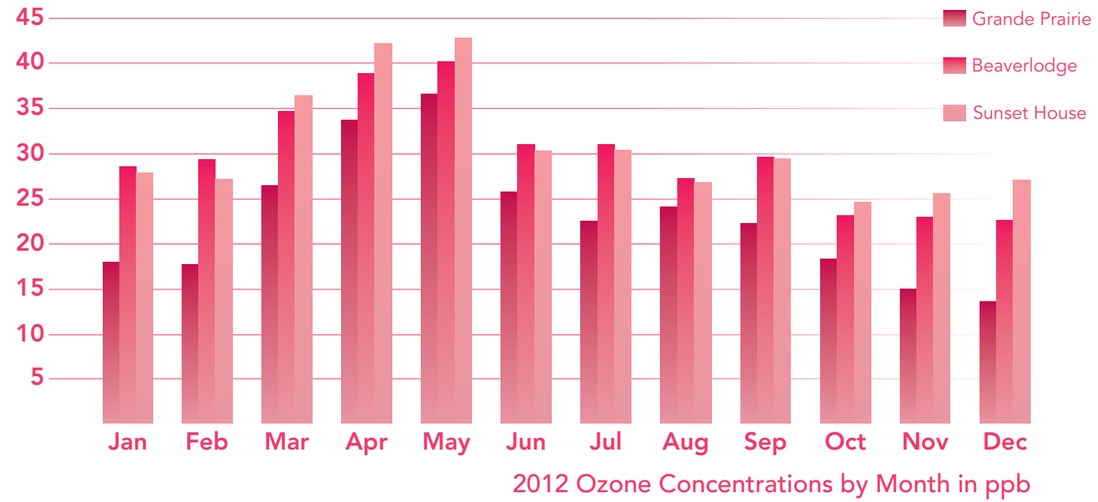
Ozone (O_3)

Ozone and particulate matter play a role in the production of smog. These pollutants may cause human health problems and can pose a threat to environmental systems. They mainly affect the lowest part of the atmosphere, which holds the air we breathe.

Ozone is not emitted directly, but is formed from the reaction of nitrogen oxides, emitted from fossil fuel combustion, and volatile organic compounds (VOCs) in the presence of sunlight and/or heat. When sunlight is not present, nitrogen oxides consume ozone to form nitrogen dioxide. This is why ozone levels are lower in urban areas or transportation corridors—where we expect to see more nitrogen oxides from vehicles—than in rural areas. This is evidenced in the graph at right.

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 weather conditions such as temperature inversions that trap stagnant air close to ground level. See the graph below for an illustration of these trends.





2012 Ozone Concentrations by Month in ppb

NOTE: Graphs and other graphic representations of data in this report were created for illustration only, based on official 2012 data. Values represented are approximate. For official audited data, including full reports, please visit our website.

Air Quality Health Index

The average person takes about 20,000 breaths a day—that's an amazing 10,000 litres of air passing through your lungs every 24 hours. Wouldn't it be helpful to know how all that air affects your health? Now you can.

An advantage of continuous monitoring is the ability to calculate an Air Quality Health Index (AQHI). The AQHI is a tool designed to help Albertans better understand what the air quality around us means to our health. Everyone is affected by air pollution differently. Some are at a higher risk than others.

AQHI uses a scale of 1 to 10+ to indicate the level of risk associated with the local air quality. The lower the number, the lower the health risk. The AQHI value for the hour is calculated by a formula using the concentrations of the following three parameters, measured continuously:

- Fine Particulate Matter (see pg. 20)
- Nitrogen dioxide (see pg. 22)
- Ozone (see pg. 23)

Because of our energy based economy, Alberta has enhanced the AQHI to also consider concentrations of the following pollutants:

- Sulphur dioxide (see pg. 22)
- Hydrogen sulphide (see pg. 21)
- Total reduced sulphur
- Carbon monoxide

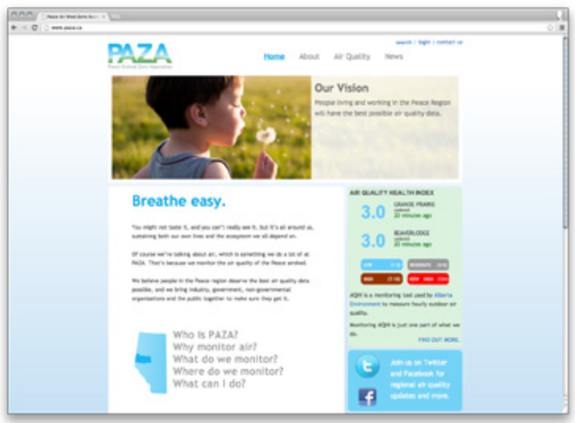
Additionally, special community-based messaging for odour or visibility is an added feature to the AQHI reported in Alberta. The index does not measure the effects of pollen, heat or humidity on health.

AN HOURLY MEASURE OF OUTDOOR AIR QUALITY
The AQHI allows you to plan your outdoor activities with health risk messaging.

In 2012, the PAZA region enjoyed AQHI risk ratings of "low" or "moderate" over 99.8% of the time.

The Peace region experienced limited "High" risk rating due to wildfires burning in northern Alberta. There was no "Very High" risk rating recorded.

Communities compared in the graph on the opposite page experienced low or moderate risk ratings over 99% of the time.



