Substances monitored by Fort Air Partnership

Many of the substances we monitor are reported in **parts per billion** (ppb). One part per billion is equivalent to one drop of water diluted to 250, 200-litre barrels, or three seconds out of every 100 years.

Substance	Description
Ammonia (NH3)	Ammonia is a colourless gas with the well-known pungent odour found in ammonia-containing household cleaners. 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. Alberta's one-hour guideline for Ammonia is 2.0 parts per million (ppm).
Benzene (C6H6)	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. 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. Alberta's one-hour guideline for Benzene is 9 parts per billion (ppb) based on haemotological effects. Alberta's annual average guideline is 0.9 ppb based on carcinogenic effects.
Carbon Monoxide (CO)	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. Alberta's one-hour guideline for Carbon Monoxide is 13 parts per million (ppm) average concentration.

Ethylbenzene (C8H10)	Ethylbenzene is an organic compound. It is a highly flammable, colorless liquid with an odor 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. Alberta's one hour guideline for Ethylbenzene is 460 parts per billion (ppb).
Ethylene (C2H4)	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. Alberta's one hour average ambient air quality guideline for Ethylene is 1.044 parts per million (ppm).
Ground-level Ozone (O3)	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 UV-B radiation from reaching the earth's surface. But at ground level, ozone is a major component of smog. Alberta's guideline for one-hour Ozone concentrations is 0.082 parts per million (ppm).
Non-methane (reactive) Hydrocarbons (NMHC)	Hydrocarbons are compounds consisting of hydrogen and carbon. Non-methane or 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.
Total Hydrocarbons (THC)	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.
Hydrogen Sulphide (H2S)	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.

	Alberta's one-hour guideline for Hydrogen Sulphide is 0.010 parts per million (ppm).
Methane (CH4)	Methane is a colorless, odourless gas. It is the simplest alkane and the main constituent of natural gas. It is used as a fuel.
Nitrogen Oxides (NOx)	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. Nitrogen dioxide (NO2) can be identified by its reddish-brown colour and pungent odour. Alberta's one-hour guideline for Nitrogen Dioxide is 0.210 parts per million (ppm).
Particulates	**Inhalable Particulates (PM10)** Inhalable particulates are less than 10 micrometres in diameter and can be inhaled into the nose and throat. Sources include soil, road and agricultural dust, smoke from forest fires and recreational wood burning, vehicle exhaust and industrial emissions. **Respirable Particulates (PM2.5)** Respirable particulates are less than 2.5 micrometres in diameter and small enough to penetrate into the lungs. Respirable particulates originate in the atmosphere because of condensation and combustion from sources such as vehicle exhaust and industrial emissions, and wood burning. Alberta's one hour guideline for PM2.5 concentrations is 80 micrograms of particulate per cubic metre of air (µg/m3). **Very Fine Particulates (PM1.0)** Very fine particulates are a diameter of 1 micron (1 millionth of a metre) or less.
Styrene	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.
Sulphur Dioxide (SO2)	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.

Alberta's one-hour guideline for Sulphur Dioxide is 0.170 parts per million (ppm).

Toluene (C7H8)

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.

Alberta's one hour guideline for Toluene is 499 parts per billion (ppb).

Volatile Organic Compounds (VOCs)

An organic compound is a carbon-based molecule that may be bonded to other elements such as hydrogen, oxygen, nitrogen, chlorine, fluorine and/or bromine. Volatile organic compounds are chemicals that easily form vapors under normal pressures and temperatures. Once emitted into the atmosphere, they can present hazardous effects on plants, animals and humans. They can also react photo-chemically – in the presence of sunlight – to produce additional pollutants. VOCs are produced by a variety of natural and human sources, with the major human source in urban areas being vehicle exhaust emissions.

Additional human sources are gasoline, petroleum and chemical industries, dry cleaning, fireplaces, natural gas combustion and aircraft. Emissions from natural sources include forests, grasslands and swamps.

Xylene (C24H30)

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 aromatics (benzene, toluene and xylenes) extracted from the product of catalytic reforming known as "reformate". The mixture is a slightly greasy, colourless liquid commonly encountered as a solvent.

Alberta's one hour guideline for Xylene is 529 parts per billion (ppb).