

# *Airshed Management Planning in Quesnel*

## **- A community initiative to improve air quality -**

### *What is Airshed Management Planning?*

Airshed Management Planning in Quesnel is a process aimed at improving air quality. It is overseen by a multi-stakeholder committee and the goal is to tackle virtually all sources of air pollution from back yard residential burning to large industrial sources.

Activities under the process include:

- additional monitoring of pollution sources;
- identifying present air pollution problems;
- producing an Airshed Management Plan, to identify short and long term steps for improving air quality in the community; and
- implementing these management solutions while maintaining jobs.

### *Is the present air quality hazardous to people's health?*

When asked the question, *“During the past 12 months, do you think any indoor or outdoor pollution issues have affected your health?”* one out of three Quesnel residents responded “Yes” to a Community Health Survey conducted in the winter of 1998. Of these individuals, 89% said they thought outdoor air quality was the cause.

- The air quality in Quesnel needs improvement. In fact, in 1998 air quality in downtown Quesnel was the worst in the province out of 28 residential continuous monitoring locations. The levels recorded in Quesnel are a concern from a public health perspective.
- Health authorities feel that the following health outcomes are linked to poor air quality:
  - increases in hospitalizations and emergency room visits due to asthma, chronic bronchitis, emphysema, other respiratory conditions; as well as heart conditions;
  - days absent from work or school and days of restricted activity;
  - decreases in lung function of children and asthmatic adults;
  - reduced lung function and capacity in children; and
  - increases in total mortality, as well as in mortality from respiratory or cardiac disease.
- Additional information on health effects can be found further on in this brochure.



## *Why is Airshed Management Planning important for Quesnel?*

Air quality problems affecting the physical and economic health of Quesnel are of great concern to residents, local environmental societies, health professionals, local government, the business community and industry. The Airshed Management Planning process, which was officially launched in December 1999, will address community air pollution concerns related to the health of local residents, and to the future economic development of the region.

- The Plan will address the region's health concerns by measuring all inhalable particulates on a continuous basis, by identifying the sources of air pollutants and by reducing overall particulate levels in the community.
- On the economic development front, the reduction of air pollution will result in an improvement in the region's air quality. This improvement is essential in order to encourage the development of value-added industry and tourism, and to promote the region to prospective employees and persons entering retirement.

## *What is the Quesnel Airshed?*

The Quesnel airshed refers to the mass of air contained in Quesnel and the immediate surrounding communities of the Cariboo Regional District, and particularly that air mass contained and affected by the natural topographical features at the confluence of the Quesnel and Fraser Rivers. The Ministry of Environment, Lands and Parks has defined this area on a map provided on the back page of this brochure. These boundaries are not all encompassing as there will be times when meteorological conditions will transport pollutants from outside the airshed into the Quesnel area (e.g. smoke from forest fires).

## *Who will do the Airshed Plan and how long will it take?*

- The community of Quesnel has a committee known as the Air Quality Roundtable that guides the development of the Airshed Plan.
- The Roundtable is composed of a cross section of the community and includes representatives from local industry, local and provincial government, regional and community health authorities, environmental groups, and concerned citizens groups. The Quesnel Environmental Society presently chairs the Roundtable.
- Development and implementation of the Plan will take approximately five years, although it is anticipated that some plan recommendations will take longer.
- The Roundtable has a detailed outline of how the process will proceed.



## *How will the Airshed Plan address sources of pollution that are deemed to be a problem?*

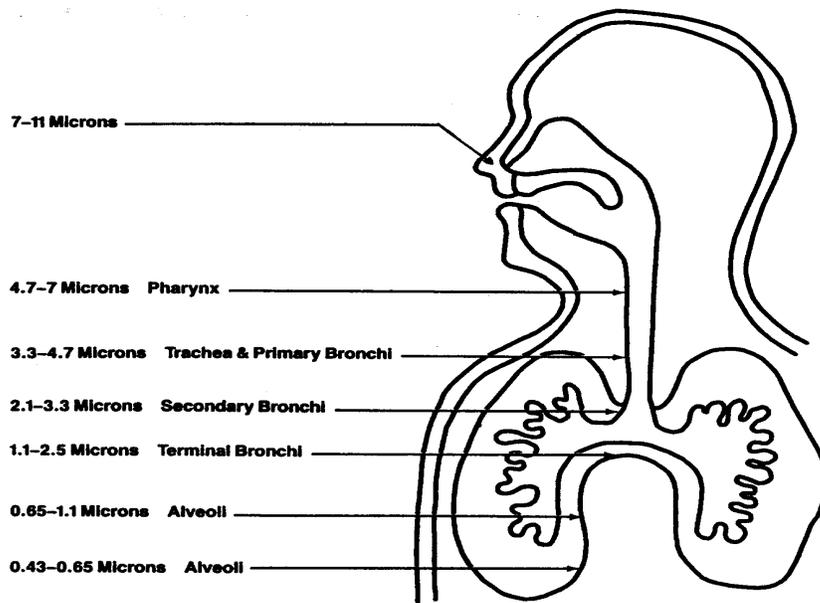
Once air quality monitoring and assessment work has identified emission sources and their relative contributions to poor air quality, the goal will be to:

- ensure that existing commercial and industrial sources are using the best technology available to treat air emissions;
- use Pollution Prevention Plans to systematically reduce point and non-point (diffuse) sources of industrial pollution;
- implement dust control measures at strategic locations in the airshed;
- institute better regulation of all types of burning; and
- suggest innovative approaches to reducing emissions from all types of motor vehicles.

## *What is suspended particulate matter and PM<sub>10</sub>?*

- Suspended particulate matter refers to airborne particles that range in size from 0.001 micrometers ( $\mu\text{m}$ ) to 100  $\mu\text{m}$  (the period at the end of this sentence is about 500  $\mu\text{m}$  in diameter). These particles vary in chemical composition, size and shape, depending on their origin.
- PM<sub>10</sub> refers to suspended particulate matter less than 10  $\mu\text{m}$  in diameter. Particles larger than 10  $\mu\text{m}$ , such as flyash, settle out close to the emission source relatively soon after being emitted. Particles smaller than 10  $\mu\text{m}$  (PM<sub>10</sub>) can remain suspended in the atmosphere for long periods of time and travel great distances from the source.
- While large suspended particulates, such as flyash, may cause a nuisance or aesthetic problem, fine particulates (less than PM<sub>10</sub>) have the greatest effect on human health. Recent health and medical studies have shown that PM<sub>10</sub> has extensive and serious human health impacts (Vedal, 1995) – see page 7 for more information on health. There is also evidence suggesting that the smaller the particle, the greater the health risks as these tiny particles are inhaled deeply into the lung cavity.

