

PRINCE GEORGE AIR QUALITY  
MANAGEMENT PLAN  
-PHASE ONE-

*Progress Report*

Phase One of Plan Prepared by  
Prince George Airshed Technical Management Committee

Progress Report Prepared by the Prince George Air Quality  
Implementation Committee

June 28, 2004

## EXECUTIVE SUMMARY

*The Prince George City Council and the Fraser-Fort George Regional District Board approved the “Prince George Air Quality Management Plan (PGAQMP)- Phase One”, hereafter referred to as ‘the Plan’, in 1998. The fundamental motivation for creating the Plan was overwhelming evidence that poor air quality in the Prince George airshed was impacting the health and quality of life of our residents. The plan’s implementation is the responsibility of the Prince George Air Quality Implementation Committee. This committee is a multi-stakeholder group (representatives from government, industry, the public, and UNBC), which meets on a regular basis to discuss how best to implement the Plan- Phase One and begin work on Phase Two.*

*The Plan- Phase One identifies measures to improve air quality in the Prince George airshed, in particular to achieve acceptable levels of fine particulate matter. It contains 28 recommendations for actions to reduce and manage pollutant sources, including industrial emissions, road dust, and residential sources such as open burning and woodstoves. The Plan also addresses land use planning issues, poor air quality episode management, and the monitoring and research required to measure progress and to identify future management needs. Some of the recommended actions have been completed or are being implemented.*

*This Progress Report of the Air Quality Management Plan has been prepared by the Prince George Air Quality Implementation Committee and is based on input gathered from this multi-stakeholder committee and information gathered over the last five years. The Management Plan is the first phase of an ongoing process of reducing or preventing increases in emission sources, and monitoring air quality.*

*Where are we now?? In the past 5 years, the ambient fine particulate trends indicate that  $PM_{10}$  (Particulate Matter  $10\mu\text{g}/\text{m}^3$  or smaller) levels have declined quite significantly throughout the airshed though this sizeable reduction has not been observed in  $PM_{2.5}$  (Particulate Matter  $2.5\mu\text{g}/\text{m}^3$  or smaller). At College Heights, although  $PM_{10}$  levels have declined substantially, it is not possible to determine if that reflects the effects of reduction, and then elimination of beehive burner emissions, or just the effects of road dust reduction, since  $PM_{2.5}$  has never been monitored there.*

*There have been a number of recommendations from the Prince George Air Quality Management Plan that have been completed since its approval in 1998. On the following pages is a table indicating the recommendations and their status at the present.*

*Progress is still needed. Research is ongoing in this airshed and the goal is to take into account science based conclusions for local airshed management planning. The next steps in the Prince George air quality planning process are to begin work on Phase Two and continue the work towards the completion of those recommendations already in progress. Public consultations and workshops will be held to generate feedback on those recommendations suggested by the Prince George Implementation Committee and ways to incorporate community concerns and actions into Phase Two.*

## Prince George Air Quality Management Plan Recommendations

#	Recommendation	Status of Completion
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<b>BEEHIVE BURNERS</b>		
1	Burning be eliminated at the following beehive burners according to the schedule set by the provincial cabinet. <ul style="list-style-type: none"> <li>· Northwood Rustad Mill burner</li> <li>· Canfor Netherlands Overseas Mill</li> <li>· Carrier Lumber Mill burner</li> </ul>	Completed

<b>DUST FROM STREET SANDING, PAVED AND UNPAVED AREAS AND OTHER SOURCES</b>		
2	The City expand its program to use winter abrasives that generate less fine particulate matter	Ongoing
3	The City do more frequent sweeping of municipal streets and additional dust control on unpaved high traffic routes, to further reduce dust levels	Ongoing
4	MWLAP request the Ministry of Transportation and Highways to implement similar measures on provincial highways within the City Bowl	Completed
5	The management agencies request the Ministry of Forests to set a schedule for hard surfacing the portion of the Willowdale Forest Road within the Fraser River floodplain	Completed
6	The management agencies request B.C. Rail and C.N. Rail to set schedules for paving, or otherwise effectively controlling dust, on any remaining unpaved traffic areas within the BCR and CNR Industrial Sites	Completed
7	The City require paving of all traffic areas permitted for new industrial and commercial developments	Phase Two
8	The City establish guidelines and standards, for all paved commercial and public parking lots, to mitigate the release of fine dust from sanding and sweeping, and from storage and disposal of the sweepings	Completed

<b>PULP MILL SOURCES</b>		
9	Further reductions in pulpmill particulate emissions be done according to the plans provided by the operators, as follows: · Canfor upgrade of Intercon power boiler by the end of 1998; and, · Northwood reduction of pulpmill particulate emissions from sources that will be chosen following a modelling of dispersion of PM <sub>10</sub> from various pulpmill sources	Completed
<b>OPEN BURNING</b>		
10	The City ban all open burning on properties of less than 5 acres, and on all properties in the Bowl	Completed
11	The Regional District continue to advise residents of the hazards of open burning, and the availability of facilities to reuse, compost or properly dispose of burnable materials at the Foothills Boulevard Regional Landfill	Completed

<b>WOOD BURNING APPLIANCES</b>		
12	The City promote minimization of the use of wood burning appliances in the City	Ongoing
13	The City prohibit the burning of wood in residential neighbourhoods during PM <sub>10</sub> air quality advisories, except where wood is the primary heating source	Completed
14	The City and Regional District require that any new or replacement wood burning appliance meets the standards in the B.C. Solid Fuel Burning Domestic Appliance Regulation	Completed

<b>TOTAL REDUCED SULPHUR (TRS) MANAGEMENT ACTIONS</b>		
15	MWLAP require the owners of the highest priority TRS sources to prepare pollution prevention plans for additional emission reductions, to achieve full compliance with the Level B ambient objective, and to further reduce the level of exceedances of the Level A objective	No Further Action Needed
16	Air quality considerations be incorporated into the Prince George Official Community Plan, including transportation efficiency and alternative transportation, and into the Regional District Community Plans during the next plan reviews	Completed
17	The City and Regional District identify new areas for heavy industrial development, taking potential air quality effects into account	Completed
18	The City refer all proposals for significant new emissions to MWLAP for review	Completed

