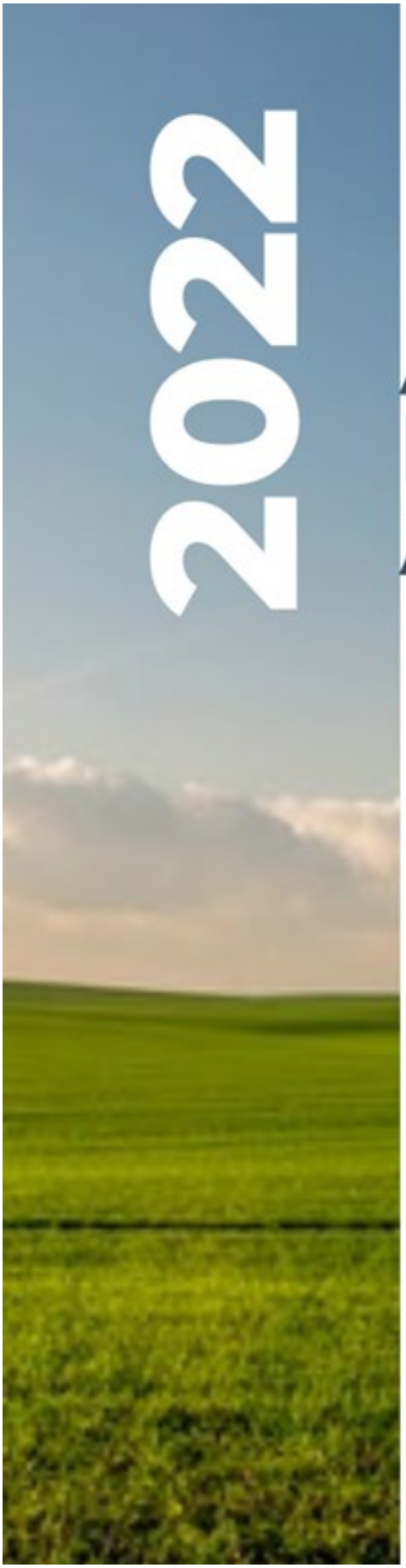

2022

A YEAR IN THE PALLISER AIRSHED

palliser airshed society

Palliser Airshed Society

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Medicine Hat, AB T1B 4C7

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PH 403.512.0085

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Introduction

The Palliser Airshed Society (PAS) is a multi-stakeholder, not-for-profit organization consisting of industry, local government, environmental organizations, in partnership with Alberta Environment and Protected Areas. PAS was formed in 2003 in response to concerns over air quality in the Medicine Hat region. In 2007, the PAS expanded its borders to the boundaries of the former Palliser Health Region. The airshed zone was expanded again in 2011, when the southwest border was extended to Highway 4 and Highway 36. Figure 1 illustrates the boundaries of the area monitored by the Palliser Airshed Society.

The current airshed boundaries encompass an area greater than 58,000 km^2. Approximately 140,000 people live and work in this area. The major industries include oil and gas processing, power generation, manufacturing, agriculture, ranching and tourism.

The PAS air monitoring network uses a combination of both continuous and passive monitoring technologies. The network is designed to provide reliable information to a wide range of stakeholders, including those involved in developing strategies to maintain environmental quality through sound management.

In 2022, PAS operated three continuous monitoring stations, and 16 passive sampling sites. The Crescent Heights continuous monitoring station has been in operation since 2003. The *airpointer+PM*® moved to a new home in Taber and began full operation in June 2022. AEP has loaned PAS an Airpointer that is located in Brooks at the Medicine Hat College Campus. It began full operation in June 2022.

PAS' network now include sensor-based monitoring for $PM_{2.5}$. Current locations include: Acadia Valley, Bassano, Bow Island, Brooks, Consort, Duchess, Empress, Medicine Hat (Crescent Heights and Desert Blume Golf Course), Milk River, Oyen, Redcliff, Vauxhall, and Warner.

Vision

Air quality is known and valued to promote a healthy environment.

Mission

Collecting and communicating credible ambient air quality data to develop strategies to manage air quality issues within Palliser Airshed.

Principles

Through the development and achievement of a consensus based, multi-disciplinary stakeholder group, the Palliser Airshed Society (PAS) is committed to:

- Collecting and communicating credible ambient air quality data.
- Connecting stakeholders and promoting community involvement.
- Educating the community, advocating for environmental stewardship
- Responsibly managing our resources to achieve our vision and mission.
- Understanding air quality issues prevalent in the airshed and the potential effects to human, animal, and vegetative health.
- Collaborative actions with Alberta Airsheds Council (AAC) on projects of common interest.

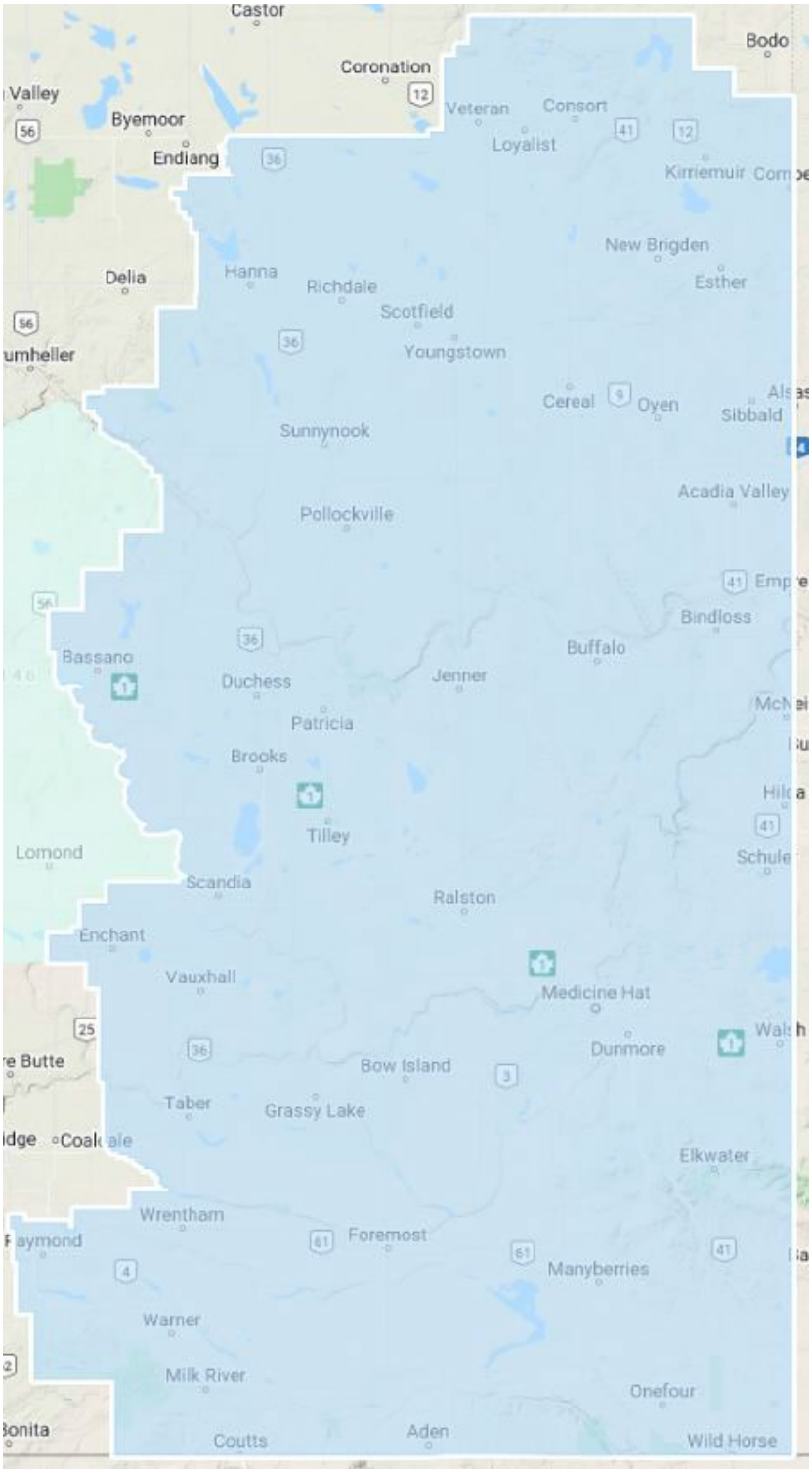


Figure 1. Boundaries of the Palliser Airshed

Year in Review

PAS Air Monitoring Network

The Crescent Heights air monitoring station and the Taber and Brooks Airpointer® met the operations criteria defined by the Alberta Ambient Air Monitoring Directive (AMD) throughout 2022. The measured air quality was within the Alberta Ambient Air Quality Objectives (AAAQO) for 2022, with the exception of $PM_{2.5}$ exceedance events. In total nine 24-hour and nine 1-hour events were recorded between the 3 stations attributed to wildfire smoke and high wind speed events in the region.
All passive sampling sites yielded more than 90% valid samples for SO_2, and NO_2.

Contact Information

Please visit the PAS website for additional information: www.palliserairshed.com. If you have any comments or suggestions, please contact Lorna Morishita at (403) 512-0085 or admin@palliserairshed.com.

Consultants

The PAS Board contracts WSP E&I Canada Limited (formerly Wood) to operate and manage the monitoring equipment as well as reporting of data representative of the airshed. Wood's primary goal is to ensure high quality data is collected while maintaining efficient operations of the monitoring network.

Figure 2. PAS Continuous Air Quality Monitoring Stations

Message from the Chair

On behalf of the Palliser Airshed Society (PAS), it is my pleasure to present the 2022 Annual Report. 2022 was our seventeenth full year of air quality monitoring in southeastern Alberta. The current zone covers the southeastern corner of Alberta, an area of approximately 58,000 square kilometers and includes about 140,000 people who work and live in the area.

As part of Communication and Outreach program PAS began installing PM2.5 PurpleAir sensors located at Medicine Hat, Brooks, Oyen, and Milk River in 2020-21. With PurpleAir Sensors donated by ECCC in 2022, PAS was able to expand our sensor network by 10 more units now serving Acadia Valley, Bassano, Bow Island, Consort, Desert Blume, Duchess, Empress, Redcliff, Vauxhall, and Warner. We were also able to work with Alberta Parks to start a PurpleAir Network. They installed their first of three units in Cypress Hills Provincial Park in the Fall of 2022. We currently have monitoring in every municipal district in our Airshed and will continue to expand this network in the summer of 2023.

Our long-term contracts with Alberta Environment and Protected Areas (EPA) continues to provide PAS with the financial stability that will allow us to make long term plans for the airshed.

In 2022 we started tracking the volunteer hours at PAS, in order to understand and recognized the commitment of those involved. Our Board and Members have contributed over 470 hours of service to improve our Governance, Technical Aptitude, and Community Outreach.

I want to thank AEPA, industry and municipalities for their commitment to airsheds in the province. Without their support our airshed would not be sustainable.

I look forward to an interesting and exciting 2023 and years ahead.

Bill Nalder
Chairman

Membership - Board of Directors

Position	Name	Association
Chair	Bill Nalder	CNRL
Vice-Chair	Ed Rahn	Alberta Energy Regulator
Executive Director	Lorna Morishita	Palliser Airshed Society
Treasurer	Pamela Hodgkinson	Alberta Health Services
Director	Gerry Buck	Lantic Inc.
Director	Frauke Spurrell	Alberta Environment and Protected Areas
Director	Jason Sweeney	Cancarb Ltd.
Director	David Gue	Grasslands Naturalists
Director	Adria Coombs	City of Medicine Hat
Director	Boyd Mostoway	City of Medicine Hat Electric Utility
Director	Kim Schacher	International Petroleum Corp.
Director	Crystal Galloway	Methanex

Membership – Funding Members

GOVERNMENT & MUNICIPALITIES

Alberta Environment and Protected Areas, Air and Watershed Stewardship Branch	Alberta Environment and Protected Areas, Intergovernmental Relations and Engagement Branch
City of Medicine Hat	Cypress County
County of Newell	Town of Redcliff

INDUSTRY

Baytex Energy	JBS Foods Canada
Big Marble Farms	Journey Enerov Inc
Black Spur Oil Corp	Karve Energy
Campus Energy	Lamb Weston Canada
CF Industries	Lantic Inc
Cancarb Limited	Methanex
Canlin Resources	NAT-1 Ltd Partnership
Cardinal Energy	North 40 Resources
CertainTeed Corp	Obsidian Energy
City of Medicine Hat Electric Utility	Pembina Pipelines
City of Medicine Hat Gas Utility	Pine Cliff Energy Ltd
CNRL	Porocel of Canada Ltd
COR4 Oil Corp	Prairie Gold Produce Ltd
Crescent Point Energy	Prairie Provident Resources
Doag Energy	Surge Energy
Foothills Pipe Lines	Tamarack Valley Energy
Gryphon Petroleum Corp	Torxen Energy
Heartland Generation	TC Energy
Hemisphere Energy Corp	West Drum Energy
IPC Canada Ltd.	Westlake Energy
	Zargon Oil and Gas

Membership – In Kind Contributions

Alberta Health Services	Alberta Energy Regulator
M.D, of Acadia Valley	Town of Bassano
Town of Bow Island	City of Brooks
Village of Consort	Desert Blume Gold Course
Village of Duchess	Village of Empress
Grasslands Naturalists	Medicine Hat College
Town of Milk River	Special Areas Board
Taber Irrigation District	Town of Vauxhall
Village of Warner	Environment and Climate Change Canada

MEMBER VOLUNTEER HOURS

PAS would like to thank our members who devoted 471 hours in 2022 for Board Meetings, Committee Meetings (Governance and Finance, Communications and Outreach and Technical Advisory).

