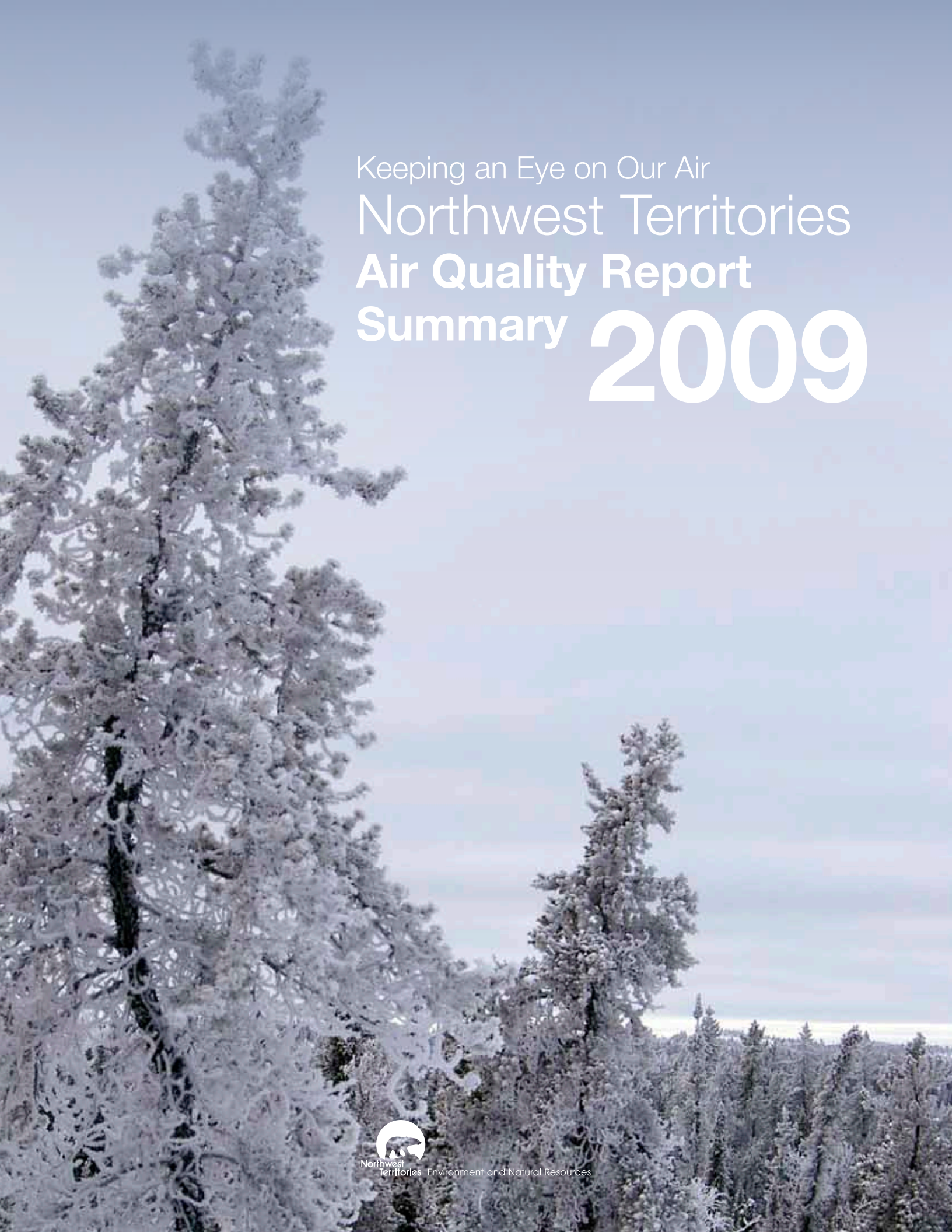

Keeping an Eye on Our Air

Northwest Territories
Air Quality Report Summary 2009

Northwest Territories Environment and Natural Resources

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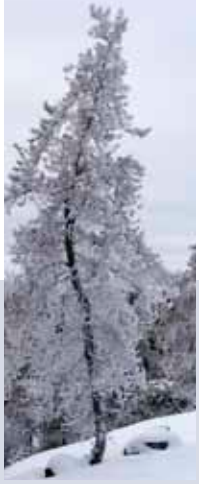
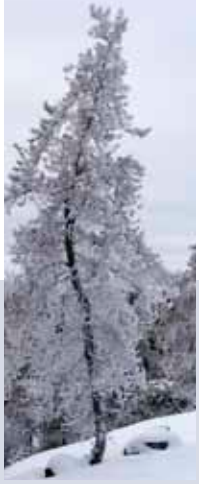




INTRODUCTION

The Department of Environment and Natural Resources (ENR) watches for changes in air quality. ENR monitoring stations located 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 web site on the Internet at http://www.air.enr.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. There are standards that describe the maximum amount of dust and chemicals that are allowable in ambient air. The naturally occurring levels of dust and chemicals in the air are called “background levels”. Human activities and unusual natural events such as forest fires 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. Smoke from fires burning in Alberta, Alaska, Yukon and the NWT caused fine dust pollution at all of the NWT stations in the past. This year, as in 2008, there was minimal pollution from forest fires.