<b>PREVENTION OF AIR QUALITY PROBLEMS</b>		
19	MWLAP evaluate the acceptability of new sources of air contaminants, especially PM10, TRS, SO2 and NOx , based on use of the “lowest achievable discharge rate”	No New Sources have been Located
20	The City promote reductions in vehicle emissions and request Environment Canada to conduct a mobile emission testing program	Completed

<b>MANAGEMENT OF POOR AIR QUALITY EPISODES</b>		
21	MWLAP require owners of the most significant fine particulate sources to provide plans for temporarily reducing emissions during air quality advisories	Ongoing
22	The feasibility of predicting fine particulate episodes be reviewed by the Airshed Technical Management Committee, and any feasible methods be implemented as soon as available	Ongoing

<b>MONITORING AND RESEARCH</b>		
23	That the current air monitoring program be continued until an evaluation of effectiveness and participation is completed in 1998	Ongoing
24	A health study steering group be established to determine the need for, and to design, any required air quality effects studies, and the study be started no later than the year 2000	Phase Two
25	Research be initiated, with particular emphasis on determining and controlling the effects of fine particulates (PM10 and PM2.5), to consider the following: <ul style="list-style-type: none"> <li>· monitoring of the contribution to fine particulate levels of those secondary particulates that originate from SO2 and NOx emissions;</li> <li>· determining the effect of meteorological factors on ambient fine particulate trends;</li> <li>· determining the contribution of individual fine particulate sources to ambient levels; and</li> <li>· defining “permissible exceedance levels” for PM10 and other priority ambient air quality objectives.</li> </ul>	Ongoing/ Phase Two

<b>RESPONSIBILITIES OF THE MANAGEMENT AGENCIES</b>		
26	Prior to finalizing the Management Plan, the management agencies reach an agreement on responsibilities for consultation and coordination of permitting, community planning, and other administrative and regulatory actions that may affect air quality	Completed
27	The management agencies establish an Air Quality Steering Committee to oversee the implementation of the Management Plan Actions and to establish subgroups as needed to manage specific tasks	Completed

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## **INTRODUCTION**

The Prince George City Council and the Fraser-Fort George Regional District Board approved the “Prince George Air Quality Management Plan (PGAQMP)- Phase One”, hereafter referred to as ‘the Plan’, in 1998. The fundamental motivation for creating the Plan was overwhelming evidence that poor air quality in the Prince George airshed was impacting the health and quality of life of our residents.

The Plan- Phase One identifies measures to improve air quality in the Prince George airshed, in particular to achieve acceptable levels of fine particulate matter. It contains 28 recommendations for actions to reduce and manage pollutant sources, including industrial emissions, road dust, and residential sources such as open burning and woodstoves. The Plan also addresses land use planning issues, poor air quality episode management, and the monitoring and research required to measure progress and to identify future management needs. Some of the recommended actions have been completed or are being implemented.

The Plan has also identified the need to form an implementation committee whose primary role is to assist in implementing the Plan, and in making recommendations concerning future phases of the Plan. The committee includes representatives from all major community stakeholders in air quality management.

## **PURPOSE OF REPORT**

This Update (2004) of the Air Quality Management Plan has been prepared by the Prince George Air Quality Implementation Committee and is based on input gathered from this multi-stakeholder committee and information gathered over the last five years. The Management Plan is the first phase of an ongoing process of reducing or preventing increases in emission sources, and monitoring air quality.

The intent of this update is to present progress reports for the recommendations arising from Phase One actions.



## 1.1 AIR QUALITY MANAGEMENT PRINCIPLES AND OBJECTIVES

Preparation and implementation of the Management Plan should be guided by the following principles:

1. Acceptable air quality is everyone's right; protecting air quality is everyone's responsibility.
2. Acceptable air quality is an important contributor to a healthy community and a sustainable economy.
3. Achieving acceptable air quality requires that local, provincial and federal government agencies work together. Public and industry involvement is also necessary.

The objective of the Management Plan is:

To achieve and maintain acceptable air quality by reducing the emission of those air contaminants that are causing unacceptable air quality, and by preventing future air quality problems from developing.

To achieve this objective most effectively, the management agencies must:

1. Set priorities for emission reductions;
2. Take a staged approach to implementing the management actions;
3. Monitor the effectiveness of the plan and research future needs;
4. Anticipate and take steps to prevent new air quality problems from developing;
5. Find funding to carry out the plan; and
6. Obtain input from the public, industry, health professionals and environmental groups.

# PHASE ONE PROGRESS REPORT MANAGEMENT RECOMMENDATIONS AND UPDATE 2004 PROGRESS REPORTS

## 2.1 FINE PARTICULATE MANAGEMENT ACTIONS

### BEEHIVE BURNERS

1. Burning be eliminated at the following beehive burners according to the schedule set by the provincial cabinet.
  - Northwood Rustad Mill burner
  - Canfor Netherlands Overseas Mill burner
  - Carrier Lumber Mill burner

*Update 2004:* This recommendation has been completed. Burning has been eliminated from all beehive burners in the Prince George Airshed. In 1992 eleven burners were operating in the airshed. At the end of 2000 the last burner was shut down. One burner was shut down with the closure of the Netherlands Overseas Sawmill, white wood residues from some mills was moved to Pellet Flame for the manufacture of wood pellets and the bulk of the residue has been redirected to the Canfor Pulpmills. A series of power boiler upgrades has allowed for the increased capacity to turn this wood residue into green energy.