History and Outlook of the Palliser Airshed Network

The PAS air quality monitoring network design was approved by the Board prior to the fall of 2003. A continuous monitoring station was placed within the Airshed to collect representative, scientifically credible air quality data for the area. In addition, a passive monitoring network of six stations was implemented to augment the data collected at the continuous station.

The continuous monitoring station was established across from the McCoy High School in the Crescent Heights region of Medicine Hat (Figure 3). This station monitors sulphur dioxide (SO_2), nitrogen oxides (NO, NO_2, NOx), ozone (O_3), total hydrocarbons (THC), carbon monoxide (CO), and fine particulate matter ($PM_{2.5}$). The station also collects meteorological data, including wind speed, wind direction, ambient temperature, relative humidity, and solar radiation data. Meteorological data is used to assist in interpretation of air quality parameter readings and source investigation.

In 2007, the Palliser Airshed expanded its borders. The airshed was expanded to encompass approximately 40,000 km^2 and included a population of approximately 100,000 people. The borders were aligned with the boundaries of the former Palliser Health Region. A new monitoring plan was developed based on the expansion. As a result, the network added a portable air monitoring station and fourteen passive sampling stations.

In 2010, the Palliser Airshed Society faced serious financial stress. To resolve the circumstances, the passive sampling program was modified by monitoring ten sites for six months and then switching to the other ten sites for the remainder of the year. The portable monitoring program was downsized to a two-month program at the Jenner Station.

In 2011, the southwest border was extended to the junction of Highway 4 and Highway 36. The portable monitoring station was decommissioned in October following the Hays monitoring program. Two passive sites at Hays were added to the passive network, forming a total of twenty-two passive stations, as shown in Figure 3.

In July 2015, an *airpointer+PM*® was commissioned for operation at a location adjacent to the City of Brooks. The *airpointer+PM*® is intended for use as a portable monitoring station and was relocated to a site near the Medicine Hat Airport in September 2016, where it operated through to July 2018. The *airpointer+PM*® was moved to a site located nearby the Medicine Hat Trap Club in October 2018 and operated through to May 2022. The *airpointer+PM*® moved to a new home in Taber and began full operation in June 2022. AEP has loaned PAS an Airpointer that is located in Brooks at the Medicine Hat College Campus, it began full operation in June 2022.

Due to financial constraints in 2017, PAS completed a rationalization of the passive monitoring network with the technical help of AEP. As a result of the study, O_3 passive monitoring was discontinued in March 2017. Seven sites were discontinued completely, and SO_2 monitoring was discontinued at an additional seven sites in June 2017. A new NO_2 site was established in December 2017 near Milk River.

In October 2022, the southwest border was extended east to include the MD of Taber, Warner County and Special Areas 2, 3, and 4. The current airshed encompasses an area of greater than 58,000 km^2, with approximately 140,000 people living and working in this area.

PAS' network now include sensor-based monitoring for $PM_{2.5}$. Current locations include Acadia Valley, Bassano, Bow Island, Brooks, Consort, Duchess, Empress, Medicine Hat (Crescent Heights and Desert Blume Golf Course), Milk River, Oyen, Redcliff, Vauxhall, and Warner.

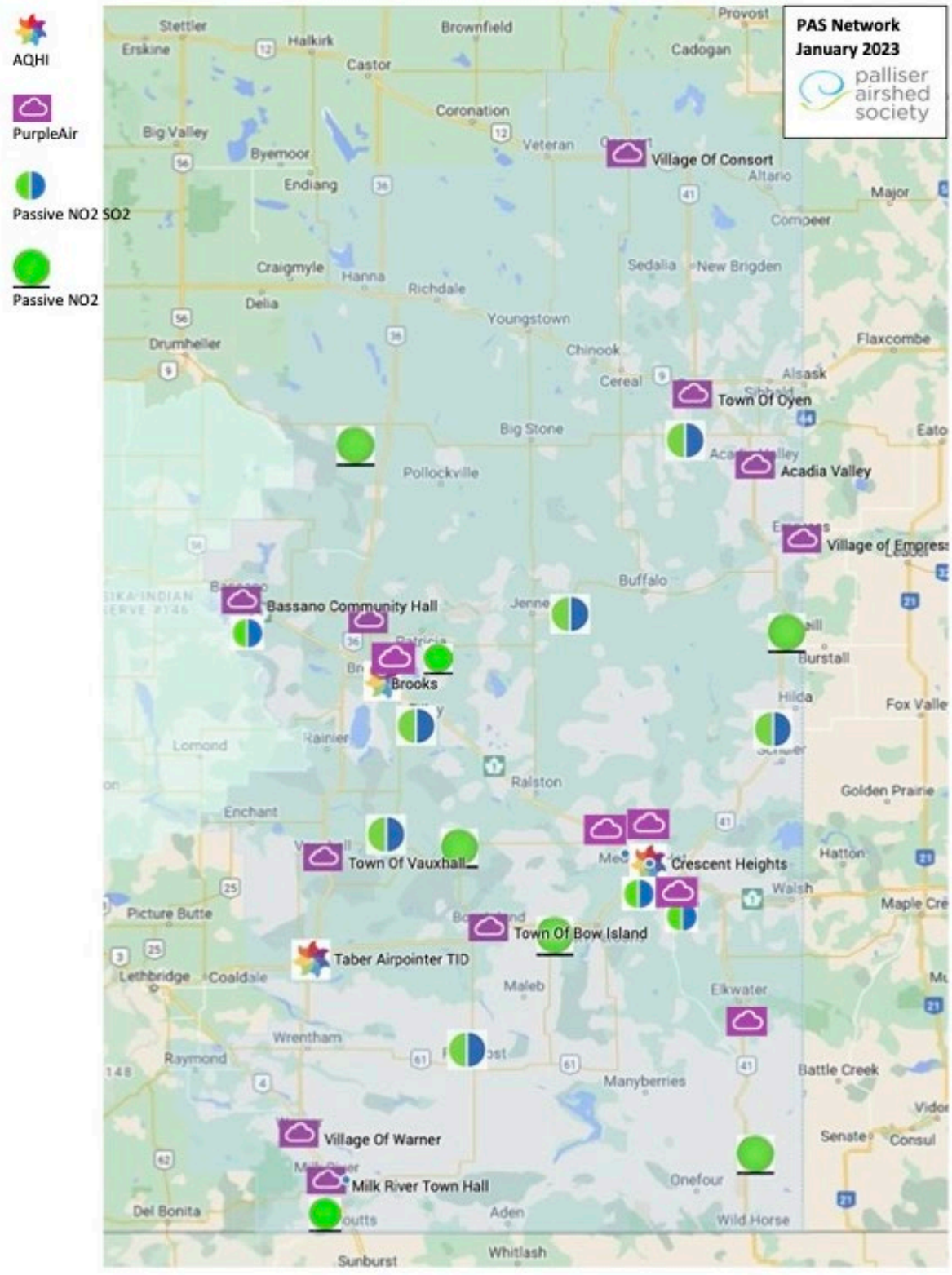


Figure 3. PAS Air Quality Monitoring Network for 2022

Continuous Air Quality Monitoring Program

The Palliser Airshed Society operates two continuous air monitoring stations which are monitoring ambient air quality in the City of Medicine Hat. The Crescent Heights station is a stationary air monitoring station, which began monitoring operations in December 2003. The Medicine Hat Airport site is monitored by a portable *airpointer+PM*® station which began operations on September 9, 2016 and continued to July 2018. The *airpointer+PM*® was moved to a site located nearby the Medicine Hat Trap Club in October 2018 and operated through to May 2022. The *airpointer+PM*® moved to a new home in Taber and began full operation in June 2022. AEP has loaned PAS an Airpointer that is located in Brooks at the Medicine Hat College Campus, it began full operation in June 2022. The *airpointer*® is a compact monitoring system, and as such, it can be mobilized to address special air monitoring needs within the airshed.

Near real-time data from the continuous air monitoring stations has been available on the PAS website since the spring of 2004, allowing public access to this data and providing an indication of the ambient air quality.

Environment Canada, as a stakeholder, provided a TEOM fine particulate analyzer and a carbon monoxide analyzer for the Crescent Heights station when the PAS airshed began operations. Donation of the equipment was made through a partnership program with Alberta Environment and Protected Areas, and the National Air Pollution Surveillance program (NAPS) of Environment Canada. In 2013, AEP provided a SHARP $PM_{2.5}$ monitor to replace the TEOM. This instrument enables the Crescent Heights station to report the Air Quality Health Index (AQHI). The AQHI is a public health tool used to provide advice to the general population and at-risk groups on how to reduce health risk by adjusting daily activities according to the status of air quality. In Alberta, the AQHI is measured and forecast for 31 communities. Near real-time AQHI data is available on the AEP website:
https://airquality.alberta.ca/map/

Continuous Air Quality Monitoring Results

Oxides of Nitrogen

Oxides of nitrogen (NO_X) are present in the air primarily in the form of nitric oxide (NO) and nitrogen dioxide (NO_2). These emissions are produced from the reaction of nitrogen and oxygen gases during combustion, especially at high temperatures. In atmospheric chemistry, oxides of nitrogen refer to the total concentration of nitric oxide and nitrogen dioxide.

Oxides of nitrogen (NOx) are produced from both natural and anthropogenic sources. Forest fires, lightning, and nitrogen fixation microorganisms are the primary natural contribution sources. Anthropogenic emissions are primarily from fuel combustions, such as transportation sources (automobiles, trucks, and trains), industrial sources (oil and gas industries), power generation plants, and space heating. The largest urban source of oxides of nitrogen is motor vehicles.

Nitrogen dioxide is a major component of photochemical reactions in the atmosphere that leads to smog formation, acid rain, and ground-level ozone formation and scavenging. High concentrations of oxides of nitrogen can damage plants, causing leaf discoloring and impairment of leaf function. Nitrogen dioxide, at higher concentrations, is an irritating gas that can constrict airways of asthmatics and may increase the susceptibility of infection in the general population.

Alberta Environment and Protected Areas sets air quality objectives for NO_2 among the nitrogen oxides compounds. The Alberta Ambient Air Quality Objectives for nitrogen dioxide are:

- 1-hour average AAAQO = 159 ppb
- Annual average AAAQO = 24 ppb

The Crescent Heights station was greater than 90% operational for 2022. The operational uptime for Taber and Brooks stations were 81.4% and 100.0% respectively. There were no exceedances of the 1-hour and annual AAAQO values. The annual average concentration of NO_2 at the Crescent Heights station was recorded as 5.8 ppb. Averages for Taber was 3.9 ppb and Brooks was 4.0 ppb. The maximum 1-hour average concentration of 47.7 ppb at the Crescent Heights station was detected in November. The maximum 1-hour average concentration of 31.8 ppb at the Taber station in November and 31.7 ppb at Brooks were detected in November.

Figure 4 compares annual average concentrations of NO_2 for the Air Monitoring Stations (AMS) in Alberta. The concentration at the Crescent Heights and Medicine Hat Airport stations was comparable to other cities of similar size. Higher concentrations of nitrogen dioxide tend to be recorded in large cities, such as Calgary and Edmonton, due to traffic and space heating. A higher concentration of NO_2 is also detected in energy resource operation regions, e.g. Wood Buffalo area.

