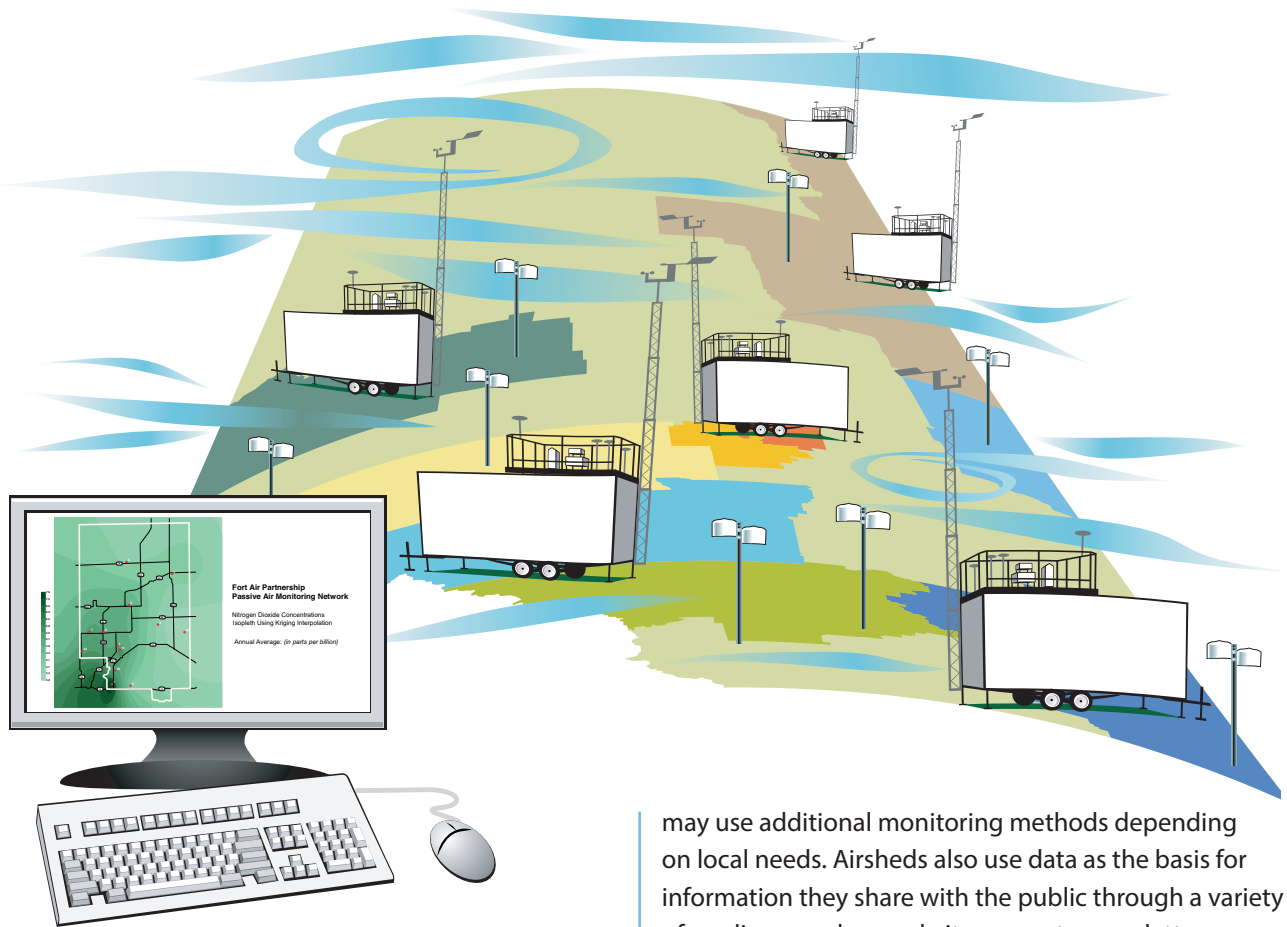


REGIONAL AIRSHED MONITORING IN ALBERTA

Alberta Airsheds are guided by local or regional multi-stakeholder non-profit societies who use the Clean Air Strategic Alliance (CASA) consensus model to make decisions. These societies work within a designated area to monitor, analyze and report on air quality. They also recommend and implement actions to improve air quality within their airsheds.