On May 8, 1978, Carrier Lumber Ltd. was issued Permit PA-004680 allowing the operation of two (2) beehive burners at the Prince George mill site. By December 2000, both beehive burners had ceased operation. An amendment to the Carrier permit on December 22, 2000, allowed Carrier Lumber to operate a modified silo burner. The new McPherson incinerator operated for test purposes only on May 23, 2001. Since this testing, the incinerator has not been in operation. All wood residue for our mill is presently removed off site by trucks. Carrier plans more testing on the McPherson incinerator at an undetermined later date, in compliance with the amended permit, and retains the right to use the incinerator should the need arise.

### DUST FROM STREET SANDING, PAVED AND UNPAVED AREAS AND OTHER SOURCES

2. The City expand its program to use winter abrasives that generate less fine particulate matter;

*Update 2004:* The City of Prince George has expanded its program such that Winter Fracture is used on any arterial roads outside the Downtown Core that was in the original pilot area. This is still generally restricted to roads within the Bowl - 5th, 15th, etc. This is still a cost issue and in addition the City has been reluctant to spread this use liberally without knowing/monitoring complaints on rock damage to windshields. It should also be remembered that the City has now completed installation of pre-wetting equipment on 8 of 9 sand trucks. By pre-wetting the City should be able to reduce the

use of its normal winter sand product. This winter season the City has set up standards for spread rates that measure the volumes of materials that they apply to the various winter road conditions. Until this season the City has relied heavily on the driver's judgement to apply the right product at the right time and in the right quantity. Unfortunately as winter seasons can vary dramatically in their demands for the use of abrasives, it is very difficult to tell how effective these strategies are until the City begins to see some trends in product use over some years. Annual product use is posted to the City's website.

- 3. The City do more frequent sweeping of municipal streets and additional dust control on unpaved high traffic routes, to further reduce dust levels;**

*Update 2004:* In 2002, Council approved a second round of dust control on gravel roads and lanes. The City has included the paving of Ryan Road (approx 200m of existing gravel road). This is not a Local Improvement Project (cost shared) as the City would normally do under the Gravel Road Paving Policy. The City modified the policy to include gravel roads in the Bowl that may be paved by the City to complement our Air Management Plans and funds 100% of the cost of these roads.

At the Plaza 400 Building site (4<sup>th</sup> avenue), where PM<sub>10</sub> and PM<sub>2.5</sub> have been measured simultaneously on an hourly basis since 1997, it is apparent that, at least since that time, the coarse fraction (PM<sub>10</sub> minus PM<sub>2.5</sub>) has been reduced, but the fine fraction (PM<sub>2.5</sub>) has remained relatively unchanged. Because road dust normally contains much more of the coarse, than the fine particulate fraction, the PM trends at Plaza are likely showing the beneficial effects of the City's dust management measures, rather than the reduction of combustion sources such as beehive burners and pulpmill power boiler emissions.

- 4. MWLAP request the Ministry of Transportation and Highways to implement similar measures on provincial highways within the City Bowl;**

*Update 2004:* This recommendation has been completed. In March 2003, the Ministry of Transportation and Highways inserted a clause into its renewed highway maintenance contracts requiring contractors to comply with all local bylaws. Once the Clean Air Bylaw has been amended to include standards for cleaning paved roads, then MOTH contractors will have to comply with the dust suppression requirements.

- 5. The management agencies request the Ministry of Forests to set a schedule for hard surfacing the portion of the Willowcave Forest Road within the Fraser River floodplain;**

*Update 2004-* This recommendation has been completed. The Willowcave Forestry Road User Group completed the hard surfacing project of a portion of the Willowcave Forest Road extending between Penn Road to the Carrier mill site. This completed paving project has eliminated the road dust on the portion of the road most travelled.

6. **The management agencies request B.C. Rail and C.N. Rail to set schedules for paving, or otherwise effectively controlling dust, on any remaining unpaved traffic areas within the BCR and CNR Industrial Sites;**

*Update 2004:* This recommendation has been completed. CN Rail activities in Prince George have been further consolidated into a single building, formerly the Mechanical Shop. The yard office and automotive garage have been demolished, the wheel shop is currently closed, and the former Work Equipment Shop is being used by the railway museum. The area around the Mechanical Shop, including the employee parking area, is paved, so there is very little vehicular traffic on gravel roads.

Dust suppressants are applied to unpaved roads in the yard used for train inspections and fuelling by CN and its contractors. CN already uses asphaltic emulsions at most locations for controlling fugitive dust emissions on unpaved roadways. We have found these products to be far more effective than lignin sulphonate or magnesium chloride.

A large scale consolidation of BCR's facilities in the Prince George Yard, from 7 to 3 maintenance shops, has occurred within the last year. Shop facilities are now concentrated at the southwest corner of the yard substantially reducing vehicular traffic between facilities (December 2002). All major roads, crossings and parking lots within the yard are now paved (May 2003). Secondary private roads within the yard, used exclusively by company personnel for rail car or track inspection purposes, continue to be treated periodically in non-winter months using dust suppressants.

The monitoring of a new generation of asphalt based dust suppressants is also underway in Prince George Yard. Preliminary results indicate superior effectiveness and longevity to the lignin sulfonate based products that have been used in the past for dust control in rail yards.

7. **The City require paving of all traffic areas permitted for new industrial and commercial developments;**

*Update 2004:* The City of Prince George is in the process of revising the Zoning bylaw and options for the enhancement of dust suppression and road surfacing materials will be examined as part of the revision.

8. **The City establish guidelines and standards, for all paved commercial and public parking lots, to mitigate the release of fine dust from sanding and sweeping, and from storage and disposal of the sweepings;**

*Update 2004:* This recommendation has been completed. Dust suppression restrictions were incorporated into the Clean Air Bylaw (2001), which includes the use of water or other dust suppressing liquids, that must be applied to the paved areas prior to or during sweeping operations in amounts sufficient to minimize the generation of dust, or by using a dry vacuum streetsweeper.