Parameter	Annual Average Concentration – Nitrogen Oxides (NO/NO_2/NOx, ppb)									
	Crescent Heights						Taber		Brooks	
	2022	2021	2020	2019	2018	2017	2022	2021	2022	2021
NOx	7.5	7.2	7.3	8.6	9.6	7.2	5.2	6.7	5.0	4.2
NO_2	5.8	5.6	5.6	6.8	7.2	5.7	3.9	4.4	4.0	3.3
NO	0.1	1.6	1.8	1.8	2.3	1.4	1.3	2.4	1.1	1.0

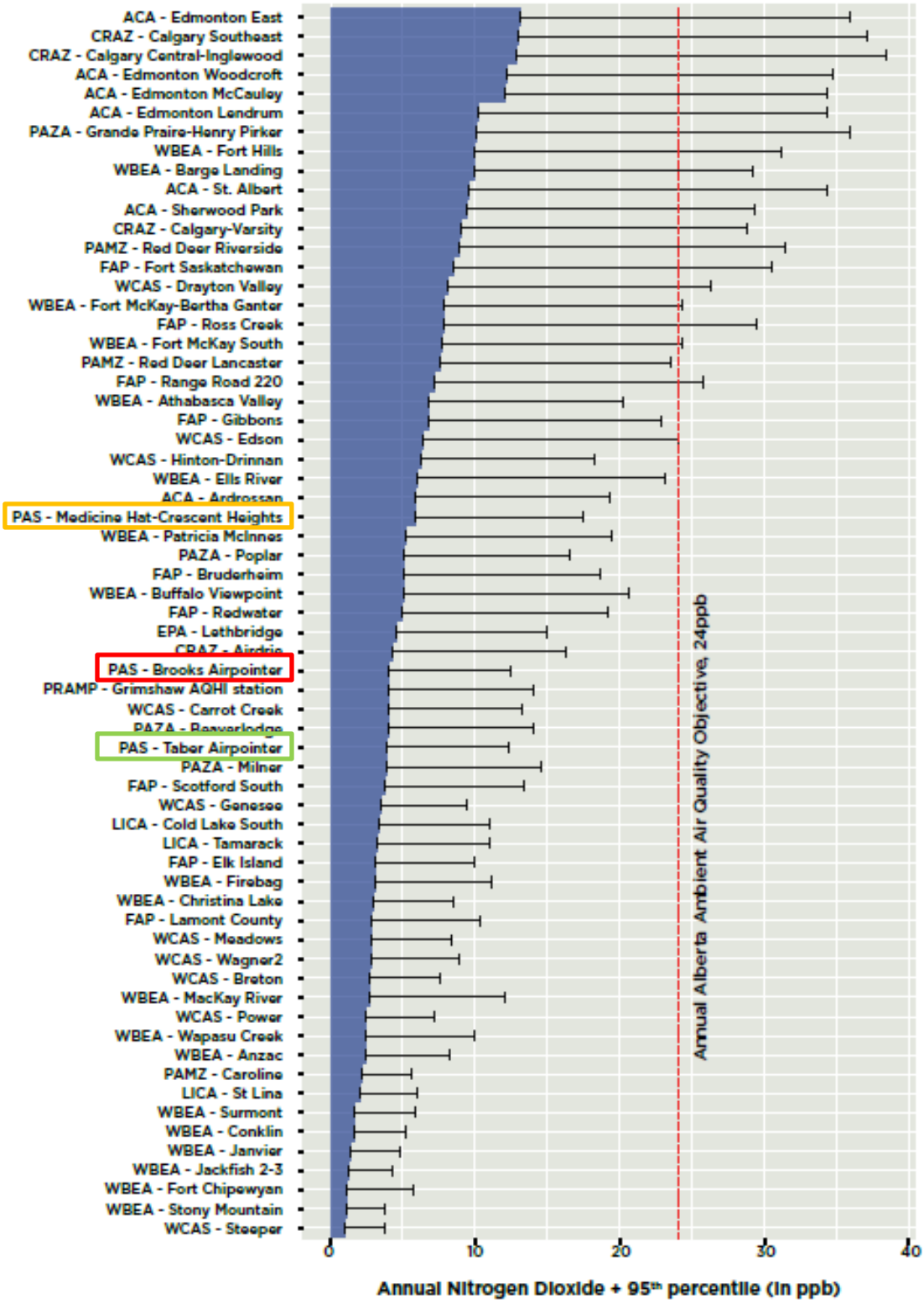


Figure 4. Nitrogen Dioxide (NO_2) – 2022 Annual Average

Ozone

Ozone (O_3) is most commonly known as the "ozone layer" in the upper atmosphere (stratosphere) which shields the Earth against harmful radiation from the sun, particularly ultraviolet B radiation. However, ozone is considered a pollutant at ground level as it is involved with photochemical production of many secondary air pollutants (such as smog). Ozone is described as "Good up high; Bad nearby".

Ozone is a bluish colored gas that has a distinctive sharp odour at higher concentrations, such as that generated from lightning storms or near photocopiers indoors. At normal outdoor concentrations, ozone tends to be odourless. At higher concentrations, ozone can reduce lung function, aggravate existing respiratory illness, and irritate eyes, nose, and throats.

Ozone is a reactive gas. It tends to react rapidly in the presence of oxides of nitrogen. In Alberta, ozone concentrations are generally lower in urban areas. The trend is likely due to scavenging of ozone by nitric oxide emitted by traffic emissions and residential/commercial heating. Ozone concentration is typically highest between late spring and summer. Research in the Edmonton Capital Region found that high concentrations of ozone could be associated with contributions from the upper air ozone and photochemical reaction of biogenic emissions. More research is underway to investigate ozone formation mechanisms.

The Alberta Ambient Air Quality Objective for ozone is 76 ppb for the daily maximum concentration averaged over a one-hour period.

All stations were greater than 90% operational for 2022.
There were no recorded exceedances of the 1-hour AAAQO. The annual average concentration at the Crescent Heights station was 30 ppb. The maximum 1-hour average concentration of 64 ppb at the Crescent Heights station was detected in August. 2022 averages for Taber were 29 ppb and Brooks was 28 ppb. The maximum 1-hour average concentration of 58 ppb at the Taber station in August and 65 ppb at Brooks were detected in July.
The historical annual average concentrations for the past 12 years are summarized in the table below. There is no apparent yearly trend at the Crescent Heights station.

Figure 5 compares 2022 annual average concentrations of O_3 for the AMS located in Alberta. The concentrations at the Crescent Heights and Medicine Hat Trap Club stations tend to be lower than at rural monitoring stations, and higher than the large cities, such as Edmonton and Calgary. The spatial trend indicates ozone scavenging is likely an important ozone chemistry mechanism in Alberta.

Monitoring Station	Annual Average Concentration - Ozone (O_3 ppb)											
	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Crescent Heights	30	31	30	30	30	32	27	27	28	28	29	30
Taber	29	29	-	-	-	-	-	-	-	-	-	-
Brooks	28	27	-	-	-	-	-	-	-	-	-	-

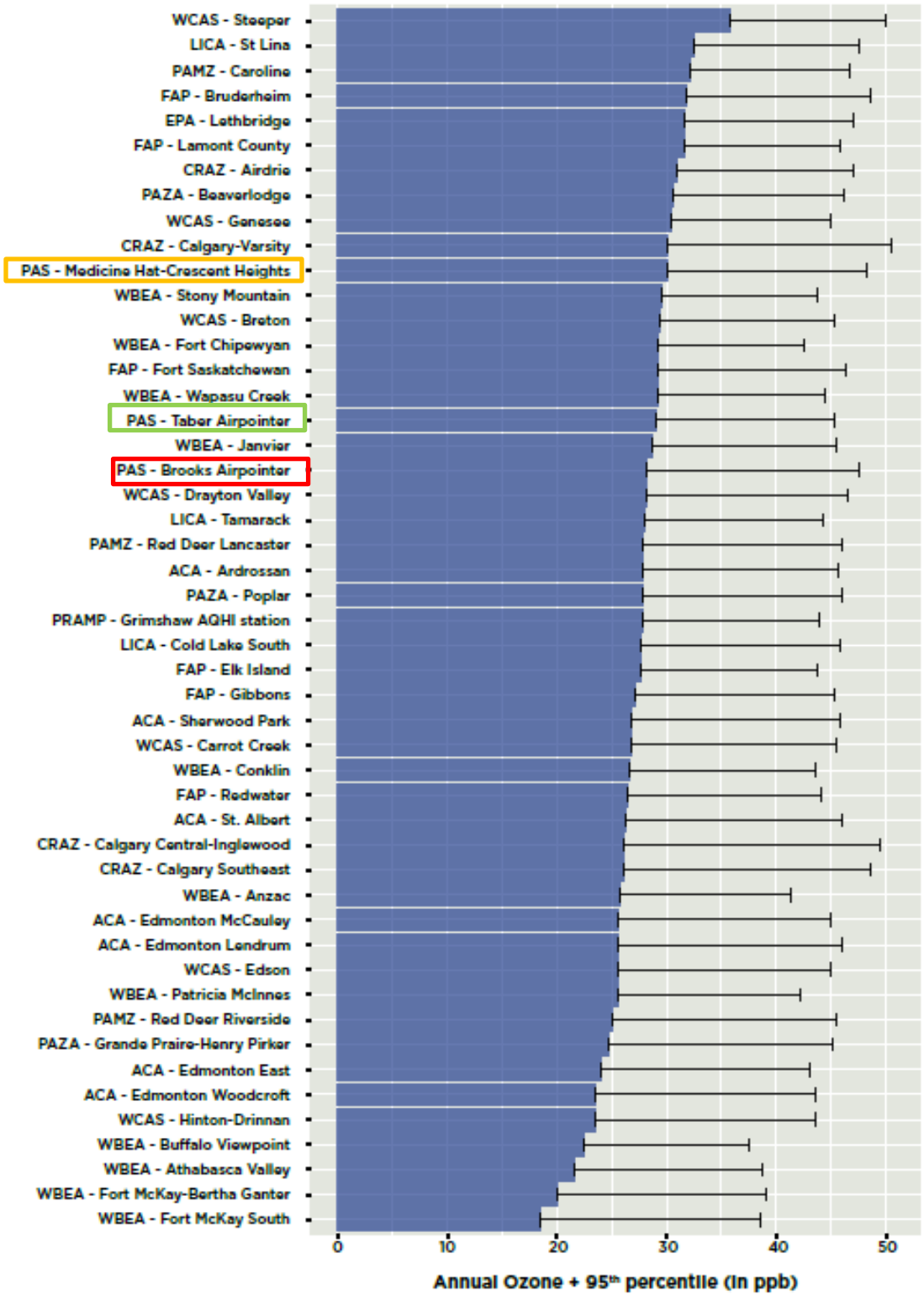


Figure 5. Ozone (O_3) – 2022 Annual Average

Fine Particulate Matter

Particulate matter (PM) is unique among air pollutants for it is identified by its size rather than by its composition. The major health concerns for particulate matter are for small particles, which are referred to as inhalable particulate, or PM_{10}. PM_{10} is defined for particles which have an aerodynamic diameter less than 10 microns (or 0.01 mm). The small particles can be emitted directly into the air from sources or be generated through physical and chemical reactions in the atmosphere. They can remain airborne for a long period of time and can travel a long distance.

PM_{10} can be divided into two groups based on particle sizes: fine particles and coarse particles. The fine particles are those particles which have an aerodynamic diameter smaller than 2.5 microns (0.0025 mm) and are identified as $PM_{2.5}$ (respirable particulate matter). In contrast, coarse particles are defined as those that are greater than 2.5 microns and smaller than 10 microns in aerodynamic diameter.

Generally, fine particles pose a greater health risk because these particles can be inhaled deep into the lungs, bringing with them potential chemicals that may be harmful. In the atmosphere, fine particles are the main contributors to reduction of visibility (haze). Exposure to harmful particulate matter can cause eye, nose, and throat irritation. In addition, studies have linked respirable particulate matter to aggravated heart and lung diseases such as asthma, bronchitis, and emphysema.

The Alberta Ambient Air Quality Objectives for $PM_{2.5}$ are:

- 1-hour average AAAQO = 80 µg/m^3
- 24-hour average AAAQO = 29 µg/m^3

Major particulate emission sources in Alberta include soil erosion, road dust as well as dust resulting from other human activities, smoke from forest fires and from recreational sources, vehicle exhaust emissions, and industrial sources, e.g. power plants, cement manufacturing, mining, and forest products industry.