The Role of Airsheds in Alberta

Many of Alberta's air quality issues are local, both in their cause and the solutions required. In these cases, province-wide approaches may not adequately address the local situation. Airsheds can enable local stakeholders to design solutions to address local air quality issues.

Airsheds in Alberta

There are nine Airsheds in Alberta responsible for monitoring air quality in a specified region. Airsheds are responsible for monitoring and reporting ambient air quality, as well as education and outreach activities, within their specific region. Most Airsheds use a combination of continuous monitoring stations and passive monitors, and

may use additional monitoring methods depending on local needs. Airsheds also use data as the basis for information they share with the public through a variety of mediums such as websites, reports, newsletters, open houses and presentations.

Airsheds provide the data required by the Government of Alberta to calculate the Air Quality Health Index. This data is also used to make air quality management decisions and for input into air quality models and scientific projects.

Monitoring Networks in Alberta

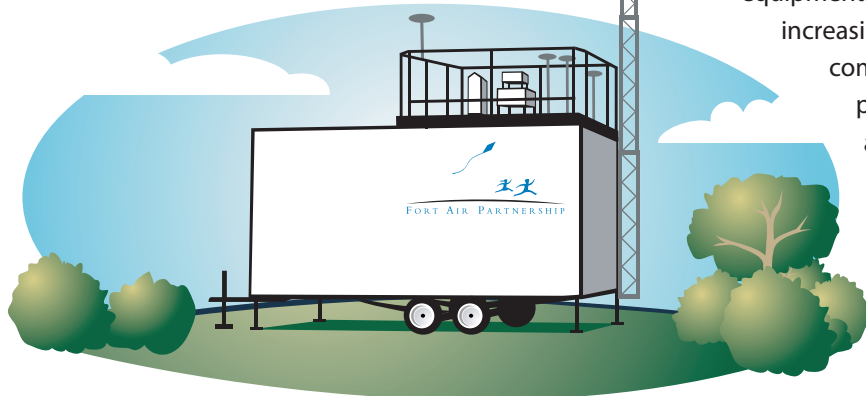
In Alberta, air quality is monitored by a network of Airsheds, the Government of Alberta and industry. Every monitoring network is different, influenced by a unique mix of local and provincial issues, emissions sources and information needs.

STATION OBJECTIVES

The first step in designing or implementing any monitoring network is defining its overall objectives. Having a clear monitoring objective helps answer the questions: Which air quality indicators should be measured? Where should the monitoring sites be located? How precise do the measurements need to be? Are we interested in following trends over a long period of time, or is it important to understand what changes in air quality occur within an hour?

One or more of the following activities may be conducted to fulfill Airshed monitoring objectives:

- Understand spatial distribution of pollutants in the region.
- Identify regional air quality trends.
- Provide flexibility to characterize emerging issues, sources, and locations.
- Provide appropriate information for evaluating population exposure to ambient air quality.
- Provide information required to understand air quality impacts on the health of the environment.
- Improve the ability to identify and apportion pollutant sources for purposes of air quality management.



- Provide suitable input and validation information for air quality models
- Measure the air quality where people live.
- Measure compliance with provincial or national standards.
- Inform the public and raise awareness of air quality.

Ultimately, the purpose for monitoring air quality is not simply to collect data, but to provide information required by scientists, policy makers and planners to enable them to make informed decisions on managing the impacts on the environment.