## PULP MILL SOURCES

9. Further reductions in pulpmill particulate emissions be done according to the plans provided by the operators, as follows:
  - Canfor upgrade of Intercon power boiler by the end of 1998; and,
  - Northwood reduction of pulpmill particulate emissions from sources that will be chosen following a modelling of dispersion of PM<sub>10</sub> from various pulpmill sources.

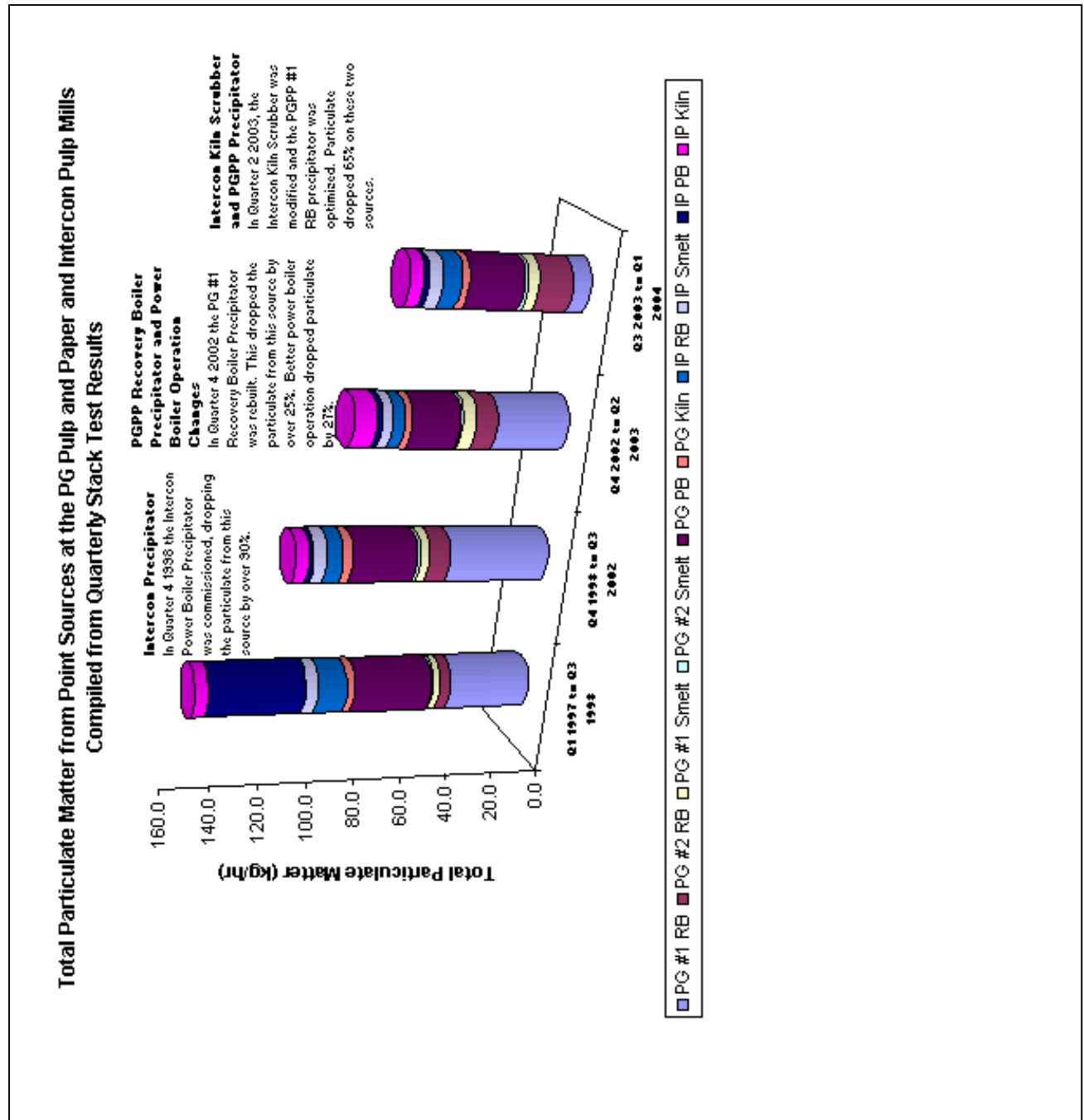
**Update 2004:** A precipitator was installed on the Canfor Intercon power boiler at a cost of \$7 million in 1998. This installation had the effect of reducing total particulate emissions from the Intercon mill by over 50%.

Northwood retained Jacques Whitford Consulting to conduct a modeling study. The purpose of this work was to predict the benefit to the local airshed of emissions reductions at the pulpmill. The recommendation that originates from the report emphasizes that opportunities to affect real improvements would require a better understanding of the impact of all sources on local air quality. This information would be used to support a cost/effectiveness based approach to airshed management. Since that time significant improvements have been made at the two pulpmills that are 8km closer to the City.

- A new precipitator was installed on the recovery boiler at Prince George Pulp and Paper in 2002;
- Operational changes at the Prince George Pulp and Paper power boiler reduced particulate emissions by over 25%; and,
- Upgrades to the Intercon lime kiln scrubber were completed in 2003.

Since fall of 1998, current combined particulate emissions (all source at the two mill sites) have been reduced by an average 47% from the Intercon and Prince George Pulp and Paper mills. Please refer to Figure 1: Total Particulate Matter from Point Sources at the PG Pulp and Paper and Intercon Pulp Mills.

Figure 1: Total Particulate Matter from Point Sources at the PG Pulp and Paper and Intercon Pulp Mills.



## OPEN BURNING

10. **The City ban all open burning on properties of less than 5 acres, and on all properties in the Bowl;**

*Update 2004:* Open burning Restrictions were incorporated into the Clean Air Bylaw (2001). The Bylaw has a number of policies that regulate the combustion of yard and garden waste including outdoor burning in a container. Open burning is prohibited to take place within the area of the City delineated by the Open Burning Ban Boundaries that takes in the bowl area including the North Nechako area and lower College Heights. Another important aspect of the Bylaw is that no open burning can occur if an Air Quality Advisory has been issued including recreational fires.