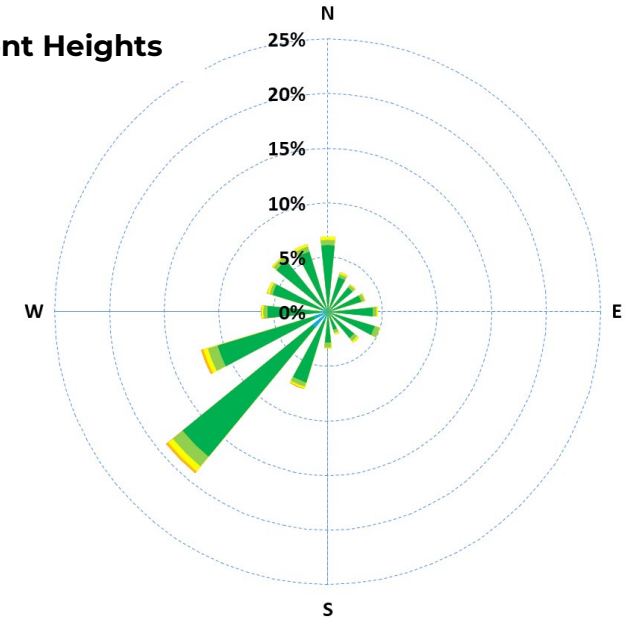
All stations were greater than 90% operational for 2022. There were nine exceedances of the 24-hour AAAQO and nine exceedances of the 1-hour AAAQO, attributed to wildfire smoke and high wind speed events. High particulate events were lower in 2022 compared to previous years.

The historical annual average concentrations for the past 13 years are summarized in the table below. An increased concentration was observed between 2009 and 2010 due to an analyzer upgrade. A Filter Dynamics Measurement System (FDMS) was installed on the TEOM in 2009. The FDMS enables the TEOM to measure volatile particulate matter, causing an increased concentration. The TEOM-FDMS was replaced with a SHARP analyzer in November 2013. The SHARP analyzer combines light scattering photometry and beta radiation attenuation. It is believed to provide a better detection limit and data quality than the TEOM-FDMS.

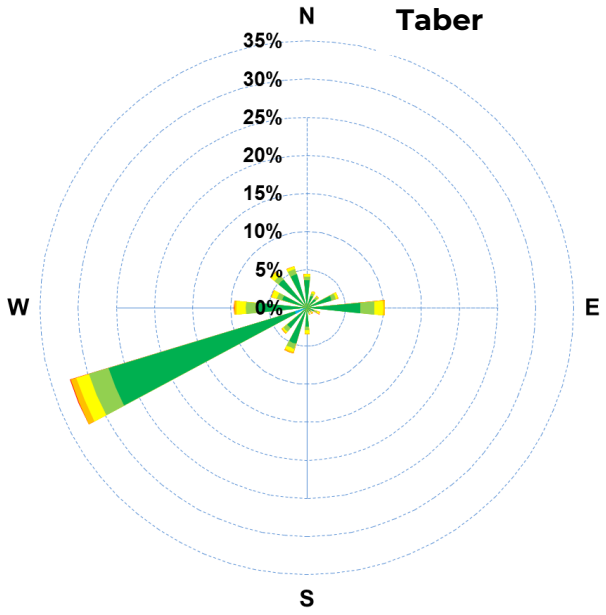
Figure 6 compares the annual average concentrations for the Alberta AMS. The concentration at the Crescent Heights, Taber and Brooks stations is low to average among the reviewed stations. A higher concentration of $PM_{2.5}$ tends to be detected in large cities, energy resource exploration areas, and industrial areas.

Monitoring Station	Annual Arithmetic Average - Fine Particulate Matter ($PM_{2.5}$, µg/m³)												
	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Crescent Heights	5	7	5	5	7	6	4	7	5	8	9	8	8
Taber	8	13	-	-	-	-	-	-	-	-	-	-	-
Brooks	5	8	-	-	-	-	-	-	-	-	-	-	-

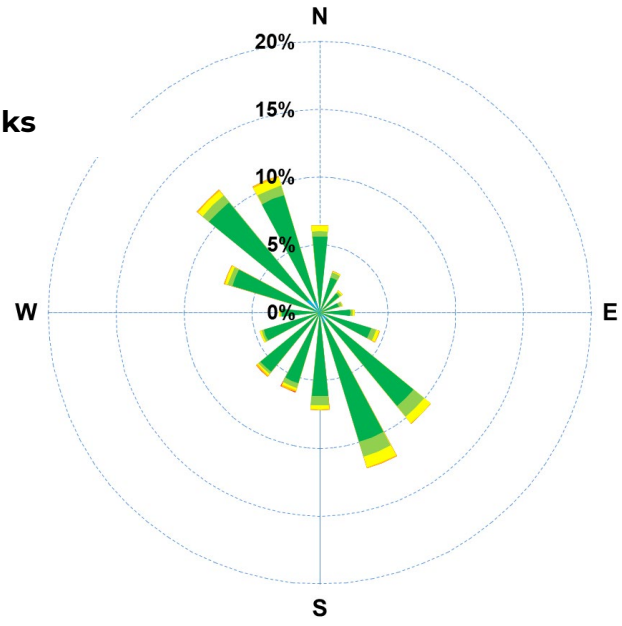
Crescent Heights



Taber



Brooks



Concentration (µg/m³)

- > 80
- 30 - 80
- 15 - 30
- 10 - 15
- 1 - 10
- 0 - 1

PM 2.5 Pollutant Roses

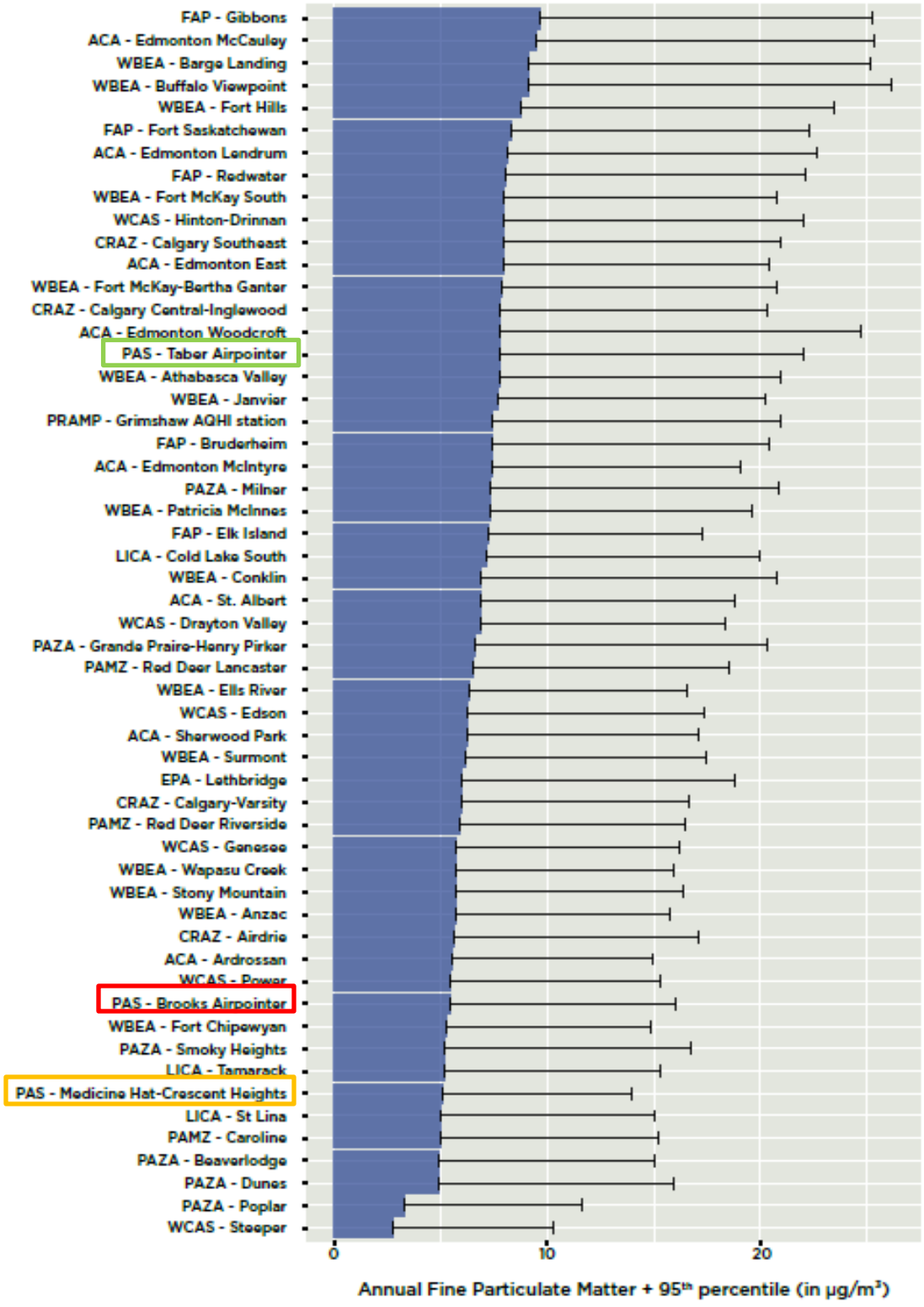


Figure 6. Fine Particulate Matter ($PM_{2.5}$) – 2022 Annual Arithmetic Average

Sulphur Dioxide

Sulphur dioxide (SO_2) is a colourless gas with a strong, pungent odour. At concentrations as low as 300 ppb, it can be tasted and smelled. Acute exposure to high concentration SO_2 can lead to constricted airways, which can be especially troublesome for people with asthma. Children may experience an increase in respiratory tract infections. Healthy people may experience sore throats, coughing, and breathing difficulties. Chronic exposure to high concentrations of SO_2 has been associated with an increased risk of mortality from respiratory or cardiovascular disease.

Sulphur dioxide is formed during processing and combustion of fossil fuels containing sulphur, such as gasoline, natural gas, oil, coal, and oil sands. On a global basis, volcanic eruptions are the major natural source of sulphur dioxide into the atmosphere.

Sulphur dioxide, once emitted into the atmosphere, can persist for days, allowing for wide spatial distribution of the gas. In the atmosphere, some SO_2 can be oxidized by ozone and hydrogen peroxide to form sulfur trioxide (SO_3). Both SO_2 and SO_3 are soluble in water; hence, if they are present in the atmosphere when condensation occurs, droplets of sulfuric acid (acid rain) are formed.

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

- 1-hour average AAAQO = 172 ppb
- 24-hour average AAAQO = 48 ppb
- Annual average AAAQO = 8 ppb

The SO_2 analyzer at the Crescent Heights station was 100% operational for 2022. There were no exceedances of the 1-hour, 24-hour, or annual AAAQO values. The measured concentration was typically quite low, with an annual average of 0.1 ppb. The maximum 1-hour average concentration of 6.3 ppb was detected in February.

The historical annual average concentrations for the past 10 years are summarized in the table below. Annual averages tend to be between 0.1 and 0.2 ppb.

Figure 7 compares the annual average concentrations for Alberta AMS. The concentration at the Crescent Heights station is among the lowest in Alberta. A higher concentration of sulphur dioxide tends to be measured in the energy operation regions, e.g. the Wood Buffalo area and Fort Air Partnership area.

Monitoring Station	Annual Average – Sulphur Dioxide (ppb)									
	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Crescent Heights	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2

