

# ALBERTA'S AMBIENT AIR QUALITY OBJECTIVES FACTSHEET

## AMBIENT AIR QUALITY OBJECTIVES

Ambient Air Quality Objectives (AAQOs) are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks (AEP) is responsible for setting and implementing them. They are compared to actual air quality measurements and used in the following ways:

- Assess compliance near major industrial air emission sources
- Establish approval conditions for regulated industrial facilities
- Evaluate proposals for constructing facilities
- Guide special ambient air quality surveys
- Inform Albertans on air quality through an air quality health index
- Report on the state of Alberta's atmospheric environment

It is important AAQOs are reviewed on a regular basis to ensure they are current and new objectives are developed when there is a need.

## CASA AND THIS PROJECT

The Clean Air Strategic Alliance (CASA) is a multi-stakeholder partnership. It is composed of representatives selected by industry, government, and non-government organizations to provide strategies to assess and improve air quality for Albertans, using a collaborative consensus process.

CASA was tasked with recommending AAQOs for fine particulate matter, ozone, sulphur dioxide, nitrogen dioxide, and hydrogen sulphide/total reduced sulphur, with consideration of:

- Scientific information
- Health and ecosystem effects
- Technological factors
- Economic factors

## SUBSTANCES

### *Fine Particulate Matter (PM<sub>2.5</sub>)*

Airborne solid or liquid particles that are 2.5 microns or less in diameter. It may form as a by-product in the atmosphere through chemical reactions of other substances, or be directly emitted by combustion sources including automobiles, industry and wood burning. Forest fire smoke and other biomass burning can also be a major source of PM<sub>2.5</sub>.

*PM<sub>2.5</sub> AAQO and Guideline as of Oct. 2020:*

Averaging Period	Objective	Basis
24-hour (AAQO)	29 µg/m <sup>3</sup>	Health effects
1-hour Guideline	80 µg/m <sup>3</sup>	Health effects

### *Ozone (O<sub>3</sub>)*

A highly reactive, colourless gas that is normally present in the atmosphere. Ground level ozone is formed in the atmosphere through complex chemical reactions primarily between nitrogen oxides and volatile organic compounds, in the presence of sunlight. These ozone precursor chemicals are from emissions from automobiles, industry, and from trees and other vegetation.

*O<sub>3</sub> AAQO as of Oct. 2020:*

Averaging Period	Objective	Basis
1-hour daily maximum	150 µg/m <sup>3</sup>	Pulmonary effects

## SUBSTANCES

### *Nitrogen Dioxide (NO<sub>2</sub>)*

A reddish-orange-brown gas with an irritating, acrid, pungent odour. Anthropogenic emissions are mainly from combustion processes (fuel combustion in vehicles or industrial processes). NO<sub>2</sub> also occurs naturally as a result of forest fires, lightning, and oxidation processes in soils.

*NO<sub>2</sub> AAQOs as of Oct. 2020:*

Averaging Period	Objective	Basis
1-hour	300 µg/m <sup>3</sup>	Respiratory effects
Annual	45 µg/m <sup>3</sup>	Vegetation effects

### *Sulphur Dioxide (SO<sub>2</sub>)*

A colourless, non-flammable gas with a sharp, pungent odour. Human activities leading to SO<sub>2</sub> emissions are fossil fuel combustion, petroleum refining, and smelting sulphide ores. Natural sources include volcanoes and geothermal hot springs.

*SO<sub>2</sub> AAQOs as of Oct. 2020:*

Averaging Period	Objective	Basis
1-hour	450 µg/m <sup>3</sup>	Pulmonary effects
24-hour	125 µg/m <sup>3</sup>	Human health
30-day	30 µg/m <sup>3</sup>	--
Annual	20 µg/m <sup>3</sup>	Ecosystem protection

### *Hydrogen Sulphide and Total Reduced Sulphur (H<sub>2</sub>S/TRS)*

Total reduced sulphur is the cumulative measure of compounds containing one or more sulphur atoms in their reduced state (e.g., H<sub>2</sub>S and methyl mercaptan). Reduced sulphur compounds tend to be very odorous, (e.g., H<sub>2</sub>S is associated with rotten egg odours and is emitted by industrial processes).

Hydrogen sulphide is a colourless gas that is poisonous, corrosive, and flammable. Most H<sub>2</sub>S in the atmosphere comes from natural sources, such as decaying organic matter, but it is also produced through industrial processes.

*H<sub>2</sub>S AAQOs as of Oct. 2020:*

Averaging Period	Objective	Basis
1-hour	14 µg/m <sup>3</sup>	Odour
24-hour	4 µg/m <sup>3</sup>	Human health

## OUTCOMES

Consensus recommendations were made for lowering fine particulate matter and ozone AAQOs. These were transmitted to AEP, who then implemented the recommendations.

While CASA did reach agreement on a total reduced sulphur guideline value, it did not reach consensus on its implementation, which was outside the scope of the project. It also did not reach consensus on revisions to nitrogen dioxide or sulphur dioxide AAQOs. It instead provided advice to AEP in the form of stakeholder perspectives to assist in the final decision making on updating the AAQOs for these substances.

CASA also provided advice to AEP on how to prioritize substances for review for the next AAQO work plan.

## For more information

On AEP's posts about AAQOs at:

<https://www.alberta.ca/ambient-air-quality-objectives.aspx>

On the team's work:

<https://www.casahome.org/past-projects/ambient-air-quality-objectives-project-team-52/>

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