The City of Prince George recommends that the definition for Open Burning be updated by the creation of a definition for Land Clearing Debris, Demolition and Construction Waste, and Nuisance. The new definition will provide further information and definition clarity.

11. **The Regional District continue to advise residents of the hazards of open burning, and the availability of facilities to reuse, compost or properly dispose of burnable materials at the Foothills Boulevard Regional Landfill;**

*Update 2004:* This recommendation has been completed. The Regional District Fraser Fort George (RDFFG) continues to run newspaper ads each spring and fall to promote the availability of centralized composting facilities and encourage use. The RDFFG also promotes home (backyard) composting as an alternative to burning. REAPS provides home composting education and promotion by way of contract with the RDFFG.

The RDFFG has recently completed a feasibility study concerning source-separated organics composting (collection, processing and marketing) within the City of Prince George. Study concepts include curbside collection service for residential sourced food and yard wastes and development of an in-vessel composting facility to process the materials.

## WOOD BURNING APPLIANCES

12. **The City promote minimization of the use of wood burning appliances in the City;**

*Update 2004:* The City and the Ministry of Water, Land, and Air Protection have conducted Burn It Smart Workshops and are in the process of creating a Woodstove Exchange program. The goal of a wood stove change out is to encourage homeowners, through incentives, to trade in uncertified, dirty-burning wood stoves and replace them with new, EPA and CSA certified, clean burning appliances. The changed out stoves are recycled, not resold. The following two objectives will also be achieved:

1. to raise awareness of and educate the wood burning public about, the importance of efficient, safe, smoke-free wood burning; and
2. to encourage wood burners to take action to improve their ability to burn wood smoke-free, efficiently and safely by offering information and financial incentives for positive change.

**13. The City prohibit the burning of wood in residential neighbourhoods during PM<sub>10</sub> air quality advisories, except where wood is the primary heating source;**

*Update 2004:* This recommendation has been completed. Woodburning Restrictions were incorporated into the Clean Air Bylaw (2001). The Bylaw has a number of policies that regulate the use of a woodburning appliance at any time when an air quality advisory has been issued and remains in effect. There are some provisions for those persons who are considered to be Sole Woodburning Heat User. A Sole Woodburning Heat User means those premises that use woodburning appliances as their ONLY source for heating and which are not equipped with any other source of heating facility.

It is important to note that Pellet stoves and Gas-fired fireplaces are exempt from this Bylaw since they have low emissions.

**14. The City and Regional District require that any new or replacement wood burning appliance meets the standards in the B.C. *Solid Fuel Burning Domestic Appliance Regulation*;**

*Update 2004:* This recommendation has been completed. Requirements for Installation of Woodburning Appliances were incorporated into the City of Prince George Clean Air Bylaw (2001). The Bylaw states that no woodburning appliance may be installed in a building unless it meets Canadian standard or US EPA standard for emissions.

## **2.2 TOTAL REDUCED SULPHUR (TRS) MANAGEMENT ACTIONS**

**15. MWLAP require the owners of the highest priority TRS sources to prepare pollution prevention plans for additional emission reductions, to achieve full compliance with the Level B ambient objective, and to further reduce the level of exceedances of the Level A objective;**

*Update 2004:* Given the priority on reducing fine particulate levels, no further actions have been taken to reduce TRS sources.



## 2.3 COMMUNITY AND REGIONAL PLANNING

16. Air quality considerations be incorporated into the Prince George Official Community Plan, including transportation efficiency and alternative transportation, and into the Regional District Community Plans during the next plan reviews;

*Update 2004:* This recommendation has been completed. The City of Prince George has incorporated air quality into its Official Community Plan (2001). The following is an excerpt from that document.

### *Air Quality*

*Improving air quality in the City of Prince George is another key goal expressed by city residents, particularly within the bowl area, which has the most serious air quality problems. There are many factors affecting air quality in the city. These include:*

- Road dust – this problem is created in northern cities from traction sand and road dust released during thaws, resulting in a significant increase in particulates*
- Major industries*
- Open burning from land clearing*
- Residential woodburning stoves*
- Residential yard waste burning*
- Vehicle exhaust*

*While provincial regulations have been established to reduce emissions related to industrial combustion, considerable efforts still need to be made to reduce the particulates created by road dust emissions, vehicle exhaust, wood burning stoves and yard waste burning. Plan policies focus on actions the city can address in this regard, as well as land use policies to ensure that future heavy industries having significant air quality impacts will be located away from the Bowl area.*

The Regional District does take these issues into consideration during the review of Official Community Plan's and with respect to individual development proposals within the Fringe area of the City. Most important is the identification of a new potential industrial area.

17. The City and Regional District identify new areas for heavy industrial development, taking potential air quality effects into account;

*Update 2004:* This recommendation has been completed. The Industrial Lands Study within approximately 30 miles of Prince George has been completed. It is available for use as a tool in selecting prime locations for new industry in the greater Prince George area that cannot be reasonably accommodated within the City. 'Initiatives Prince George' is well aware of the Study and its contents, such that it may be utilized when dealing with prospective industrial developers.

18. The City refer all proposals for significant new emissions to MWLAP for review;

*Update 2004:* This recommendation has been completed. The Ministry of Water, Land, and Air Protection is referred all proposals for new emissions and industry in the City of Prince George.

## 2.4 PREVENTION OF AIR QUALITY PROBLEMS

19. MWLAP evaluate the acceptability of new sources of air contaminants, especially PM<sub>10</sub>, TRS, SO<sub>2</sub> and NO<sub>x</sub> , based on use of the “lowest achievable discharge rate” (See Glossary.);

*Update 2004:* No new, permitted sources have been located in the airshed since the Plan was finalized.