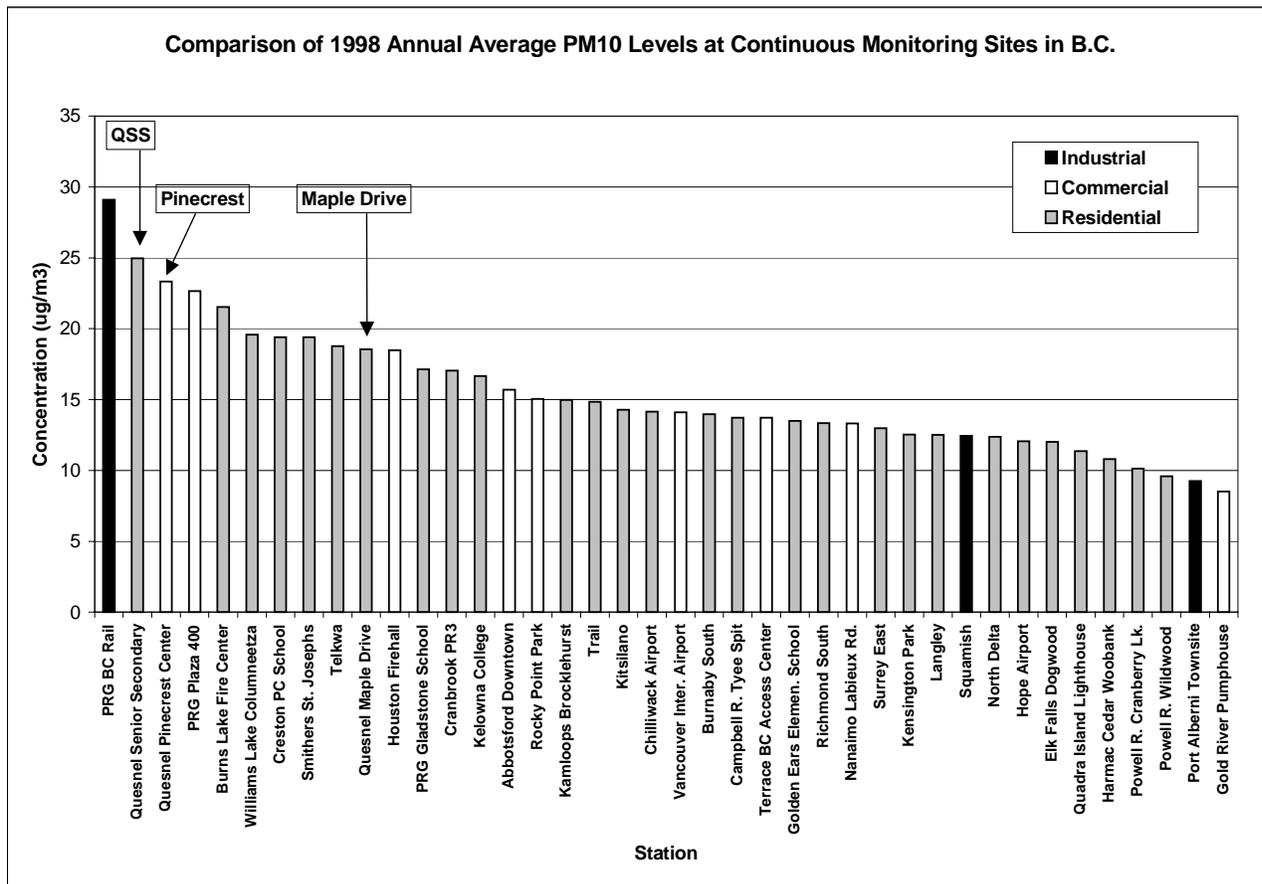




Particle size deposition for particles of varying sizes.

- $PM_{10}$  is further divided into a coarse and fine fraction, as particles in each fraction generally differ in chemical composition, source and behavior in the air.
  - The fine fraction of  $PM_{10}$  includes particles 2.5 micrometers ( $\mu m$ ) in diameter and less. This size fraction is generally composed mainly of secondary particulates, i.e. particles formed from physical and chemical reactions involving gases such as oxides of nitrogen, sulphur and ammonia, and volatile organic compounds (VOCs) that are emitted into the air.
  - Particles less than 2.5  $\mu m$  are thought to have even greater health impacts than coarser particles because of their ability to penetrate to the deepest regions of our lungs. These particles are also very efficient at scattering/absorbing light and are responsible for regional haze and smog.
  - The coarse fraction of  $PM_{10}$  includes particles between 2.5 and 10 micrometers in diameter. This is the size fraction most often associated with natural sources such as soil particles and fibres.
- The following figure shows how  $PM_{10}$  monitoring sites in Quesnel compare to other monitoring locations in the province in 1998.





### What are the main sources of air pollutants that contribute to poor air quality in Quesnel?

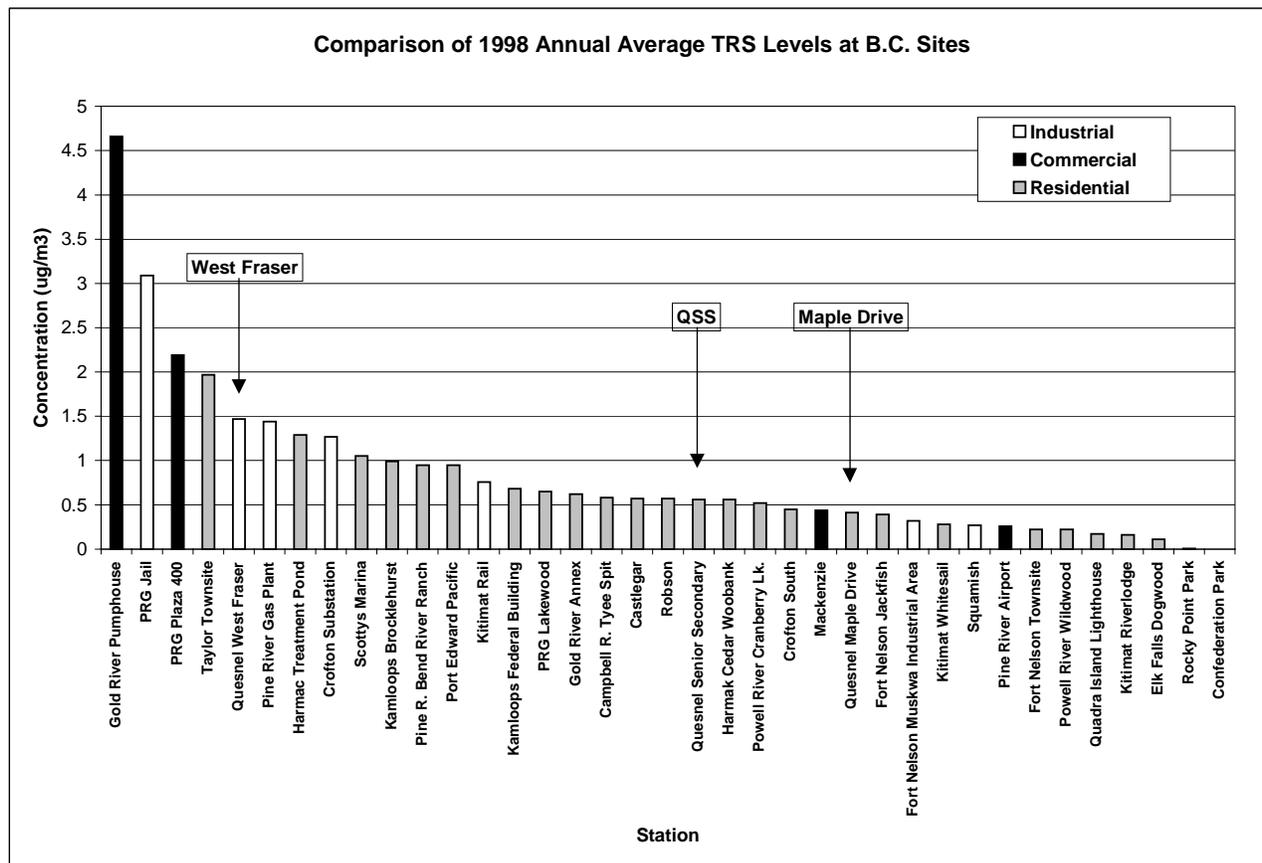
- It has been determined that the main thing that drives poor air quality episodes in the Quesnel area is PM<sub>10</sub>.
- There are a wide variety of natural and anthropogenic (man-made) sources of PM<sub>10</sub> in the Quesnel area. Some sources include wind blown dust, pollens and spores, windblown agricultural soils, road and construction dust, industrial processes, wood waste burners, sawmill cyclones, pulp mills, wild fires, prescribed burns, open burning, back-yard burning, home and commercial heating (primarily wood stoves), automobile/truck and train emissions (especially diesel), quarrying activities, etc.

