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# Green Facts

## Ontario's Air Quality Index

**Ontarians want and deserve clean air and healthy communities. This is why the ministry constantly monitors air quality in the province - Ontario's Air Quality Index.**

The Air Quality Index (AQI), introduced in 1988, currently measures and reports on six key urban air pollutants: ozone ($O_3$), fine particulate matter ($PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide ($NO_2$) and sulphur dioxide ($SO_2$). In communities where odours may be an issue, total reduced sulphur (TRS) compounds are also measured and reported. In August 2002, Ontario was the first Canadian province to add $PM_{2.5}$ to its AQI.

This brochure explains what these pollutants are, where they come from and what effects they may have on the environment and on human health.

The Ontario government's automatic air monitoring stations constantly analyse the quality of our air. The data results are translated into an AQI value that helps Ontarians understand the level of air pollution. AQI values are posted on the Ministry of the Environment's air quality website at www.airqualityontario.com, and are often reported by Ontario media outlets.

**What is a Smog Advisory*?**
The Ontario Ministry of the Environment issues smog advisories when widespread, elevated and persistent smog levels are forecast due to elevated ground-level ozone and/or fine particulate matter.

During an advisory, Ontarians are encouraged to limit activities which contribute to air pollution, such as unnecessary trips in the car, using their gas-powered lawn mowers, etc. People with respiratory and heart problems are also encouraged to limit their outdoor activities.

**Ozone**
**$O_3$**
$O_3$ is a colourless, odourless gas and a major component of smog. Ground-level ozone is not emitted directly into the atmosphere. It results from photochemical reactions between oxides of nitrogen ($NO_x$) and volatile organic compounds (VOCs) in the presence of sunlight. $O_3$ irritates the respiratory tract and eyes. Exposure to high levels of $O_3$ results in chest tightness, coughing and wheezing. People with respiratory and heart problems are at higher risk. $O_3$ causes agricultural crop loss and noticeable leaf damage in many crops, garden plants and trees.

Note: Ground-level ozone ($O_3$) should not be confused with stratospheric ozone. Ozone in the stratosphere (15 to 50 km above the Earth's surface) is naturally created and screens us from

** Ontario has a two-tiered smog alert program: A Smog Watch (introduced in 2000) is issued when widespread elevated smog is forecast within the next three days. A Smog Advisory is issued when there is a high probability of elevated smog levels occurring within the next 24 hours or if smog conditions happened without warning.*

*Protecting our environment.* Ontario

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harmful ultraviolet radiation. Ground-level ozone (described above) is harmful to plants, animals and humans.

**Fine Particulate Matter**
**$PM_{2.5}$**
Particulate matter is the umbrella term used for a mixture of solid particles and liquid droplets in the air. This includes aerosols, smoke, fumes, dust, ash and pollen. Fine particulate matter ($PM_{2.5}$) is particulate matter that is 2.5 microns and less in diameter. It is also known as respirable particulate matter, because it penetrates the respiratory system further than larger particles. People with asthma, cardiovascular or lung disease, as well as children and elderly people, are considered to be the most sensitive to the effects of fine particulate matter. $PM_{2.5}$ is also responsible for environmental impacts such as corrosion, soiling, damage to vegetation and reduced visibility.

**Carbon Monoxide**
**CO**
Automobile emissions are the primary source of this colourless, odourless, tasteless gas. CO enters the bloodstream and reduces oxygen delivery to the organs and tissues. People with heart disease are particularly sensitive. Exposure to high levels is linked with impairment of vision, work capacity, learning ability and performance of difficult tasks.

**Nitrogen Dioxide**
**$NO_2$**
$NO_2$ is a reddish-brown gas with a pungent and irritating odour. All hydrocarbon combustion in air produces oxides of nitrogen ($NO_x$), of which $NO_2$ is a major product. $NO_2$ can irritate the lungs and lower resistance to respiratory infection. Sensitivity increases for people with asthma and bronchitis. $NO_2$ chemically transforms into nitric acid and, when deposited, contributes to lake acidification. Nitric acid can also corrode metals, fade fabrics, degrade rubber and cause substantial damage to trees and crops.