20. The City promote reductions in vehicle emissions and request Environment Canada to conduct a mobile emission testing program;

*Update 2004:* This recommendation has been completed. The City of Prince George, the Ministry of Water, Land and Air Protection, and Environment Canada conducted a Vehicle Emissions Workshop in May of 2003. Another is planned for 2004. The following is an excerpt from the Environment Canada Report for Prince George (2003)

This year the clinic tested 256 vehicles. Of those valid vehicles tested, 197 (78.5%) passed the emissions test, while 54 (21.5%) exceeded either the hydrocarbon or carbon monoxide limits of the idle emissions test. The vehicles that failed the test had an underhood inspection performed. This consisted of a visual check for tampering with the emission control devices as well as a pre- and post-catalytic converter temperature check to ensure that the catalyst was functioning properly.

## 2.5 MANAGEMENT OF POOR AIR QUALITY EPISODES

21. MWLAP require owners of the most significant fine particulate sources to provide plans for temporarily reducing emissions during air quality advisories (See Glossary);

*Update 2004:* Reductions in industrial emissions, through improved emission controls on some pulpmill sources and shutdown of the last sawmill beehive burners, have reduced fine particulate emissions during episodes. The benefits and options for further reductions are being evaluated through the airshed source identification research currently in progress.

22. The feasibility of predicting fine particulate episodes be reviewed by the Airshed Technical Management Committee, and any feasible methods be implemented as soon as available;

*Update 2004:* To begin, as part of the committee structure the Airshed Technical Management Committee has been changed to the Prince George Air Quality Research Working Group. The Working Group has been reviewing a number of documents pertinent to the region's airshed and continues to research feasible methods for predicting fine particulate episodes. The Working Group has hired a consultant that will develop a needs assessment for modelling of fine particulate source contributions in the Prince George region. This study is expected to add to the current knowledge of episode causes, and assist the Research Working Group to determine future research directions, and to make source reduction recommendations to the Implementation Committee.

While the Management Plan defines an episode as "a period of unacceptable air quality", as determined using the air quality objectives, particular emphasis has been put on managing fine particulate episodes that result in the issuance of public Air Quality Advisories. The City's Clean Air Bylaw requires suspension of all but essential residential and commercial woodburning during Air Quality Advisories. Open burning of woody debris inside and outside of the airshed is also prohibited under both the City Bylaw and provincial legislation during advisories. From 1995 to 2003, air quality advisories were in effect for an average of 10.3 days per year.

In January 2003, the Ministry of Water, Land and Air Protection submitted a study, to the Research Working Group, of air quality and meteorological factors associated with fine particulate advisory episodes ( $PM_{10}$  and  $PM_{2.5}$ ) based on ambient monitoring at the downtown Plaza site. This report demonstrates that two main meteorological factors deliver the most significant contributions to PM levels during these episodes: light winds from the East-Northeast and fumigation, which is re-circulation of air from upper elevations to ground level during the breakdown of inversions. This analysis included all advisory episodes in 2000 through 2003, with the 1998 and 1999 events also to be included in the report when it is completed later this year. A UNBC group has begun a project, with MWLAP cost-sharing, to monitor profiles of wind speed, direction and air temperature above the valley to further assess the role of fumigation as a contributing factor to PM episodes.

## 2.6 MONITORING AND RESEARCH

23. That the current air monitoring program be continued until an evaluation of effectiveness and participation is completed in 1998;

*Update 2004:* This recommendation is in progress with the sources within the community that are above 1% of the total for each pollutant having been invited to join the Monitoring Working group. The goal is to have the Working Group meet by May 2004.

24. A health study steering group be established to determine the need for, and to design, any required air quality effects study, and the study be started no later than the year 2000;

*Update 2004:* Research on the subject of health has led to the recognition that the population of Prince George is too small to provide valid results. It is the intention of the Research Working Group to review literature that is published on the topic of health and air quality, and assist in any work that is being conducted on the topics of health and air quality that may pertain to Prince George.

25. Research be initiated, with particular emphasis on determining and controlling the effects of fine particulates (PM<sub>10</sub> and PM<sub>2.5</sub>), to consider the following:

- monitoring of the contribution to fine particulate levels of those secondary particulates that originate from SO<sub>2</sub> and NO<sub>x</sub> emissions;
- determining the effect of meteorological factors on ambient fine particulate trends;
- determining the contribution of individual fine particulate sources to ambient levels; and
- defining “permissible exceedance levels” for PM<sub>10</sub> and other priority ambient air quality objectives. (See Glossary)

*Update 2004:* The status of the four projects proposed in 1998 is as follows:

- Monitoring of the contribution of secondary particulates was planned for 2003 by the Ministry, but has been delayed until a study of PM<sub>2.5</sub> speciation options is completed in 2005.
- A planned UNBC thesis study on prediction of PM<sub>10</sub> episode meteorology was postponed indefinitely. Environment Canada has developed a model for predicting PM<sub>2.5</sub> and O<sub>3</sub> levels in this area, which is now being tested.
- Fine particulate source identification has continued since 1998, starting with the Northwood dispersion modelling study in 1998/99, and an episode analysis and wind sector analysis done by the Ministry in 2002/03. The current research plan proposes to use dispersion modelling to identify the most significant particulate sources in the airshed.
- A permissible exceedance level for the 50 µg/m<sup>3</sup> PM<sub>10</sub> was not developed.

## **The Research Plan**

The Prince George Air Quality Research Working Group has hired a consultant that will develop a dispersion modelling needs assessment for the Prince George region. This study, along with other ongoing research, will assist the Research Working Group to determine research directions, and to make source reduction recommendations to the Implementation Committee.

The Research Plan presented by the Prince George Air Quality (PGAQ) Research Working Group to the PGAQ Steering and Implementation Committees was approved on September 30, 2003. That Plan includes the following:

- Issue RFP for Emissions Inventory Needs Assessment (EINA)
- Use recommendations from EINA to develop scope of work to upgrade/update Emissions Inventory;
- Complete an Emissions Inventory in preparation for modeling of source impacts;
- Model source impacts based upon new Emissions Inventory;
- Conduct a Cost/benefit evaluation of source reduction opportunities by the Implementation/Steering Committees; and,
- Plan the management actions based on predicted return to air quality.