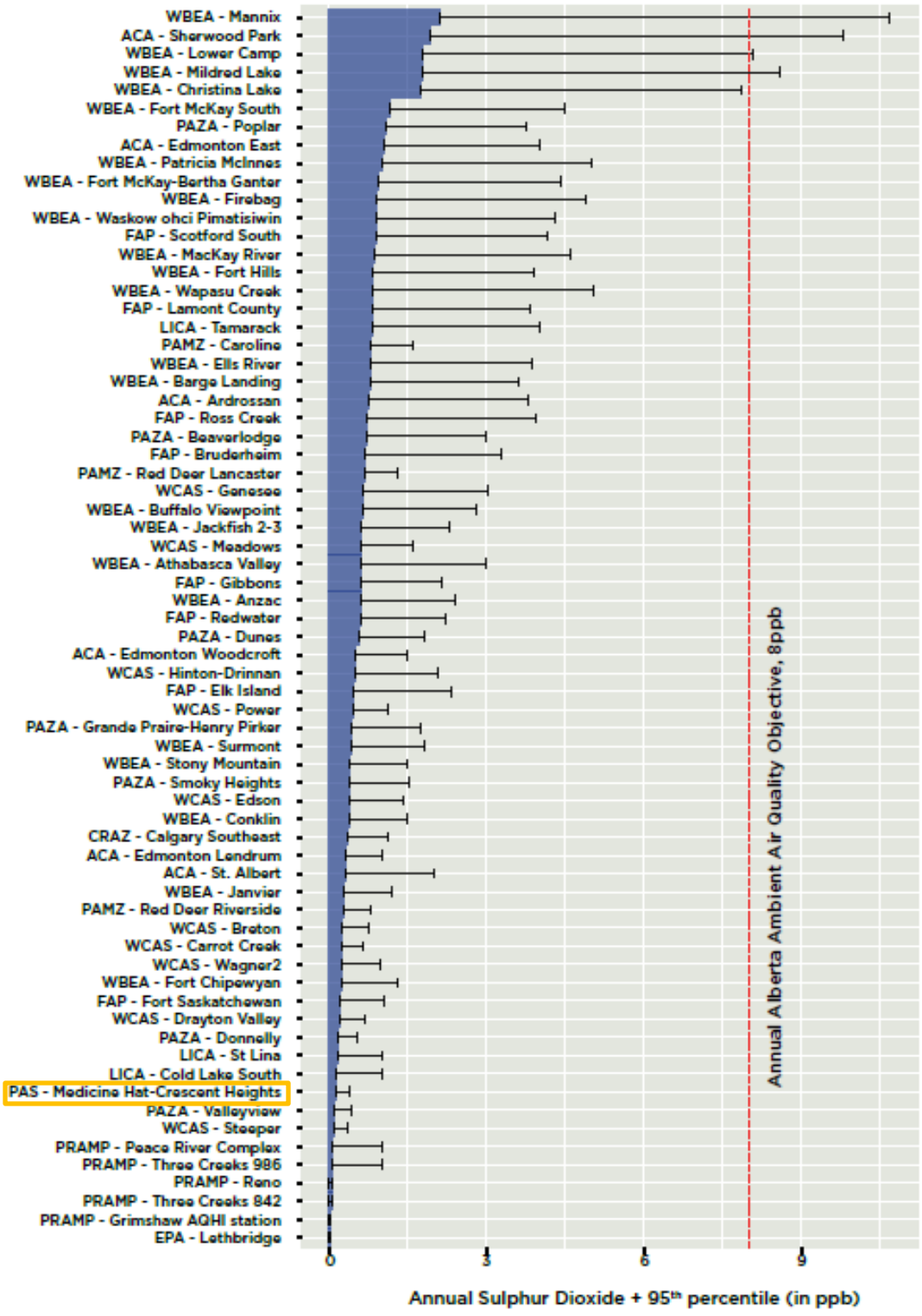


Figure 7. Sulphur Dioxide (SO2) 2022 Annual Average

Total Hydrocarbons

Hydrocarbons are divided into two categories, "reactive" and "non-reactive". The term "total hydrocarbons" (THC) refers to a broad family of chemicals that contain carbon and hydrogen atoms and includes both reactive and non-reactive hydrocarbons. Reactive hydrocarbons include many volatile organic compounds such as alkenes, alkynes, benzene, toluene, ethylbenzenes, xylenes, and other aromatics. Reactive hydrocarbons are important because they can react with oxides of nitrogen in the presence of sunlight to form ozone and may be toxic to humans, animals, or vegetation.

Trees and plants are natural emitters of reactive hydrocarbons. Other significant contribution sources include livestock operations, vehicle emissions, fireplaces, natural gas combustion, and fugitive emissions from fuel storage tanks, petroleum and chemical industries, as well as dry cleaning. Motor vehicles are the primary source of hydrocarbons in urban areas.

The primary non-reactive hydrocarbon in the atmosphere is methane, which is a naturally occurring, colorless, odorless gas. Methane is regarded as a major contributor to the greenhouse effect. Large amounts of methane are produced naturally from bogs, shallow lakes and soils through anaerobic decay of vegetation. The global background concentration of total hydrocarbons is approximately 1.8 to 2.1 ppm, consisting primarily of methane.

Alberta does not have an ambient air quality objective for total hydrocarbons. Some reactive hydrocarbons such as benzene and styrene are specified in the air quality objectives.

The THC analyzer at the Crescent Heights station has an operational uptime of 99.8% for 2022. The maximum 1-hour average concentration of 3.2 ppm was detected in September, and the annual average concentration was 2.2 ppm. The historical annual average concentrations for the past 12 years are summarized in the table below. There is no apparent yearly trend for total hydrocarbons at the Crescent Heights station.

Figure 8 compares the annual average concentrations of THC for the Alberta AMS. The annual average concentration of THC at the Crescent Heights station ranks in the middle among the reviewed stations. In Alberta, a slightly higher concentration is detected in intensive energy operation regions, e.g. Wood Buffalo area.

Monitoring Station	Annual Average Concentration - Total Hydrocarbons (THC, ppm)											
	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Crescent Heights	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1

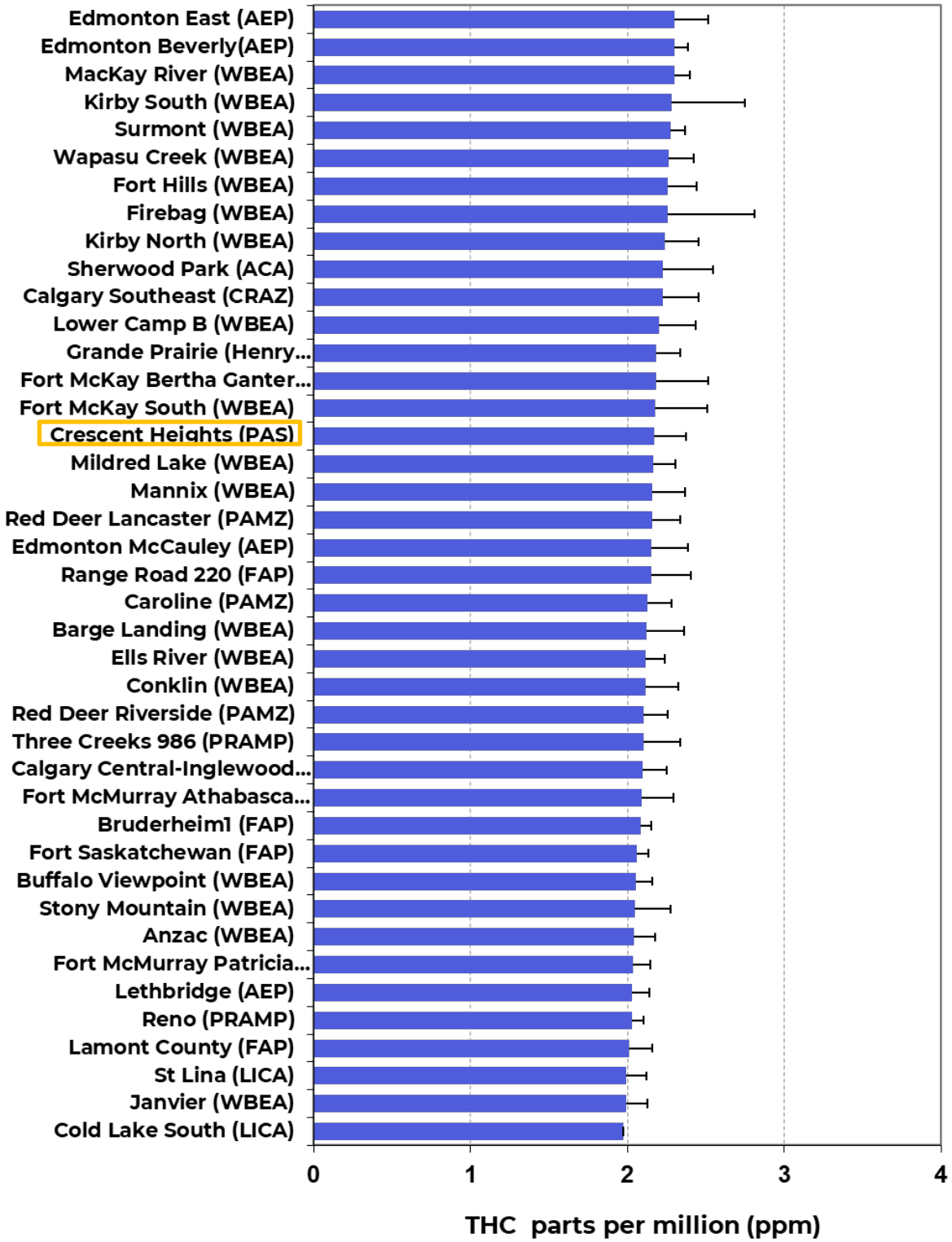


Figure 8. Total Hydrocarbons (THC) – 2022 Annual Average

Carbon Monoxide

Carbon Monoxide (CO) is a colourless and odourless gas. It is the most commonly inhaled poisonous substance. CO occurs naturally in the atmosphere, but the major causes of CO poisoning are from vehicles idling in closed ventilated areas, blocked fireplaces, and charcoal grills used in a confined space.

Carbon monoxide is produced from partial oxidation of carbon during fuel combustion. The major anthropogenic emission sources include traffic emissions (automobiles, trucks, and trains), industrial sources (incomplete combustion), space heating, gas stoves, and cigarette smoke. The largest urban source of CO is from motor vehicle emissions. The major natural emission sources include forest fires and volcanic activities.

Alberta Environment and Protected Areas sets up air quality objectives based on the protection of human health and life. As CO is inhaled, it combines with the hemoglobin in the red blood cell inhibiting the oxygen carrying capability of the red blood cells. At low concentrations, acute exposure may cause fatigue in healthy people and cause chest pain in people with heart disease.

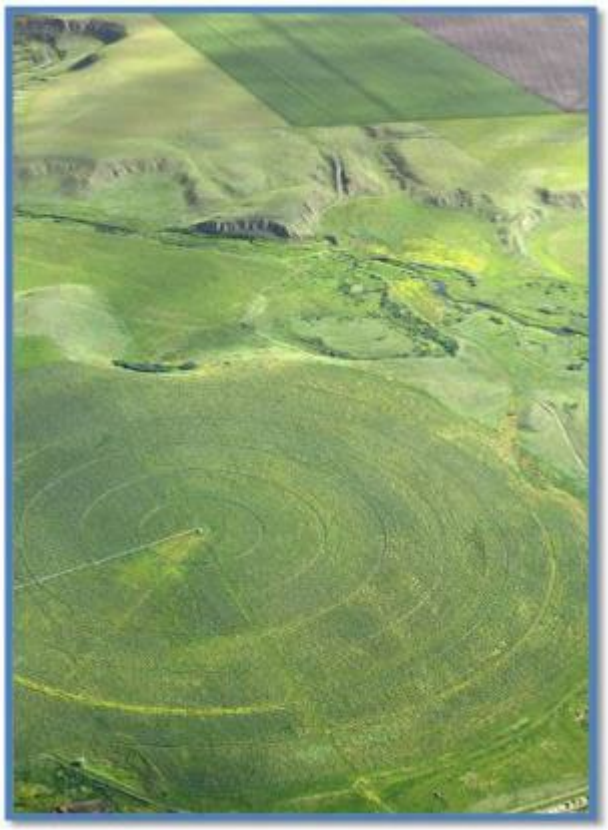
The Alberta Ambient Air Quality Objectives for carbon monoxide are:

- 1-hour average AAAQO = 13 ppm
- 8-hour average AAAQO = 5 ppm

The CO analyzer was greater than 90% operational for the year 2022. There were no exceedances of the AAAQO values at the Crescent Heights station. The maximum 1-hour average concentration of 1.1 ppm was detected in July.

The historical annual average concentrations for the past 12 years are summarized in the table below. There is no apparent yearly trend at the Crescent Heights station.

Figure 9 compares annual average concentrations for Alberta AMS. The concentration at the Crescent Heights station was the lowest among the reviewed AMS. Large cities, such as Calgary and Edmonton, tend to detect a higher concentration, attributed to traffic emissions and other combustion sources.