### What is TRS and what's that smell?

- Total Reduced Sulphur (TRS) is a colorless gas that is considered to be a nuisance odour pollutant. At detectable concentrations, TRS is characterized by an offensive odour similar to rotten eggs.



- TRS describes a group of gases primarily made up of four compounds: dimethyl disulphide (DMDS), dimethyl sulphide (DMS), methyl mercaptan (MESH), and hydrogen sulphide (H<sub>2</sub>S). These compounds are formed largely as by-products of the Kraft pulping process, that is, these compounds are not added directly during pulp production but form because of the use of other sulphides in the Kraft pulping process.
- The figure below shows how Quesnel TRS monitoring locations compared with others in the province in 1998.



- Natural sources of TRS include swamps, bogs and marshes.
- Sources of TRS in the Quesnel airshed include Cariboo Pulp and Paper (CPP), Quesnel River Pulp (QRP) and, to a small extent, automobiles (catalytic converters) and natural sources. CPP uses the Kraft pulping process and therefore emits the largest amount of TRS through process stacks (recovery boiler, lime kiln, etc.) and effluent treatment works (condensate stripper). QRP is a thermal mechanical pulp mill and its largest source of TRS compounds is the anaerobic effluent treatment system.



## Does odour associated with TRS mean POOR air quality?

Unfortunately, there is no definite answer to this question.

- TRS is considered a nuisance odour pollutant. In other words, although these pollutants are objectionable, they do not pose a concern to health or the environment at concentrations typically recorded in Quesnel. For instance, Methyl Mercaptan, the most odourous of the TRS compounds, can be detected by sensitive individuals at concentrations as low as  $0.2 \mu\text{g}/\text{m}^3$  or about 0.1 parts per billion (ppb). Therefore, just because TRS is detectable it doesn't necessarily mean that air quality is poor from a health perspective.
- It should also be noted that TRS in Quesnel is primarily linked to pulp mill emissions. There may be instances when TRS is not detectable in an area because light winds are dispersing pulp mill emissions well, but air quality is poor due to localized less-buoyant  $\text{PM}_{10}$  sources such as wood stoves or road dust. In this case, TRS is not a good indicator of air quality conditions. There are instances however, when weather patterns trap all air pollutants in the valley bottom and TRS will be evident during a poor air quality episode.
- A better air quality indicator is regional visibility. The presence of fine particles in the air reduces the distance at which we can see the colour, clarity and contrast of far away objects because the particles in the atmosphere scatter and absorb light. For instance, when we notice a blue or brown haze in the airshed, chances are that  $\text{PM}_{10}$  levels are building and air quality is less than perfect.