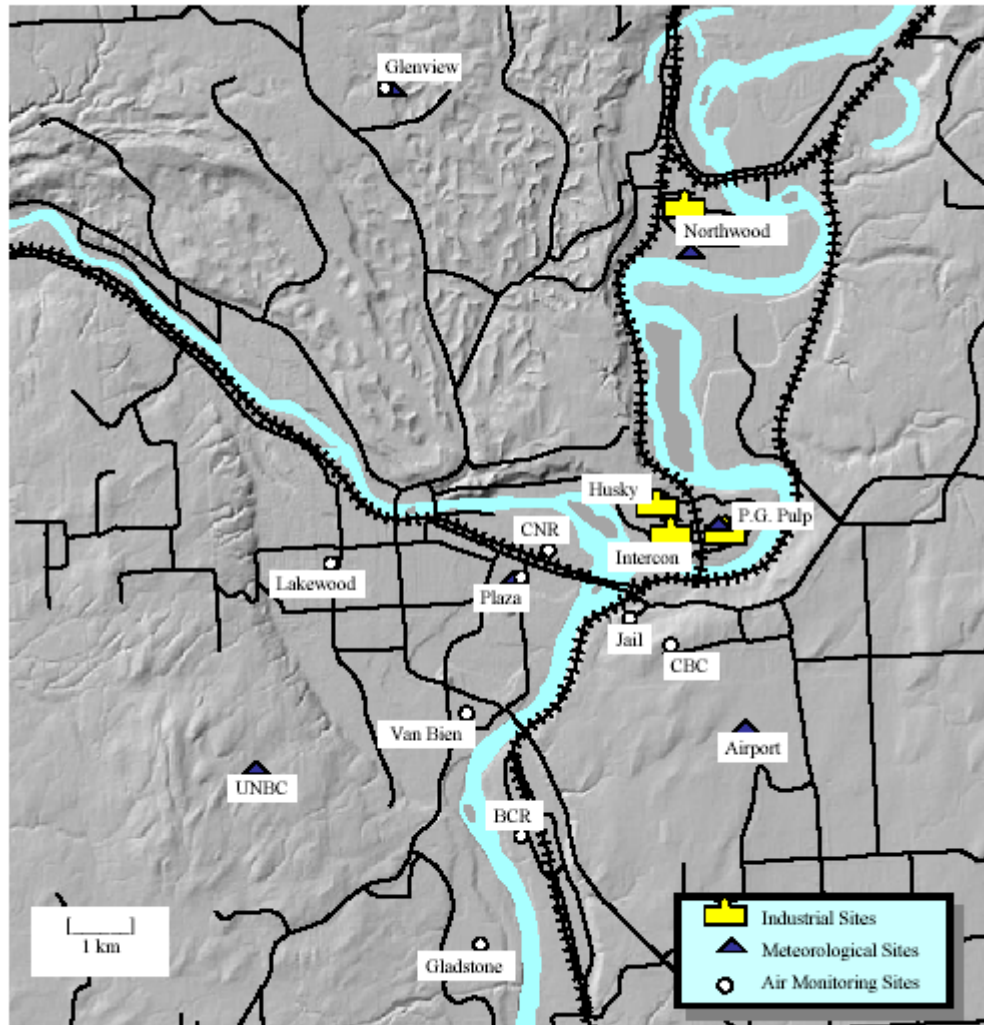
## **Wind Sector Analysis**

MWLAP are engaged in comparison of contributions of the air pollutants measured continuously at the downtown Plaza monitoring site by wind direction. The purpose is to identify the wind directions from which the most significant contributions of various pollutants originate, and to use this information to assist in establishing priorities for further identification of sources for management actions. This analysis is based on the ambient air quality and wind speed and direction data collected at the Plaza (downtown) monitoring site. This study will be further reviewed in Phase II.

## **Air Quality Trends**

The ongoing monitoring of ambient air quality at various locations in the airshed provides information required to determine the effectiveness of pollutant source reductions, as well as the effects of year-to-year variations in emissions and in meteorological conditions. Since the main focus of the Management Plan is reduction of ambient levels of  $PM_{10}$  and, more recently  $PM_{2.5}$ , the appended figures show trends in annual and monthly concentrations, and in the frequency that air quality objectives have been exceeded.

Figure 2: Prince George Monitoring Sites



Figures 3 to 6 show rolling and discrete annual average levels of  $PM_{10}$  and  $PM_{2.5}$  throughout the airshed. Both continuous (that is, hourly-averaged) and non-continuous (6-day, 24-hour averaged) levels are shown for the Plaza site.  $PM_{10}$  levels at Plaza dropped substantially since 1991, when non-continuous monitoring began. Continuous annual  $PM_{10}$  levels have also decreased since 1993, although decreases have been less significant at the Plaza site since the mid-1990's, and no trends in annual levels of either  $PM_{10}$  and  $PM_{2.5}$  have occurred at Plaza in the past five years. Rolling annual averages at the Van Bien, Lakewood and CNR sites continued to decline until 2002.

The percent of days with  $PM_{10}$  greater than the  $50 \mu\text{g}/\text{m}^3$  24-hour objective declined sharply in the mid-'90's, with exceedance levels at the Plaza site fluctuating from about 2% to 4% over the past five years (Figures 7 and 8). Similar levels of exceedance of the  $30 \mu\text{g}/\text{m}^3$   $PM_{2.5}$  objective have been recorded. Reduction of the frequency of the higher (more extreme)  $PM_{10}$  levels is also shown by the reduction in

the higher percentiles for that fraction since 1998, but not for the  $PM_{2.5}$  fraction. Comparison of the trends in Health Risk Factors shown in Figures 9 and 10 reflect the respective  $PM_{10}$  and  $PM_{2.5}$  trends.