Parameter	Annual Average – Crescent Heights Station (ppm)												
	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Carbon Monoxide	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2

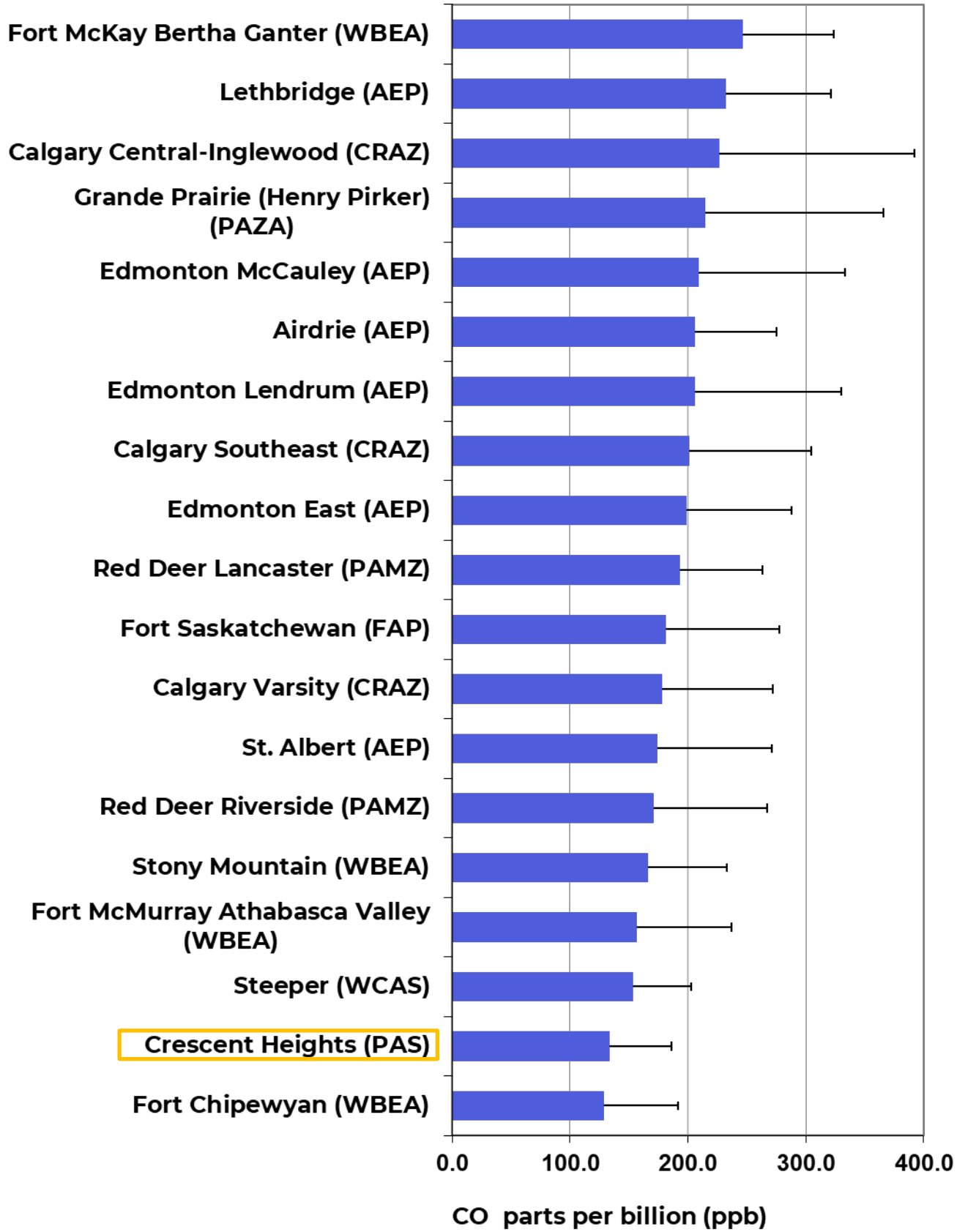


Figure 9. Carbon Monoxide (CO) – 2022 Annual Average

Air Quality Health Index

The Air Quality Health Index (AQHI) is a health protection tool that is designed to help the public make decisions to protect their health by limiting short-term exposure to air pollution and adjusting their activity levels during increased levels of air pollution. The AQHI uses concentration data for three air pollutants to calculate a single numerical value to evaluate the health risk associated with air pollution. The three air pollutants are fine particulate matter, nitrogen dioxide, and ozone. All three pollutants are required to calculate the AQHI. If one or more of the pollutants is missing data, the AQHI index cannot be reported.

The following scale illustrates the risk categories and health messages for the AQHI system (AEP, 2011). The health risk is classified in four categories: Low (1 to 3), Moderate (4 to 6), High (7 to 10), and Very High (greater than 10).

Figure 10 compares the AQHI ratings for 39 communities in Alberta. For the City of Medicine Hat, air quality was rated Low Risk 98.1% of the time, Moderate Risk 1.89% of the time, High Risk and Very High Risk 0.0% of the time. For the Town of Taber, air quality was rated Low Risk 97.4% of the time, Moderate Risk 2.47% of the time, High Risk 0.1% of the time while the City of Brooks, air quality was rated Low Risk 98.8% of the time, Moderate Risk 1.18% of the time, and High Risk 0.02% of the time.

The Moderate and High-Risk air quality events were primarily attributed to wildfire smoke in the region.

Health Risk	Air Quality Health Index	Health Messages	
		At Risk Population	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 also 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.

Source: https://www.alberta.ca/about-the-air-quality-health-index.aspx

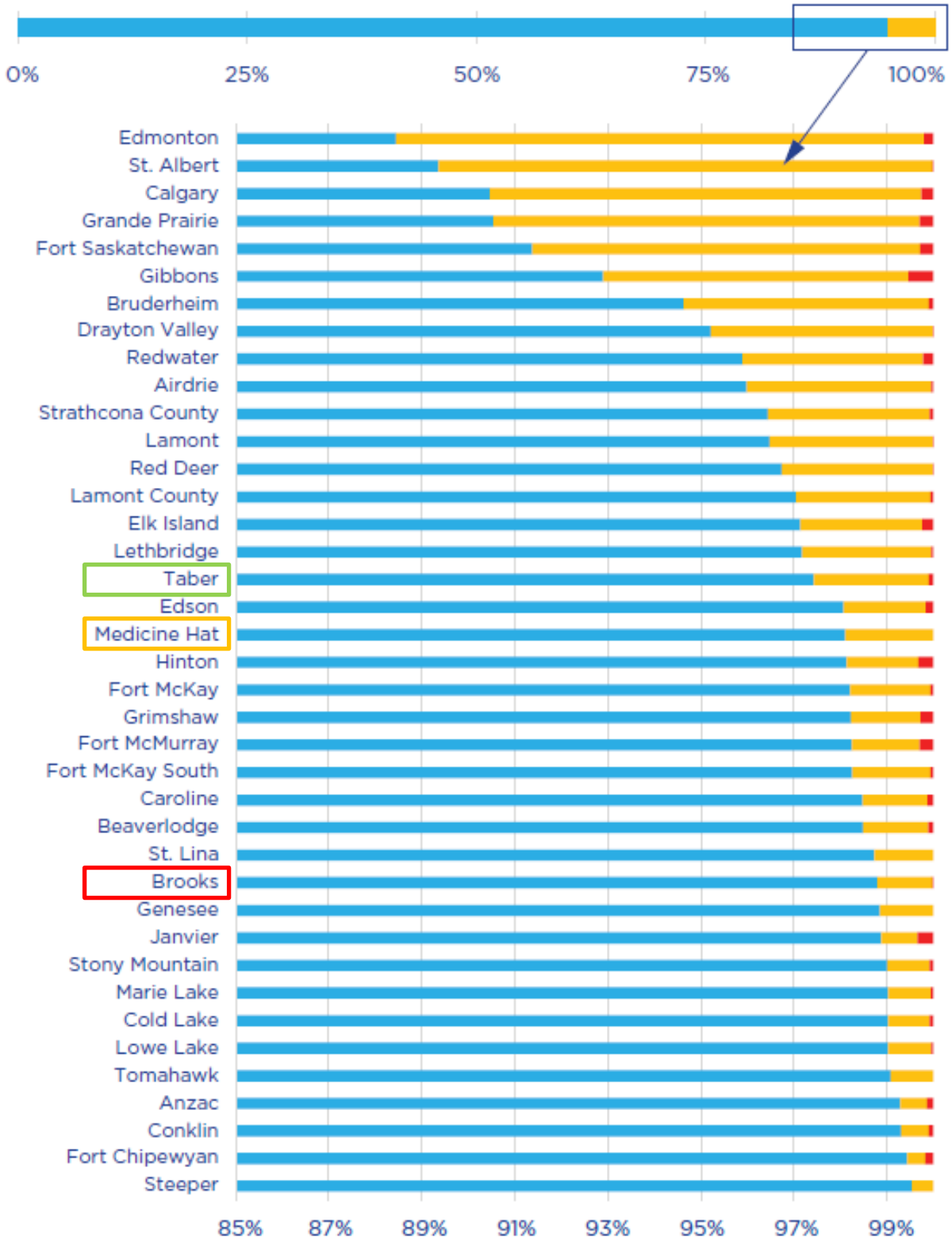


Figure 10. 2022 Air Quality Health Index for Alberta Communities

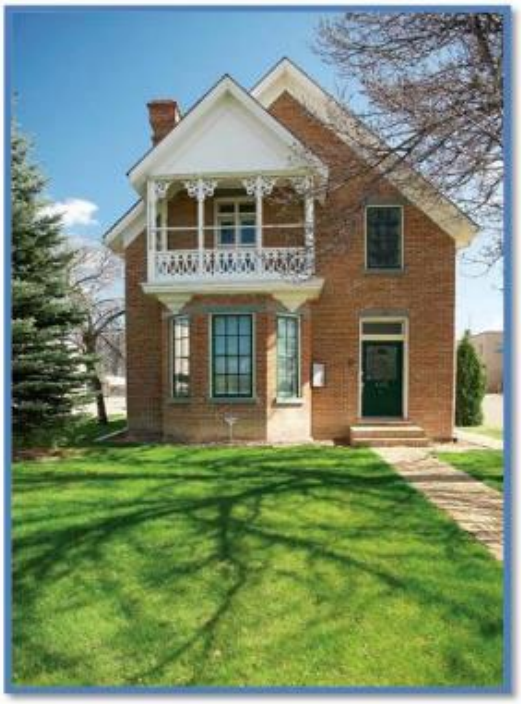
Passive Air Quality Monitoring Results

The PAS Air Quality Monitoring Program uses passive samplers as a cost-effective method to monitor air quality throughout the airshed. The results are used to assess the spatial distribution trend of air pollutants in the region. The monitoring objective is to ensure the air quality is in compliance with Alberta's Ambient Air Quality Objectives (AAAQO), as well as to provide monitoring of long-term trends.

The advantages of passive sampling devices include simple sampler design, low operation costs, and ease of use. Passive samplers require no power, making them suitable for monitoring air quality in remote areas. Passive samplers are designed to monitor long-term average concentrations. The disadvantage of the passive sampling devices is that short-duration events cannot be identified.

Passive sampling devices rely on the principles of permeation and diffusion to uptake the specific compound being sampled. Air pollutants diffuse through a semi-permeable membrane or tube to a sampling medium which has been chemically treated to absorb or react with the target air pollutant. After being exposed in the field for a predetermined period of time, the sampler is analyzed in a certified laboratory. An average concentration is calculated based on the duration of exposure and accounting for the effects of environmental conditions, e.g. temperature, humidity, and wind speed.

Initially, the PAS passive sampling program included 6 passive monitoring



stations that were located based on airshed modeling predictions of high impact areas, and to gather data in sensitive areas within the airshed (e.g. hospitals, schools). Passive Network Rationalization resulted in changes to the passive network in early 2017. The current network is made up of 8 SO_2 sites and 16 NO_2 sites.

The PAS passive network provides 30-day samples to be analyzed for sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and ozone (O_3) (January and February only). These parameters are the priority air quality concerns and remain consistent with those being monitored by other Alberta airsheds. A Multi-Gas Passive Sampler was used for the PAS passive program until May 2014, when it was replaced with the Ogawa Ozone sampler and the Radiello sampler tube for sulphur dioxide and nitrogen dioxide. The samplers were changed again in November 2017, to the Maxxam Passive Air Sampling System (PASS).

Nitrogen Dioxide

The annual average concentration of nitrogen dioxide ranged from 0.7 ppb to 2.9 ppb, which is substantially less than the annual AAAQO of 24 ppb. The maximum 30-day average concentration of 8.8 ppb was detected in December at Site 19 (Monitoring Station), while the lowest 30-day average concentration of <0.1 ppb was detected at multiple sites in January, March and November.

Figure 11 illustrates the historical data for monthly network average concentrations for passive NO_2. The histogram exhibits a seasonal trend: higher concentrations tend to occur in the winter months. In winter, the Palliser airshed region is characterized by low atmospheric ceilings and thermal inversions such that air pollutants are trapped near the ground level. Emissions from space heating may be another factor contributing to the seasonal trend.

Figure 14 illustrates the annual average concentrations across the PAS airshed. A spatial trend seems to exist: a higher concentration tends to occur in the cities and near major highways. Traffic emissions and space heating could be the potential causes. Within the passive network, the maximum annual average concentration of 2.9 ppb was detected at both Site 11 (Brooks) and Site 19 (Monitoring Station), while the minimum concentration of 0.3 ppb was detected at Site 17 (Onefour).