SITE SELECTION

Both the type of substances to be measured and location of monitors are selected based on monitoring objectives. If the objective is to characterize air quality where people live, ozone and fine particulate matter might be monitored because of their potential health effects. If the objective is to understand the impact on local air quality from the emissions of emitted compounds coming from an industrial facility, these substances might be measured at the fence line of the facility.

When selecting a monitoring site, the nature of nearby sources and substances are considered. Some substances are likely to be found near an industrial source that's emitting substances not captured in tanks or processing, or they can be natural emissions coming from a wetland.

Other monitoring site considerations are transportation of substances by prevailing winds, formation of substances by chemical reactions in the atmosphere, topography, access to electricity and communications, all season access to the site, landowner's permission and security.

MONITORING EQUIPMENT SELECTION

There is a clear trade-off between equipment cost, complexity, reliability and performance. It is not always better to have the most complex, expensive monitoring equipment. While very advanced systems can provide increasingly refined data, they are usually more complex and difficult to maintain. A monitoring program should meet monitoring objectives as simply as possible.

When monitoring methods are selected, both the resources and required measurement precision are carefully considered. A full complement of continuous monitoring equipment in a station (able to report very precise, minute-by-minute data almost instantaneously) might cost \$400,000 to construct and \$70,000 to operate. By comparison, a passive monitor capable of reporting monthly average concentrations of one to four substances (suitable for identifying long-term trends) is inexpensive and may cost as little as \$50 per month to operate.

DATA QUALITY

Whatever the reasons for monitoring, the measurements need to be accurate and reliable. The Alberta Air Monitoring Directive is a provincial guiding document that prescribes monitoring methods to be used across Alberta.



Station audits performed by the Government of Alberta ensure that all ambient air monitoring complies with this directive.

Data quality assurance and data quality control is an important component of a monitoring program. Quality assurance policies and quality control procedures ensure consistent, high quality data. A quality assurance program is a series of activities that ensure the measurements meet defined and appropriate standards of quality. Some of these activities are:

- Frequent site visits.
- Automatic daily checks against a known zero and high point on each analyzer against known gas concentrations.
- Daily data validation and screening.

- Monthly multi-point calibration that checks several readings from each analyzer against known gas concentrations.
- Use of certified calibration gases.
- Monthly data inspection.
- Annual audits by an external auditor.