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

OUR NETWORK

Environment and Natural Resources' permanent monitoring stations are located in:

- Yellowknife
- Inuvik
- Norman Wells
- Fort Liard

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

- Fine particle 'dust' ($PM_{2.5}$)
- Coarse particle 'dust' (PM_{10})
- Sulphur dioxide (SO_2)
- Nitrogen oxides (NO_x)
- Ground level ozone (O_3)

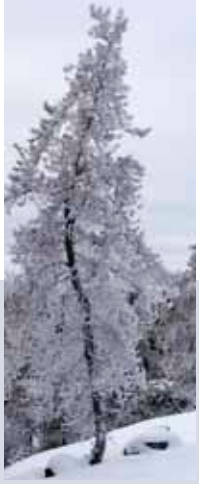
Also, testing is done for the following substances at selected stations:

- Hydrogen sulphide (H_2S)
- Carbon monoxide (CO)
- Particle Speciation
- Acidic Deposition at Snare Rapids

We determine the significance of measured levels by comparing them to the *NWT Ambient Air Quality Standards* adopted under the NWT *Environmental Protection Act*. In some cases, standards have not been developed for the NWT and so we use limits set by the federal and other provincial governments.

We also work with Canada-wide air quality networks:

- The Yellowknife and Inuvik stations are part of the National Air Pollution Surveillance (NAPS) Network. NAPS tests air quality in cities throughout Canada.
- Rainwater and snow sampled at Snare Rapids is part of the Canadian Air and Precipitation Monitoring Network (CAPMoN).



THE POLLUTANTS WE MONITOR AND THE PROBLEMS THEY CAN CAUSE

Our job is to watch 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 $PM_{2.5}$. High levels of $PM_{2.5}$ 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. PM_{10} particles are slightly larger than $PM_{2.5}$ particles, but are still inhalable and, therefore, they also cause health concerns.

We monitor the following gaseous substances:

Sulphur Dioxide

SO_2 can come from building heating, power generating plants, gas plant flares, oil refineries, and from forest fires. High levels can cause lung problems, especially for people with asthma. SO_2 can affect plants, especially lichens, and lead to the formation of other pollutants.

Nitrogen Oxide

The sources of NO_x are the same as SO_2 as well as vehicle emissions. High levels can cause serious breathing problems that can be ongoing. NO_x can also lead to formation of other pollutants.

Hydrogen Sulphide

H_2S smells like rotten eggs and can come from oil and gas activities and 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_3) that is found higher up in the atmosphere, where it is called stratospheric ozone. High in the atmosphere, O_3 is a good thing – it protects the planet from the sun's harmful ultraviolet rays. However, at ground level, O_3 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_x and substances called volatile organic compounds or VOCs). High levels can lead to chest tightness, coughing, wheezing and other heart and lung problems. The effect of O_3 on plants can be seen as discoloured leaves and general poor vegetation 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.

HIGHLIGHTS IN 2009

Throughout the NWT we continue to enjoy clean air with minimal effects from pollution. The dust and chemicals we find in the air are usually well below the amounts allowed by our standards.

The main causes of pollution we observe at our stations are from forest fires and springtime/summer dust. Fine particle 'dust' ($PM_{2.5}$) levels in 2009 were low because there were few major forest fire events. The forest fires in 2009 were primarily in the Yukon and Alaska, and as a result, the effects we observed at our stations were not as strong as if the fires were burning right in the NWT. Coarse particle 'dust' (PM_{10}) affected air quality in Yellowknife and Inuvik in the spring, and in Fort Liard throughout the summer. Other readings show us the effects on air quality from burning petroleum for heating and in our vehicles during the cold days of winter.

Yellowknife

Yellowknife air quality remained good for the most part, although the effects of springtime dust and forest fires were noticeable on occasion, similar to previous years.

- Forest fire smoke, measured as fine 'dust' ($PM_{2.5}$), was elevated in the air in Yellowknife on occasion in July and August.
- The coarse particle 'dust' (PM_{10}) monitor showed some high readings in April, corresponding with the residual gravel left on the roads after the snow melt. The levels came back down after the city conducted street sweeping.

Fort Liard

Fort Liard air quality remained excellent, with only some small effects of forest fire smoke measured in the summer. The dust from the gravel roads was measurable as PM_{10} in the snow-free months, but there were no exceedances of adopted standards. The natural gas developments in the area do not appear to be presently affecting the air quality in the community.

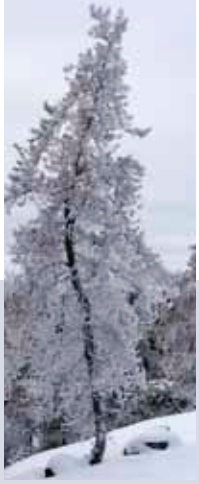
Norman Wells

Norman Wells air quality remained excellent, with only some small effects of forest fire smoke measured in the summer. The local oil and gas industry does not appear to be presently affecting the air quality in the community.

Inuvik

Air quality in Inuvik remained excellent for the most part, although the effects of dust were noticeable throughout the summer.

- Forest fire smoke, measured as fine 'dust' ($PM_{2.5}$), was elevated in the air in Inuvik on occasion in July and August.
- The coarse particle 'dust' (PM_{10}) monitor showed some high readings in the spring months related to the residual gravel on the roads following the snow melt.



EQUIPMENT AND QUALITY CONTROL

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.

There are two methods of testing for dust. One method to test for $PM_{2.5}$ and PM_{10} uses a vacuum pump that sucks air in through filters to catch the dust. Samples are collected on these filters in a machine called an Automated Partisol Dichotomous sampler, and sent to a laboratory for testing.

Another method to test $PM_{2.5}$ and PM_{10} uses machines called Beta-Attenuation Mass Monitors (BAM) that collects samples continuously instead of intermittently. This provides almost real-time data to ENR.

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.

Analyzers

Bam Head

NEED MORE INFORMATION?

After reading this summary, if you would like to find out more about air quality you can find the NWT Air Quality Report for 2009 on the Internet at:
http://www.enr.gov.nt.ca/_live/pages/wpPages/publications.aspx

or check out ENR's air quality web site at:
http://www.air.enr.gov.nt.ca/NWTAQ/NetworkSummary.aspx

You can also contact our Environment Division:
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