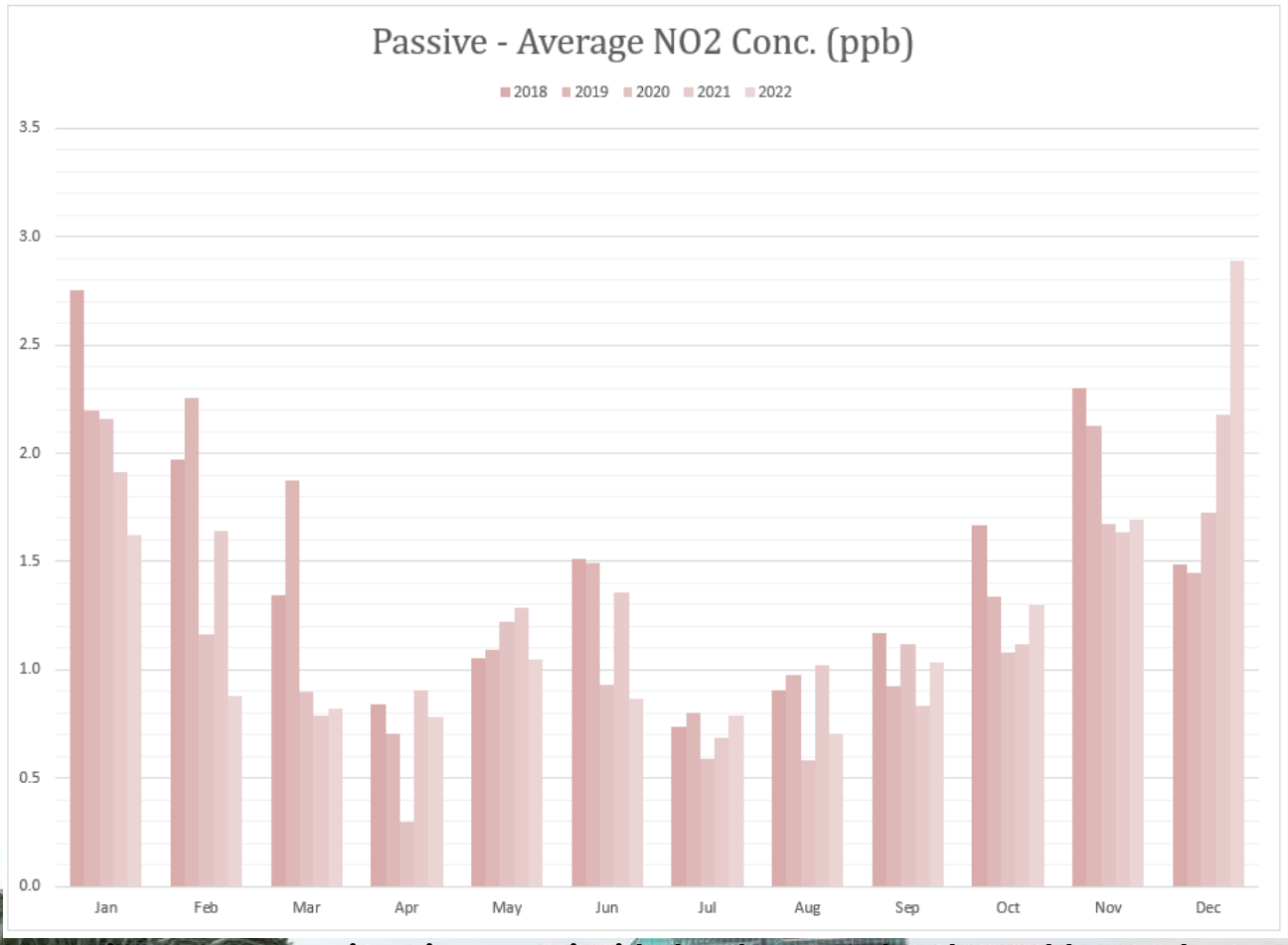


Figure 11. Passive Nitrogen Dioxide (NO_2) – Annual and Monthly Trends

Sulphur Dioxide

The concentration of sulphur dioxide generally is quite low in the PAS airshed zone. The annual average concentration of SO_2 ranged from 0.1 to 0.7 ppb, with no exceedances of the annual AAAQO of 8 ppb or of the 30-day AAAQO of 11 ppb.

The annual average concentration in 2022 was 0.3 ppb. The maximum 30-day average concentration of 1.1 ppb was detected in December at both Site 3 (Oyen) and Site 8 (Jenner), while the lowest concentration was 0.1 ppb (detected at multiple monitoring sites).

Figure 13 illustrates historical data for the monthly average concentrations of the passive SO_2 network. Given the low concentration of SO_2, data uncertainty may be too high to comment on a monthly, seasonal or yearly trend.

Figure 14 illustrates the annual average concentrations across the PAS airshed zone for the last 5 years. Given the low concentration of SO_2, data uncertainty may be too high to comment on a spatial trend. The maximum annual average concentration of 0.4 ppb was detected at Site 8 (Jenner).

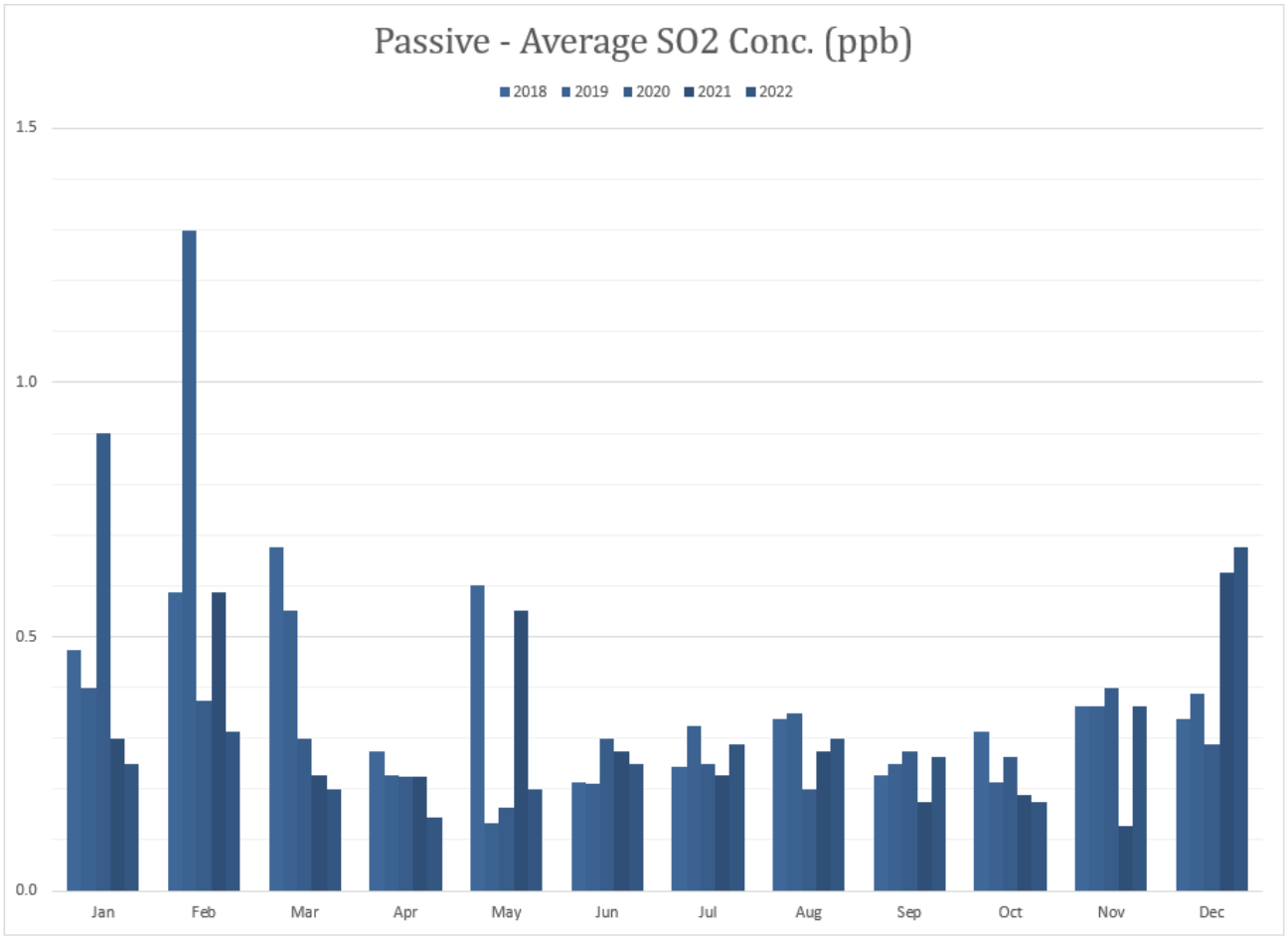


Figure 13. Passive Sulphur Dioxide (SO_2) –Annual and Monthly Trends

2022 Annual Averages
For the Passive Program

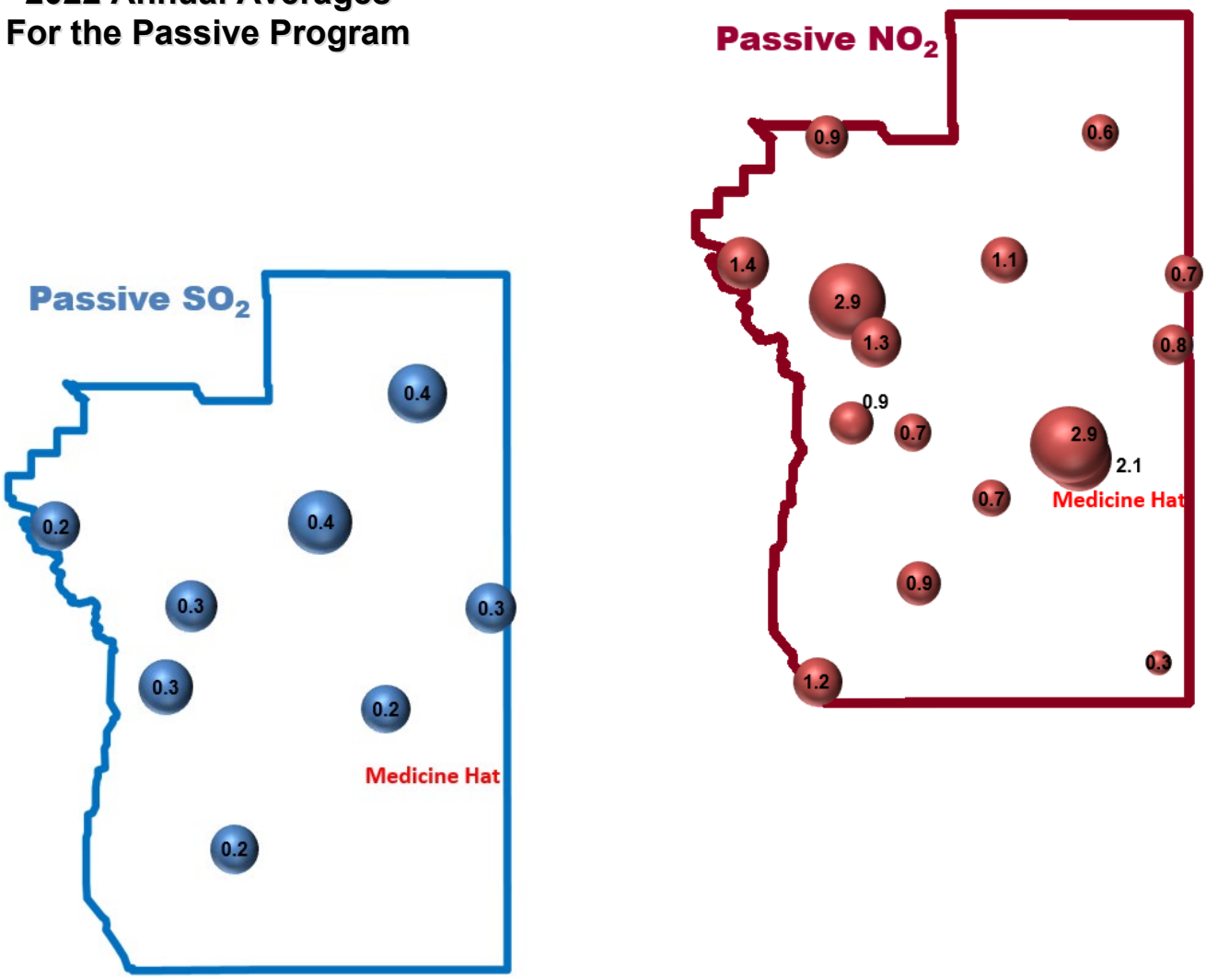


Figure 14. Passive Concentrations in the PAS Airshed – 2022 Annual Averages

PAS Financial Statements – Reviewer's Report

Palliser Airshed Society

Financial Statements

December 31, 2022

Palliser Airshed Society
Index to Financial Statements
For the Year Ended December 31, 2022

SEAN D. MILLER
PROFESSIONAL CORPORATION
CHARTERED PROFESSIONAL ACCOUNTANT

Independent Practitioner's Review Engagement Report

To the Members of Palliser Airshed Society

I have reviewed the accompanying financial statements of Palliser Airshed Society (the society) that comprise the statement of financial position as at December 31, 2022, and the statements of operations, changes in net assets and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations (ASNPO), and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Practitioner's Responsibility

My responsibility is to express a conclusion on the accompanying financial statements based on my review. I conducted my review in accordance with Canadian generally accepted standards for review engagements, which require me to comply with relevant ethical requirements.