REAL-TIME AQHI FOR THE PEACE AIRSHED
As part of our website, we have added real-time AQHI data. The system provides up to the hour indices for Grande Prairie and Beaverlodge.

What does it mean for me?

The AQHI allows you to look ahead at anticipated air quality conditions for 48 hours and provides associated health advice. You can refer to the AQHI to check the quality of outdoor air in your community before heading off to work or play, and you can use the forecasts to plan your activities, whether over the next hour or the next day. Check the index at paza.ca, airquality.alberta.ca, or by calling 1-877-247-7333.

		At Risk Populations	General Population
Low Risk	1–3	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities.
Moderate Risk	4–6	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	No need to modify your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High Risk	7–10	Reduce or reschedule strenuous activities outdoors. Children and the elderly should take it easy.	Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very High Risk	10+	Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	Reduce or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

What affects AQHI?

High risk and very high risk air quality episodes can occur when particulate matter is carried into urban areas from forest fires, or during wintertime, or when ground level ozone forms during periods of summertime smog. Ground level ozone can form in hot, sunny weather, through complex chemical reactions involving pollutants emitted by automobiles and industry. Winter-time smog often forms during a temperature inversion (warm air trapped under heavier colder air) and sunny weather.

In 2012, all but one of the high risk rating events occurred when wildfires burning in northern Alberta had an impact on air quality in the region. The other event occurred during a winter temperature inversion. There was no very high risk rating measured in 2012.

	Grande Prairie	Beaverlodge	Edmonton	Calgary	Fort McMurray	Red Deer	Medicine Hat
Low Risk	95.3%	97.7%	87.2%	89.9%	97.6%	91.4%	92.9%
Moderate Risk	4.5%	2.2%	12.6%	10.1%	2.0%	8.6%	7.0%
High Risk	0.2%	0.0%	0.2%	0.1%	0.3%	0.0%	0.1%
Very High Risk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

2012 AQHI Average Ratings from Sample Communities

Source: http://environment.alberta.ca/03599.html

What can I do?

Learn

Be proactive! Learn about air quality. Visit paza.ca for info.

Get Involved

PAZA welcomes anyone with an interest in air quality to our regular meetings. Meeting dates are posted online. Join us!

Find up-to-the-minute air quality data, including AQHI, online.

Request a presentation to be made to your organization or group.

Attend our AGM in May to learn more about air quality monitoring and PAZA's activities.

Get Active

Small changes can have the biggest cumulative impact:

- Walk, bike, car pool, or use public transportation
- Reduce vehicle idle time
- Keep your vehicle tuned up and ensure proper tire pressure for better fuel efficiency and reduced emissions
- Install a programmable thermostat
- Turn down your hot water tank
- Turn off lights and electronics when not in use
- Reduce, reuse, then recycle
- Use energy-efficient appliances
- Buy local and reduce your carbon footprint
- Start a compost and garden organically

Contact us for more information:
780.833.4343 or 1.866.764.2681

2012 Membership and In-kind Support

PAZA thanks our members for their past and continued support into 2013. Our regional ambient air quality monitoring network has an annual budget of over $750,000 funded by industry, municipalities, Alberta Environment and Sustainable Resource Development and other contributing members. All municipal, NGO and numerous industry members contribute voluntarily. Without the valuable support of our members, PAZA would be unable to continue to monitor the air we breathe.

Individual members representing various stakeholder groups regularly attended meetings, participated on committees and provided their time and resources. Sincere thanks to all our members for over 950 hours of volunteer time and resources, totalling over $105,000 worth of in-kind support.

2012 Funding Members

Advantage Oil & Gas Ltd.
Alberta Environment and Sustainable Resource Development
Altagas Ltd.
Apache Canada Ltd
ARC Resources Ltd.
Artek Exploration Ltd.
ATCO Power Canada
Barrick Energy Partnership
Bernum Petroleum Ltd
Birch Hills County MD 19
Birchcliff Energy Ltd.
Bonavista Petroleum
Canadian Forest Products Ltd. (CANFOR)
Canadian Natural Resources Limited
Cequence Energy Ltd.
ConocoPhillips Canada Resources Corp.
County of Grande Prairie No. 1
Crescent Point Resources Limited Partnership
Dark Energy Ltd.
DeeThree Exploration Ltd.
Delphi Energy Corp.
Devon Canada
Encana
Enerplus Resources Corporation
Exoro Energy Inc.
Friends of an Unpolluted Lifestyle
Glenogle Energy Inc.
Grande Prairie Generation Inc.
Hanna Oil & Gas Company
Insignia Energy Ltd.
KinMerc Oil & Gas Inc.
Long Run Exploration
Longview Oil Corp.
MD of Greenview
MD of Smoky River
MD of Spirit River No 133
Municipal District of Big Lakes
NAL Resources Ltd.
Pengrowth Energy Corporation
Penn West Petroleum Ltd.
Petrus Resources
Polar Star Canadian Oil & Gas Inc.
Reber Exploration Ltd.
Response Energy
RMP Energy Inc.
Saddle Hills County MD 20
Shell Canada Energy
Shoreline Energy Corp.
Sinopec Daylight Energy Ltd.
Sonde Resources Corp.
Spectra Energy Midstream
Storm Resources Ltd.
Suncor Energy Resources Partnership
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Town of Valleyview
TransAction Oil & Gas Ventures Inc.
Veresen Energy Infrastructure Inc.
Weyerhaeuser Canada
Whitecap Resources Inc.
Williston Hunter Canada, Inc.

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