**Sulphur Dioxide**
**$SO_2$**
$SO_2$ is a colourless gas that smells like burnt matches. Smelters and utilities (especially electricity generation) are primary sources of $SO_2$. Other industrial sources include iron and steel mills, petroleum refineries, and pulp and paper mills. Health effects caused by exposure to high levels of $SO_2$ include breathing problems, respiratory illness, changes in the lung's defenses, and worsening respiratory and cardiovascular disease. People with asthma or chronic lung or heart disease are the most sensitive to $SO_2$. The pollutant also damages trees and crops. $SO_2$ and nitrogen oxides are the main precursors of acid rain, a phenomenon that contributes to the acidification of lakes and streams and the accelerated corrosion of buildings.

**Total Reduced Sulphur**
**TRS**
TRS compounds produce offensive odours similar to rotten eggs or cabbage. Industrial sources of TRS include the steel industry, pulp and paper mills, refineries and sewage treatment facilities. Natural sources include swamps, bogs and marshes. TRS compounds are not normally considered a health hazard. Some people may experience nausea or headaches being exposed to very high TRS concentrations.

The Ministry of the Environment provides daily AQI readings and smog forecasts for areas across Ontario on the website www.airqualityontario.com. Daily AQI values are also available from the ministry by calling 416-246-0411 in Toronto or toll free at 1-800-387-7768 (English) or 1-800-221-8852 (French).

For more information on air quality issues or additional copies of this brochure, please contact the ministry's Public Information Centre at 416-325-4000 or toll free (from outside the 416 area) at 1-800-565-4923, or visit us at www.ene.gov.on.ca. For more information on Drive Clean, call 1-888-758-2999 or visit the website www.driveclean.com.

## Air Quality Index Pollutants and Their Impacts*

| Index | Ozone ($O_3$) | Fine Particulate Matter ($PM_{2.5}$) | Carbon Monoxide (CO) | Nitrogen Dioxide ($NO_2$) | Sulphur Dioxide ($SO_2$) | Total Reduced Sulphur (TRS) Compounds |
|---|---|---|---|---|---|---|
| **0-15** | No health effects are expected in healthy people | Sensitive populations may want to exercise caution | No health effects are expected in healthy people | No health effects are expected in healthy people | No health effects are expected in healthy people | No health effects are expected in healthy people |
| **16-31** | No health effects are expected in healthy people | Sensitive populations may want to exercise caution | No health effects are expected in healthy people | Slight odour | Damages some vegetation in combination with ozone | Slight odour |
| **32-49** | Respiratory irritation in sensitive people during vigorous exercise; people with heart/lung disorders at some risk; damage to very sensitive plants | People with respiratory disease at some risk | Blood chemistry changes, but no noticeable impairment | Odour | Damages some vegetation | Odour |
| **50-99** | Sensitive people may experience irritation when breathing and possible lung damage when physically active; people with heart/lung disorders at greater risk; damage to some plants. | People with respiratory disease should limit prolonged exertion; general population at some risk | Increased symptoms in smokers with heart disease | Air smells and looks brown; some increase in bronchial reactivity in asthmatics | Odour; increasing vegetation damage | Strong odour |
| **100 and over** | Serious respiratory effects even during light physical activity; people with heart/lung disorders at high risk; more vegetation damage | Serious respiratory effects even during light physical activity; people with heart disease, the elderly and children at high risk; increased risk for general population | Increasing symptoms in non-smokers with heart disease; blurred vision; some clumsiness | Increasing sensitivity for asthmatics and people with bronchitis | Increasing sensitivity for asthmatics and people with bronchitis | Severe odour; some people may experience nausea and headaches |

* Please note that the information in this table will be reviewed and may change.