A review of financial statements in accordance with Canadian generally accepted standards for review engagements is a limited assurance engagement. The practitioner performs procedures, primarily consisting of making inquiries of management and others within the entity, as appropriate, and applying analytical procedures, and evaluates the evidence obtained.

The procedures performed in a review are substantially less in extent than, and vary in nature from, those performed in an audit conducted in accordance with Canadian generally accepted auditing standards. Accordingly, I do not express an audit opinion on these financial statements.

Conclusion

Based on my review, nothing has come to my attention that causes me to believe that the financial statements do not present fairly, in all material respects, the financial position of Palliser Airshed Society as at December 31, 2022, and the results of its operations and its cash flows for the year then ended in accordance with ASNPO.

Medicine Hat, Alberta
May 12, 2023

Sean D. Miller Professional Corporation
Chartered Professional Accountant

P 403.580.7400 / F 403.580.7404 / #5 - 3295 Dunmore Road SE, Medicine Hat, AB T1B 3R2 / www.millercpa.ca

Palliser Airshed Society
Statement of Financial Position
December 31, 2022

	2022	2021
ASSETS		
CURRENT		
Cash and cash equivalents *(Note 4)*	**$ 229,972**	$ 240,622
Short term investments *(Note 5)*	**31,306**	31,181
Contributions and grants receivable *(Note 6)*	**29,664**	29,664
Accrued interest receivable	**270**	113
Goods and services tax recoverable	**6,775**	6,393
Prepaid expenses	**6,670**	6,002
	304,657	313,975
CAPITAL ASSETS *(Note 7)*	**33,945**	42,432
	$ 338,602	$ 356,407
LIABILITIES AND NET ASSETS		
CURRENT		
Accounts payable and accrued liabilities	**$ 8,375**	$ 19,374
NET ASSETS		
Unrestricted net assets	**296,282**	294,602
Invested in capital assets	**33,945**	42,431
	330,227	337,033
	$ 338,602	$ 356,407

On behalf of the Board

Chairperson

Treasurer

See notes to financial statements

Palliser Airshed Society
Statement of Operations
For the Year Ended December 31, 2022

	2022	2021
REVENUE		
Member contributions	**$ 125,119**	$ 110,488
Government contracts - Alberta Environment & Parks	**115,128**	115,071
Government grants - Alberta Environment & Parks	**31,500**	31,500
	271,747	257,059
EXPENSES		
Monitoring and program management fees	**229,658**	207,312
Repairs and maintenance - equipment	**16,365**	19,217
Insurance	**8,626**	8,441
Amortization	**8,486**	10,608
Professional fees	**7,250**	5,300
Advertising and outreach	**3,343**	938
Office	**2,619**	1,886
Memberships and subscriptions	**2,275**	2,200
Interest and bank charges	**138**	167
Travel and honorarium	**75**	132
	278,835	256,201
EXCESS (DEFICIENCY) OF REVENUE OVER EXPENSES FROM OPERATIONS	**(7,088)**	858
OTHER REVENUE		
Interest	**282**	161
EXCESS (DEFICIENCY) OF REVENUE OVER EXPENSES	**$ (6,806)**	$ 1,019

See notes to financial statements

Palliser Airshed Society
Statement of Changes in Net Assets
For the Year Ended December 31, 2022

	Unrestricted Net Assets	Invested in Capital Assets	**2022**	2021
NET ASSETS - BEGINNING OF YEAR	$ 294,602	$ 42,431	**$ 337,033**	$ 336,014
EXCESS (DEFICIENCY) OF REVENUE OVER EXPENSES	1,680	(8,486)	**(6,806)**	1,019
NET ASSETS - END OF YEAR	$ 296,282	$ 33,945	**$ 330,227**	$ 337,033

See notes to financial statements

Palliser Airshed Society
Statement of Cash Flows
For the Year Ended December 31, 2022

	2022	2021
OPERATING ACTIVITIES		
Excess (deficiency) of revenue over expenses	**$ (6,806)**	$ 1,019
Item not affecting cash:		
Amortization	**8,486**	10,608
	1,680	11,627
Changes in non-cash working capital:		
Contributions and grants receivable	**-**	39,172
Accrued interest receivable	**(157)**	421
Accounts payable and accrued liabilities	**(10,998)**	12,160
Prepaid expenses	**(668)**	64
Goods and services tax payable	**(382)**	(1,782)
	(12,205)	50,035
Cash flow from (used by) operating activities	**(10,525)**	61,662
INVESTING ACTIVITIES		
Proceeds from matured guaranteed investment certificate	**31,181**	30,600
Purchase of guaranteed investment certificate	**(31,306)**	(31,181)
Cash flow used by investing activities	**(125)**	(581)
INCREASE (DECREASE) IN CASH FLOW	**(10,650)**	61,081
Cash and cash equivalents - beginning of year	**240,622**	179,541
CASH AND CASH EQUIVALENTS - END OF YEAR *(Note 4)*	**$ 229,972**	$ 240,622

See notes to financial statements

Palliser Airshed Society
Notes to Financial Statements
For the Year Ended December 31, 2022

1. PURPOSE OF THE SOCIETY

Palliser Airshed Society (the "society") is a not-for-profit organization incorporated provincially under the Societies Act of Alberta. The society is exempt from the payment of income tax under Section 149(1) of the Income Tax Act.

The society's principal business activity is to monitor air quality using a combination of both continuous and passive monitoring technologies. The society is committed to collecting and communicating credible ambient air quality data back to all stakeholders.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of presentation

The financial statements were prepared in accordance with Canadian accounting standards for not-for-profit organizations (ASNPO).

Contributed services

The operations of the society depend on both the contribution of time by volunteers and donated materials from various sources. The fair value of donated materials and services cannot be reasonably determined and are therefore not reflected in these financial statements.

Fund accounting

Palliser Airshed Society follows the deferral method of accounting for contributions.

The Unrestricted Net Assets Fund reports the revenue and expenses related to the day to day monitoring activities and operations.

The Invested in Capital Assets Fund reports the assets, liabilities, revenues, and expenses related to the society's capital assets.

Financial instruments

Financial instruments are recorded at fair value when acquired or issued. In subsequent periods, financial assets with actively traded markets are reported at fair value, with any unrealized gains and losses reported in income. All other financial instruments are reported at amortized cost, and tested for impairment at each reporting date. Transaction costs on the acquisition, sale, or issue of financial instruments are expensed when incurred.

(continues)

Palliser Airshed Society
Notes to Financial Statements
For the Year Ended December 31, 2022

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(continued)*

Revenue recognition

Palliser Airshed Society follows the deferral method of accounting for contributions.

Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Restricted contributions consist of grant revenue received from Alberta Environment and Parks and are designated to be spent on executive director fees, office operations, and board expenses. These amounts are included in "Monitoring and program management fees".

Unrestricted contributions consist of member contributions in the year and are not designated for a specific purpose. Membership contributions consist of both mandatory and voluntary memberships.

Mandatory membership fees are received from companies who are regulated and mandated by the jurisdiction to be a local airshed member. These contributions are recognized as revenue at the time of billing.

Voluntary membership fees are received from companies who are regulated but not mandated by the jurisdiction to be a local airshed member. Municipalities also make contributions through voluntary membership. These contributions are recognized as revenue when received instead of at the time of billing due to the fact that these membership fees are voluntary and depend solely on the contributors' decision to renew their annual membership.

Restricted investment income is recognized as revenue in the year in which the related expenses are incurred. Unrestricted investment income is recognized as revenue when earned.

Cash and cash equivalents

Cash and cash equivalents is comprised of cash on hand and bank balances, together with other short-term, highly liquid investments that are readily convertible into known amounts of cash and which are subject to an insignificant risk of changes in value.

Capital assets

Capital assets are stated at cost or deemed cost less accumulated amortization and are amortized over their estimated useful lives at the following rates and methods:

Equipment	20%	declining balance method

The society regularly reviews its capital assets to eliminate obsolete items.

Capital assets acquired during the year but not placed into use before the end of the year are not amortized until they are placed into use.

Measurement uncertainty

The preparation of financial statements in conformity with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amount of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the period. Items in the financial statements requiring estimates by management include accrued interest receivable, prepaid expenses, the estimated useful life of capital assets and accounts payable and accrued liabilities. Such estimates are periodically reviewed and any adjustments necessary are reported in earnings in the period in which they become known. Actual results could differ from these estimates.

Palliser Airshed Society
Notes to Financial Statements
For the Year Ended December 31, 2022

3. FINANCIAL INSTRUMENTS

The society's carrying value of cash and cash equivalents, short term investments, contributions and grants receivable, accrued interest receivable, goods and services tax recoverable, prepaid expenses and accounts payable and accrued liabilities approximates its fair value due to the immediate or short term maturity of these instruments.

The society is exposed to various risks through its financial instruments and uses risk management to monitor, evaluate and manage these risks. These risks include credit risk, liquidity risk, and interest rate risk. The soceity does not use any derivative financial instruments to mitigate these risks.

Credit risk

Credit risk arises from the potential that a counter party will fail to perform its obligations. The society is exposed to credit risk from three sources: cash and cash equivalents, accounts receivable and short term investments. Cash and cash equivalents and short term investments are deposited with reputable, major financial institutions to limit the credit risk exposure. The credit risk from counter parties not paying accounts receivable is not considered to be significant. The society has a significant number of members and contract and grant revenue is provided by the Alberta Government, which minimizes its credit risk.

Liquidity risk

Liquidity risk is the risk that the society will encounter difficulty in meeting obligations associated with its financial liabilities. The society is exposed to this risk mainly in respect of its receipt of funds from its member contributions and government contracts and grants to enable the society to pay its liabilities as they come due.

Interest rate risk

Interest rate risk is the risk that the value of a financial instrument might be adversely affected by a change in the interest rates. The society is exposed to interest rate risk with respect to the following financial instruments: cash and cash equivalents and short term investments. In seeking to minimize the risks from interest rate fluctuations, the society manages exposure through its normal operating and financing activities.

4. CASH AND CASH EQUIVALENTS

	2022	2021
Cash	**$ 229,972**	$ 240,622

5. SHORT TERM INVESTMENTS

	2022	2021
GIC - Royal Bank of Canada (interest rate 0.95%, matures February 3, 2023)	**$ 31,306**	$ 31,181

Palliser Airshed Society
Notes to Financial Statements
For the Year Ended December 31, 2022

6. CONTRIBUTIONS AND GRANTS RECEIVABLE

	2022	2021
Alberta Environment & Parks	**$ 28,782**	$ 28,782
Mandatory memberships	**882**	882
	$ 29,664	$ 29,664

7. CAPITAL ASSETS

	Cost	Accumulated amortization	**2022 Net book value**	2021 Net book value
Equipment	$ 273,077	$ 239,132	**$ 33,945**	$ 42,432

8. RELATED PARTY TRANSACTIONS

The following is a summary of the society's related party transactions:

	2022	2021
Membership Contributions		
Contributions received from companies represented on the Board of Directors	**$ 39,334**	$ 45,281
Government Contracts		
Contributions received from governments represented on the Board of Directors	**115,128**	115,071
	$ 154,462	$ 160,352

Contributions receivable (*Note 6*) include $28,782 (2021 - $29,664) due from members of the society and governments represented on the Board of Directors.

These transactions are in the normal course of operations and are measured at the exchange amount, which is the amount of consideration established and agreed to by the related parties.

Palliser Airshed Society
Notes to Financial Statements
For the Year Ended December 31, 2022

9. CONTRACTUAL OBLIGATIONS

The agreement between the society and Wood Environment & Infrastructure Solutions has been extended for a three-year period of July 1, 2022 - June 30, 2024. The agreement states that Wood Environment & Infrastructure Solutions will provide the following services to the society:

Monitoring Network Operations and Maintenance (July 2022 - June 2024):

$14,848.92 / month

The society has renewed the contract for Executive Director services for the period January 1, 2022 to December 31, 2024 as follows:

$ 5,547.50 / month

10. ECONOMIC DEPENDENCE

The society derives substantially all (over 90%) of its revenue from member contributions and Alberta Government contracts and grants. The society's ability to continue viable operations is dependant upon continuing to receive funding from these sources.

Acknowledgements

The Palliser Airshed Society would like to acknowledge the hard work and contributions of all stakeholders and contractors in partnership with the association. PAS has made significant strides towards achieving the stated goals in 2022. Our member companies and municipalities have continued to provide experience and financial stability to PAS, even in times of less than ideal economic conditions.

Special thanks to Curt Moll for providing photos of the Medicine Hat area.

We are looking forward to a successful 2023

Palliser Airshed Society

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