Benefits of Regional Airshed Monitoring

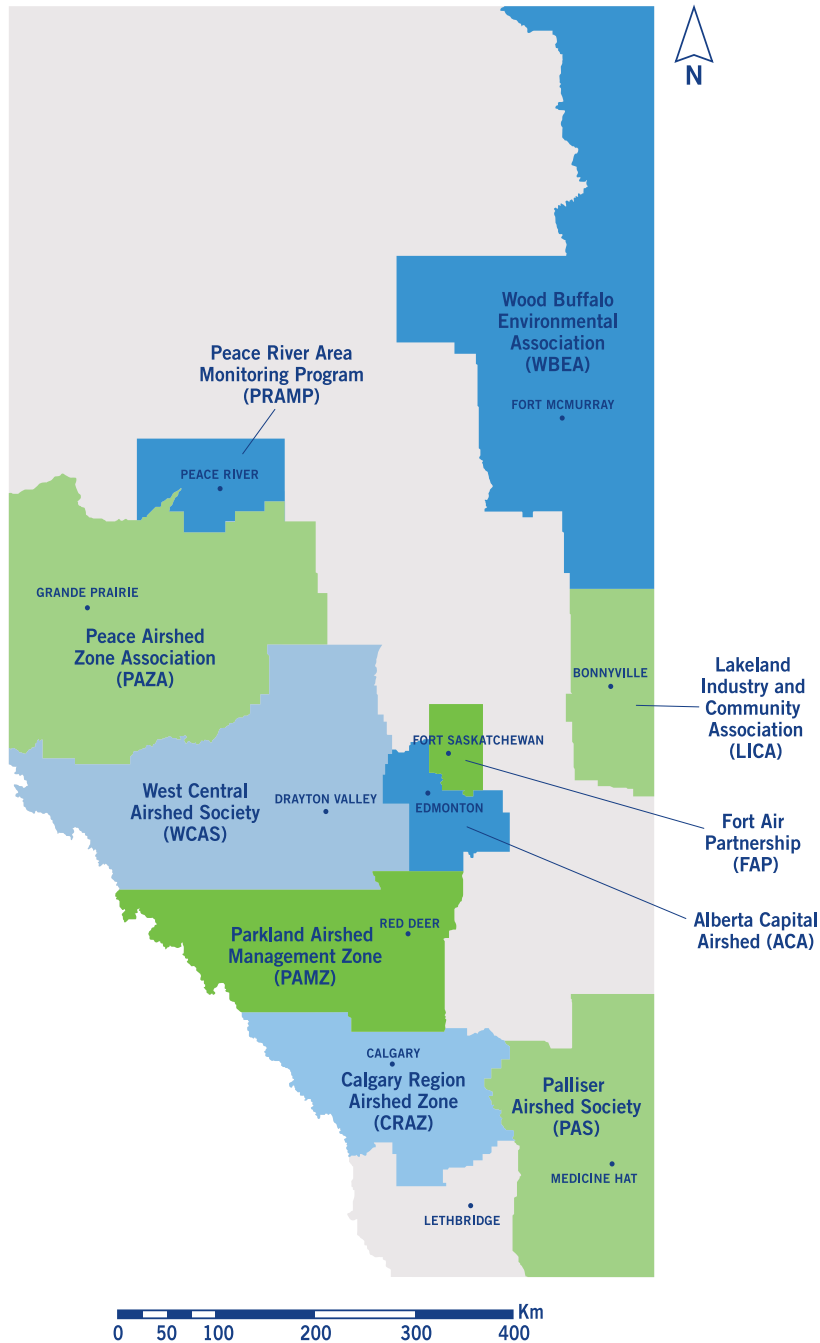
Airsheds operate Alberta air monitoring stations on behalf of the Government of Alberta, industry and other stakeholders. Apart from the transparency of an airshed monitoring program, there are advantages to having monitoring networks operated on a regional basis by an Airshed.

Sharing resources within a monitoring network means cost and resource efficiencies occur, and monitoring is more easily performed to consistently high standards. Airsheds make ambient air monitoring data easily available to the public. Given that Airsheds facilitate regional air monitoring, air quality can be evaluated on a regional basis, not just by individual station.

Airsheds also provide an important public service. They provide an avenue for local residents and industries to request and receive information specific to their region. Airsheds can provide a forum for public engagement on air quality issues. Through their own websites and through others, Airsheds provide public access to monitoring data. They also provide information and educational materials such as reports, media releases, newsletters and fact sheets.



Alberta's Airsheds



Definitions

Air dispersion modeling – a set of scientific equations used to describe and simulate the dispersion, transformation and deposition of substances emitted into the air.

Air pollutants – Chemical substances in the air that affect air quality at certain concentration levels.

Alberta Health Quality Index (AHQI) – an information tool that uses data from specific individual air substances to calculate (daily and forecast) outdoor air quality.

Alberta Air Monitoring Directive – specifies environmental monitoring and reporting requirements and guidelines in Alberta.

Ambient air quality – the quality of air found outside buildings, houses and other structures.

Calibration – a process in which measured gas concentration values are compared to a reference gas of a known concentration.

Clean Air Strategic Alliance – The Alliance is a multi-stakeholder group composed of industry, government and non-government organizations to provide strategies to assess and improve air quality for Albertans, using a collaborative consensus process.

Continuous air monitoring – an approach that provides almost instantaneous measurement of ambient air concentrations, usually for several substances. Continuous monitoring is used when substance concentrations may vary significantly in a short time.

Passive air monitoring – a monitoring method often used in rural and remote areas because they require no power to operate. Passive monitors usually provide monthly samples.