

What We Monitor



The following substances and meteorological parameters are measured at Heartland Air Monitoring Partnership continuous ambient air quality stations. No one station measures all of these, each station measures a portion of what is listed below. See [Substances Monitored by Station](#) for a complete list and a [summary of Alberta Ambient Air Quality Objectives](#) for the substances we monitor.

Many of the substances we monitor are reported in **parts per billion (ppb)**. A pinch of salt in a 10 ton bag of potato chips or one drop of ink in a large gasoline tanker truck would be equivalent to a concentration of 1 ppb.

<u>Substance</u>	<u>Description</u>
Ammonia (NH₃)	<p>Ammonia is a colourless gas with the well-known pungent odour found in household cleaners containing ammonia. Ammonia is produced both by natural sources, such as the decay of plant material and animal waste, and human sources. In Alberta, the major human-related sources of ammonia are fertilizer production facilities, agricultural application activities and commercial feedlots.</p> <p>Alberta's one-hour average concentration objective for Ammonia is 2,000 parts per billion (ppb).</p>
Benzene (C₆H₆)	<p>Benzene is a clear, colourless, volatile, highly flammable liquid with a characteristic sweet aromatic odour. Benzene is found in crude oil and is also formed in oil refineries and other petrochemical operations for use in the manufacturing of other chemical products. Small amounts of benzene are created whenever an organic (i.e. carbon-based) material is burned, e.g. gasoline or cigarettes, or during a forest fire. The greatest contribution of benzene to Canadian urban areas comes from vehicle emissions.</p> <p>The industrial sectors that contribute to benzene emissions in Alberta are principally crude petroleum and natural gas, wood industries, chemical and chemical products, petroleum products industries and refined petroleum and coal products sector.</p> <p>Alberta's one-hour average concentration objective for benzene is 9.0 parts per billion (ppb).</p>
Carbon Monoxide (CO)	<p>Carbon monoxide is a colourless, odourless gas formed when carbon-based fuels such as gasoline, oil and wood burn with an insufficient supply of oxygen. Motor vehicles are the major emission source of carbon monoxide and forest fires are a natural source. Minor sources include fireplaces, industry, aircraft and natural gas combustion.</p> <p>Alberta's one-hour average concentration objective for CO is 13 parts per million (ppm).</p>

<u>Substance</u>	<u>Description</u>
Ethylbenzene (C₈H₁₀)	<p>Ethylbenzene is an organic compound. It is a highly flammable, colorless liquid with an odour similar to that of gasoline. This aromatic hydrocarbon is important in the petrochemical industry as an intermediate in the production of styrene, the precursor to polystyrene, a common plastic material. Ethylbenzene is also used to make other chemicals, in fuel, and as a solvent in inks, rubber adhesives, varnishes, and paints.</p> <p>Alberta's one-hour average concentration objective for ethylbenzene is 460 parts per billion (ppb).</p>
Ethylene (C₂H₄)	<p>Ethylene is a flammable, colorless gas. It is industrially produced from ethane and used to make other compounds. Ethylene also occurs as a natural product emitted by fruits, flowers and other vegetation. It is also emitted when organic matter such as cigarettes are burned, and when fossil fuels are incompletely burned.</p> <p>Alberta's one-hour average concentration objective for ethylene is 1,044 parts per billion (ppb).</p>
Hydrocarbons:	
Methane (CH₄)	<p>Methane is a colorless, odourless gas. It is the simplest alkane and the main constituent of natural gas. It is used as a fuel.</p> <p>There is no Alberta objective for methane.</p>
Non-methane Hydrocarbons (NMHC)	<p>Hydrocarbons are compounds consisting of hydrogen and carbon. Non-methane hydrocarbons, also known as reactive hydrocarbons, are made up of many volatile organic compounds (VOCs). Human-related sources come from oil and gas operations, automobiles and solvents. The Government of Alberta has developed air quality objectives for specific VOCs such as benzene, toluene, ethylbenzene, xylene, styrene and ethylene.</p>
Total Hydrocarbons (THC)	<p>Total hydrocarbons are made up of reactive and non-reactive hydrocarbons. A major non-reactive hydrocarbon is methane and comes mainly from wetlands, ruminants such as cows, energy use, landfills and wood burning. Methane is the main component of natural gas.</p> <p>There is no Alberta objective for total hydrocarbons.</p>

<u>Substance</u>	<u>Description</u>
Hydrogen Sulphide (H₂S)	<p>Hydrogen sulphide is a colourless gas with a rotten egg odour. Its presence in natural gas makes the gas “sour.” Some sources include natural gas processing plants, petroleum refining and animal feedlots.</p> <p>Alberta’s one-hour average concentration objective for hydrogen sulphide is 10 parts per billion (ppb).</p>
Oxides of Nitrogen:	<p>Nitrogen oxides are produced during the burning of natural gas, coal, oil and gasoline. Nitrogen oxides are commonly found at higher concentrations in urban locations because of vehicle exhaust emissions. They are also detectable in rural areas as a result of emissions from bacterial processes, lightning, forest fires, power plants, oil and gas processing facilities and other industrial sources.</p>
Total Oxides of Nitrogen (NO_x)	<p>Oxides of nitrogen are the total of nitrogen dioxide (NO₂) and nitric oxide (NO). Transportation (automobiles, locomotives and aircraft) is the major source of NO_x in Alberta. Other major sources include the oil and gas industries and power plants. Smaller sources of NO_x include natural gas combustion, heating fuel combustion, and forest fires. The largest urban source of NO_x is emissions from motor vehicles.</p>
Nitrogen Oxide (NO)	<p>Nitrogen oxide is also known as nitric oxide. During high temperature combustion, as in the burning of natural gas, coal, oil and gasoline, atmospheric nitrogen may combine with molecular oxygen to form NO. NO is colourless and odourless. Most NO in the ambient air will react with ozone to form NO₂.</p> <p>There is no Alberta objective for total oxides of nitrogen or nitrogen oxide.</p>
Nitrogen dioxide (NO₂)	<p>Nitrogen dioxide (NO₂) can be identified by its reddish-brown gas and pungent odour. NO₂ is responsible at least partially for the brown haze often observable near large cities.</p> <p>Alberta’s one-hour average concentration objective for nitrogen dioxide is 159 parts per billion (ppb).</p>
Ozone (O₃) At ground level	<p>Reactive hydrocarbons and oxides of nitrogen combine in the presence of sunlight to form ozone, which is a bluish gas with a pungent odour that can be smelled only at very high concentrations. In the stratosphere, ozone prevents most of the sun’s harmful ultraviolet-B radiation from reaching the earth’s surface. But at ground level, ozone is a major component of smog.</p> <p>Alberta’s one-hour average concentration objective for ozone is 76 parts per billion (ppb).</p>

