



# Keeping an Eye on our Air Northwest Territories Air Quality Report (Summary)

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Environmental Protection Division

2005



## INTRODUCTION

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The Department of Environment and Natural Resources (ENR) watches out for changes in air quality. ENR monitoring stations throughout the NWT have highly specialized instruments to collect and measure dust and gases that are in the air. This information is sent electronically to the ENR office in Yellowknife. The public, environmental consultants and other interested people can find this information at our website on the Internet at <http://lisin.rwed-hq.gov.nt.ca/NWTAQ/NetworkSummary.aspx>

Outside air surrounding us on the land and in our communities, is called “ambient” air. It contains nitrogen, oxygen, a small amount of carbon dioxide and water vapour. It also has traces of dust and other chemicals in it. There are standards that describe the maximum amount of dust and chemicals that can be in ambient air. The naturally occurring levels of dust and chemicals in the air are called “background levels”. Human activities and, sometimes, unusual natural events can raise these background levels and cause pollution.

By monitoring the levels of dust and chemicals in the air, we can report pollution when it happens. This year we saw a spike in our charts during forest fire season. Smoke from fires burning in Alaska caused fine dust pollution at all of the NWT stations.

We also watch for trends over the years. One change we have seen has happened in Yellowknife. When the gold mines were operating, arsenic and sulphur dioxide polluted Yellowknife’s air, but since the mines have closed that air pollution has disappeared.

## OUR NETWORK

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ENR permanent monitoring stations are located in

- Yellowknife
- Inuvik
- Norman Wells
- Fort Liard.

They are small trailers that hold equipment that is always collecting and measuring dust and chemicals in the air. In these four communities we watch for the following substances:

- Fine-particle ‘dust’ (PM<sub>2.5</sub>)
- Sulphur dioxide (SO<sub>2</sub>)
- Nitrogen oxides (NO<sub>x</sub>)

Also, testing is done for the following substances at selected stations:

- Hydrogen sulphide (H<sub>2</sub>S)
- Ground-level ozone (O<sub>3</sub>)
- Carbon monoxide (CO)
- Total Suspended Particulate (TSP – ‘dust’)
- PM<sub>2.5</sub> at Daring Lake (in the summer)
- Acidic Deposition at Snare Rapids

We measure air quality by comparing it to the *NWT Ambient Air Quality Standards* adopted under the *NWT Environmental Protection Act*. In some cases, guidelines have not been developed for the NWT and so we use limits set by the federal and provincial governments.

We also work with Canada-wide air quality networks:

- The Yellowknife station is part of the National Air Pollution Surveillance Network (NAPS). NAPS tests air quality in cities throughout Canada.
- Rainwater and snow is sampled in Snare Rapids and sent to the Canadian Air and Precipitation Monitoring Network (CAPMoN) for testing.



## **HIGHLIGHTS IN 2005**

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Throughout the NWT we have clean air with very little pollution. The tiny amounts of dust and chemicals we find in the air are usually well below the maximum allowed by our standards.

The main causes of pollution are forest fires and springtime dust. As earlier mentioned, all four permanent stations reported high levels of fine 'dust' (PM<sub>2.5</sub>) in August, 2005, during the fire season. On 10 occasions in the forest fire season, PM<sub>2.5</sub> readings were higher than our standards.

### **Yellowknife**

Yellowknife air quality continues to be excellent.

- In 2005, the annual average for TSP or 'dust' in Yellowknife was the lowest ever recorded!
- Two times in the spring, samples collected downtown indicated dust pollution. After the snow had melted, dust from the gravel placed on the streets during the winter, was lifted into the air by wind and passing vehicles.
- Three times in August, forest fire smoke from Alaska, measured as fine 'dust' (PM<sub>2.5</sub>), polluted the air.
- The Post Office monitoring station was closed at the end of the year and equipment relocated to the Sir John Franklin School monitoring station.

## **Fort Liard**

Fort Liard air quality is excellent. The ongoing natural gas exploration and development in the area is not presently affecting the air quality in the community.

- Forest fire smoke from Alaska caused one PM<sub>2.5</sub> reading in August to go above the NWT Air Quality Standard.
- Additional monitoring equipment to measure NO<sub>x</sub> was installed in March, 2005.

## **Norman Wells**

Norman Wells air quality is excellent. Industry is not presently affecting the air quality in the community.