## What are the health effects of $\text{PM}_{10}$

- A University of BC professor and BC Lung Association researcher, Dr. Sverre Vedal, conducted a study entitled *Health Effects of Inhalable Particles: Implications for British Columbia*. Vedal's study points out that "While air pollution is composed of different types of pollutants, fine particulates (or inhalable particles) are considered a greater health hazard than some higher profile pollutants such as ground level ozone, sulphur dioxide and carbon monoxide." Studies suggest that fine particulates and sulphate together are more potent contributors to increased deaths and burden of illness than are the larger particulates.
- Dr. Vedal's study revealed that, in BC, fine particulates contribute annually to at least 82 deaths (compared to about 570 deaths reported by the Provincial Health Officer as attributable to breathing second hand tobacco smoke).
- Of the premature deaths attributed to fine particulates, more than 3 out of 4 are estimated to occur in smaller population centers (outside the Greater Vancouver, Capital and Nanaimo Regional Districts).



- If the model presented by Dr. Vedal is applied to the Quesnel situation, using air monitoring and mortality data, it results in a conservative estimate of 2 premature deaths \* per year attributable to fine particulate air pollution..
- Mortality is, of course, only one measure of negative health outcomes. Other health problems associated with PM<sub>10</sub> were discussed on page 1. These undesirable health outcomes attributable to particulates are also proportionately higher in the smaller population centers.
- Further, it has been argued that the health effects of particulate matter air pollution reported in studies represent only the ‘tip of the iceberg’. These more obvious effects could be only the most visible outcomes of a much greater burden of illness in the general population that, although less critical, may be impairing or have the potential for future impairment of quality of life (from *Ambient Particulate Matter: An Overview*).
- There appears to be a threshold level for exposure to particulates. Below certain levels of particulate matter in the air, no adverse health effects have been demonstrated. The currently accepted level of particulates (PM<sub>10</sub>) below which no adverse health effects have been demonstrated is 25 ug/m<sup>3</sup> (daily average).

### *What can the individual homeowner do to help improve air quality?*

Many emissions are created by our own lifestyle choices, such as driving a poorly maintained vehicle or using an old smoky wood stove. Here are some tips on how you can reduce sources of PM<sub>10</sub> and other pollutants in Quesnel.

- Carpool, better yet, walk or ride a bike. Leaving the car at home will also mean less road dust kicked up into the air from motorists. Make sure your car is well tuned and does not burn oil. When purchasing a vehicle, look for fuel efficiency and low emissions.
- If you burn wood for heating your home or business buy an efficient, CSA certified wood stove that is installed and operated correctly. New wood stoves can reduce smoke emissions by 90%. Also, overloading your stove, starving the fire of air or burning wet or green wood can cause lots of extra smoke. Use only dry, seasoned, split firewood that is properly stored. Convert your wood burning fireplaces to natural gas. Traditional fireplaces do not have any emission control devices to protect the air.
- Be conscious of daily air quality. If there is a temperature inversion or calm winds, don’t contribute to a possible air quality episode by burning or unnecessary driving.
- Instead of burning your leaves, dead grass or clippings, start a backyard compost. Also, don’t burn your garbage in burn barrels as this releases hazardous pollutants into the air.

---

\* Printed on recycled paper.

\*The calculation of 2 premature deaths is based on certain assumptions and approximations. Particulate matter monitoring is limited to a few specific sites. The recommended threshold level for PM<sub>10</sub> increments has recently been changed. As a result, estimates of premature deaths due to particulates in the air in Quesnel have ranged from one every two to three years to just over 2 per year







**For more information, Please contact:**

Pollution Prevention  
Ministry of Environment, Lands and Parks  
400-640 Borland Street  
Williams Lake, BC  
V2G 4T1  
Telephone: (250) 398-4530

Chair, Quesnel Air Quality Roundtable  
c/o City of Quesnel  
405 Barlow Avenue  
Quesnel, BC  
V2J 2C3  
Telephone: (250) 992-2111

**Quesnel Air Quality Roundtable Membership:**

Quesnel Environmental Society, Ministry of Environment, Lands and Parks, City of Quesnel, Cariboo Pulp and Paper Co., Quesnel River Pulp, Weldwood of Canada Ltd., Slocan Forest Products Ltd., Cariboo Community Health Services Society, Ministry of Forests, Quesnel Waste Disposal, West Fraser Mills Ltd., Argo Road Maintenance, Ministry of Transportation and Highways, North Cariboo Share, United Concrete and Gravel, North Quesnel Neighborhood Association.

A number of pamphlets are available to the public which provide information on various air pollutants and what you can do to help clean the air in your community. Please contact the Ministry of Environment, Lands and Parks or the Cariboo Health Unit.