<u>Substance</u>	<u>Description</u>
Particulate Matter (PM_{2.5})	<p>Particulate matter is measured as a fine particulate (PM_{2.5}). Also known as respirable particulates, these are particles in the air less than 2.5 micrometres in diameter and small enough to penetrate into the lungs. Fine particulates originate in the atmosphere because of condensation and combustion from sources such as vehicle exhausts and industrial emissions, and wood burning.</p> <p>Alberta's one-hour average concentration guideline for PM_{2.5} concentrations is 80 micrograms of particulate per cubic metre of air (µg/m³).</p>
Styrene (C₈H₈)	<p>Styrene is an organic compound and derivative of benzene that is a colorless oily liquid. It evaporates easily and has a sweet smell, although high concentrations confer a less pleasant odor. Styrene is the precursor to polystyrene and several other polymers.</p> <p>Alberta's one-hour average concentration objective for styrene is 52 parts per billion (ppb).</p>
Sulphur Dioxide (SO₂)	<p>Sulphur dioxide is a colourless gas with an irritating odour and taste. Major sources are natural gas processing and oil sands plants, petroleum refineries and coal-powered electric power generation facilities.</p> <p>Alberta's one-hour average concentration objective for sulphur dioxide is 172 parts per billion (ppb).</p>
Toluene (C₇H₈)	<p>Toluene is a clear, water insoluble liquid with the typical smell of paint thinners. It is an aromatic hydrocarbon that is widely used as an industrial feedstock and as a solvent. Toluene is an important organic solvent, but is also capable of dissolving a number of notable inorganic chemicals such as sulfur, iodine, bromine, phosphorus, and other non-polar covalent substances.</p> <p>Alberta's one-hour average concentration objective for toluene is 499 parts per billion (ppb).</p>
Xylene (C₈H₁₀) m, o, p isomers	<p>Xylene is an aromatic hydrocarbon consisting of a benzene ring with two methyl substituents. Xylenes are found in small quantities in gasoline and airplane fuels. Xylenes are mainly produced as part of the BTX (Benzene, Toluene and Xylenes) aromatics extracted from the product of catalytic reforming known as "reformate". The mixture is a slightly greasy, colourless liquid commonly encountered as a solvent.</p> <p>Xylenes are found in three isometric forms and designated as ortho (o-), meta (m-) and para (p-) xylenes. Fort Air Partnership measures o-xylene and combines the mp-xylene into one result.</p> <p>Alberta's one-hour average concentration objective for any xylene isomer is 530 parts per billion (ppb).</p>

<u>Weather condition</u>	<u>Description</u>
Barometric Pressure (BP)	Barometric pressure is also known as atmospheric pressure, or the pressure the air is exerting on the earth. As altitude increases barometric pressure decreases. Other factors like wind, temperature and weather affect barometric pressure. Barometric pressure of the air is measured in millimetres of mercury (mmhg).
External Temperature @ 2 metres	The temperature in degrees centigrade measured outside the monitoring stations at two metres above ground level.
External Temperature @10 metres	At one station temperature is also measured at 10 metres above ground. This is then used to calculate the difference in temperature between two metre and 10 metre heights.
Delta Temperature	The external temperature at 10 metres minus the external temperature at 2 meters. This is a positive number if the temperature is higher at the upper sensor, or negative if the reverse is the case. And not a measure of whether the external temperature is above freezing.
Relative Humidity (RH)	This is the humidity or water vapour content in the air relative to the ambient temperature and pressure. Relative humidity is measured at two metres above ground level.
Solar Radiation	Solar radiation is the power (per unit area) received from the complete spectrum of wavelengths produced by the sun. The amount of power or radiation received changes with cloud cover and the angle of the sun each day and each season. Solar radiation levels are also affected by elevated levels of particulates like those from wild fire smoke. Solar radiation is reported in watts per square metre. (w/m^2)
Wind:	
Wind Direction (WDR)	The direction the wind is blowing from, measured in compass degrees. North = 0° or 360° , east = 90° , south = 180° and west = 270° . Wind direction is measured at 10 metres above ground level.
Wind Speed (WSP)	Speed the wind is blowing in kilometres per hour. Wind speed is measured at 10 metres above ground level.
Vertical Wind Speed	Speed of the wind as it flows vertically. Vertical wind speed is measured at 10 metres above ground level. Vertical wind can be either a positive or negative number. Updrafts result in a positive wind speed while downdrafts produce a negative wind speed. Vertical wind is reported in metres per second (m/s).