- Forest fire smoke from Alaska polluted the air in August and PM<sub>2.5</sub> readings went above the NWT Air Quality Standard three times.
- Additional monitoring equipment to measure O<sub>3</sub> and NO<sub>x</sub> was installed in April, 2005.

## **Inuvik**

Air quality in Inuvik is excellent. Our results show that there are no chemicals that are higher than acceptable standards.

- Forest fire smoke from Alaska caused PM<sub>2.5</sub> readings to go above accepted standards three times in August.
- Additional monitoring equipment to measure O<sub>3</sub> was installed in April, 2005.



## THE POLLUTANTS WE MONITOR AND THE PROBLEMS THEY CAN CAUSE

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Our job is to watch out for pollution and we do that by monitoring dust and gaseous substances.

Dust comes in different particle sizes. Dust of all sizes is called Total Suspended Particulate (TSP) and dust that is about 30 times smaller than the width of a human hair is called PM<sub>2.5</sub>. High levels of PM<sub>2.5</sub> can cause health problems because the particles are so small that they get through our nose and throat defences and get deep into our lungs.

We monitor the following gaseous substances:

**Sulphur Dioxide:** SO<sub>2</sub> can come from forest fires, building heating, power generating plants, gas plant flares and oil refineries. High levels can cause lung problems, especially for people with asthma. SO<sub>2</sub> can affect plants, especially lichens, and lead to the formation of other pollutants.

**Nitrogen Oxide:** The sources of NO<sub>x</sub> are the same as SO<sub>2</sub>, as well as vehicle emissions and high levels can cause serious breathing problems that can be ongoing. NO<sub>x</sub> can lead to formation of other pollutants.

**Hydrogen Sulphide:** H<sub>2</sub>S smells like rotten eggs and can come from oil and gas activities, sewage treatment plants, as well as from natural sources such as swamps. High levels can cause eye irritation and stomach sickness.

**Ground-level Ozone:** This is the same gas (O<sub>3</sub>) that is found higher up in the atmosphere where it is called stratospheric ozone. High in the atmosphere, O<sub>3</sub> is a good thing – it protects the planet from the sun's harmful ultraviolet rays. However, at ground level, O<sub>3</sub> can be harmful to humans and plants. High levels can be created in the lower atmosphere by sunlight and heat causing chemical reactions with other gases (NO<sub>x</sub> and substances called volatile organic compounds or VOC's). High levels can lead to chest tightness, coughing, wheezing and other heart and lung problems. The effect of O<sub>3</sub> on plants can be seen as discoloured leaves and general poor growth.

**Carbon Monoxide:** CO comes from a number of sources including home heating, vehicle exhaust and forest fires. Extremely high levels of CO in our air can be poisonous and can cause headaches, shortness of breath, and stomach sickness.

## EQUIPMENT AND QUALITY CONTROL

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Our Air Quality Monitoring Network uses a variety of monitoring equipment to collect information on pollutants. To test gaseous substances in the air, analyzers are constantly vacuuming air in, measuring chemical content and providing “real time” data.



**Analyzers**



**Hi-Vol**

There are two methods of testing for dust. To test for TSP, a vacuum pump sucks the air in and filters catch the dust. Samples are collected by a machine called a High Volume Air Sampler (Hi-Vol) and sent to a laboratory for testing.



To test PM<sub>2.5</sub> and even smaller particles, samples are taken continuously by a machine called the Beta-Attenuation Mass Monitor (BAM).

ENR uses a number of methods to ensure they have correct, scientifically valid information. ENR follows Environment Canada guidelines and installs and operates equipment according to manufacturers' recommendations and maintenance plans. Analyzers are self-calibrating and our technologists also check measurements on a daily basis.

ENR stations also track wind speed, wind direction and temperature.

**BAM Head**





## **NEED MORE INFORMATION?**

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After reading this summary, if you would like to find out more about air quality you can find the NWT Air Quality Report for 2005 on the Internet at:

[www.enr.gov.nt.ca/eps/environ.htm](http://www.enr.gov.nt.ca/eps/environ.htm)

or check out ENR's new air quality website at:

<http://lisin.rwed-hq.gov.nt.ca/NWTAQ/NetworkSummary.aspx>

You can also contact our Environmental Protection Division using the information below.

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