The ambient fine particulate trends indicate that  $PM_{10}$  levels have declined quite significantly throughout the airshed. At College Heights, although  $PM_{10}$  levels have declined substantially, it is not possible to determine if that reflects the effects of reduction, and then elimination of beehive burner emissions, or just the effects of road dust reduction, since  $PM_{2.5}$  has never been monitored there.

The trends in annual average  $SO_2$  and odorous sulphur (TRS), shown in Figures 11 and 12, demonstrate the benefits of reducing these pollutants to ambient levels in the downtown area over the past decade. TRS levels still exceed the Level A and B hourly objectives, although much less frequently since emission controls were implemented. Exceedances of the Level A hourly  $SO_2$  objective at the Plaza site has been very infrequent since 1998. No trends are apparent in annual  $NO_2$  and  $O_3$  levels, reflecting the lack of an NO emission trend in the airshed.

Please refer to Figures 3-12 for graphical representation of the information above.

**Figure 3:**

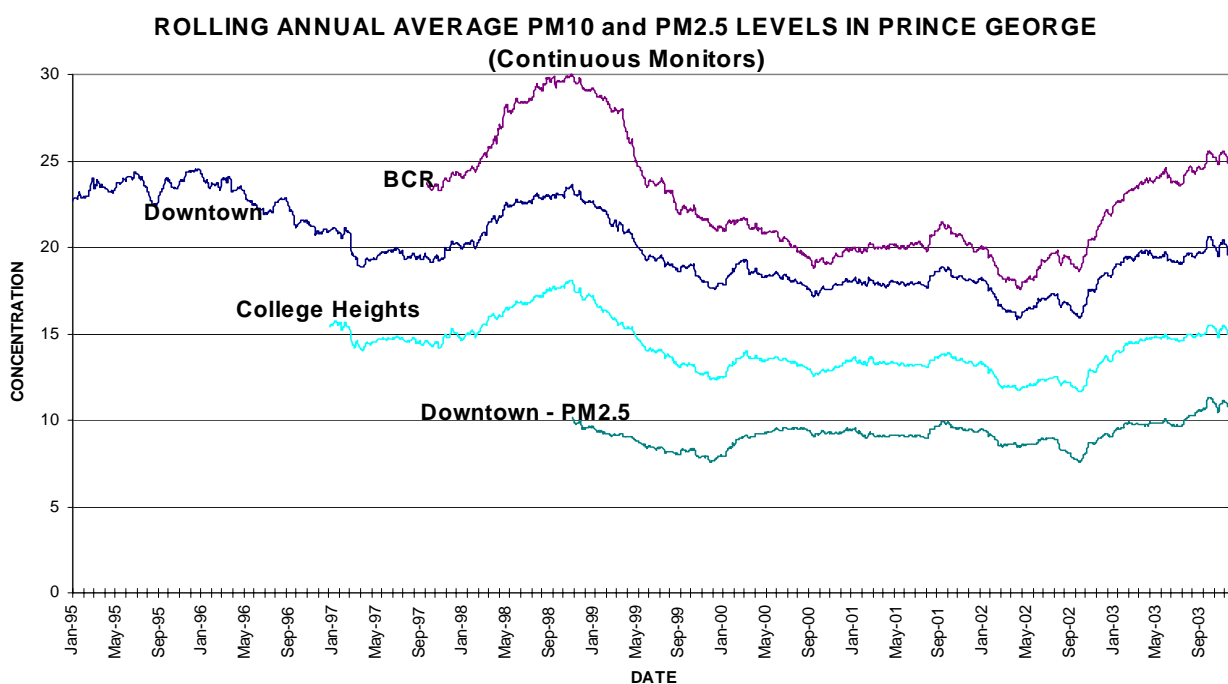


Figure 4:

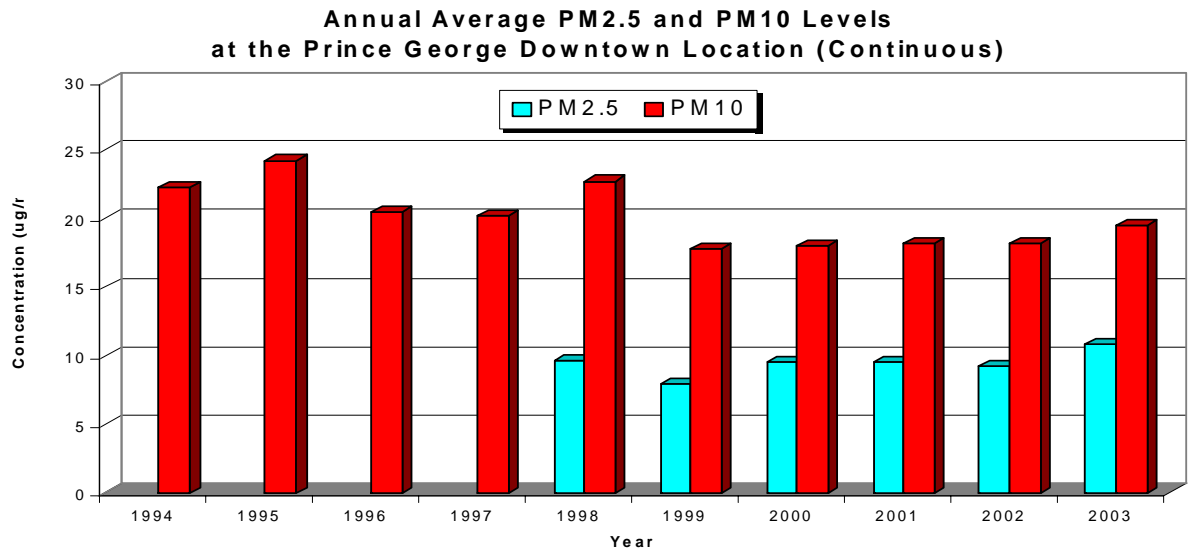


Figure 5:

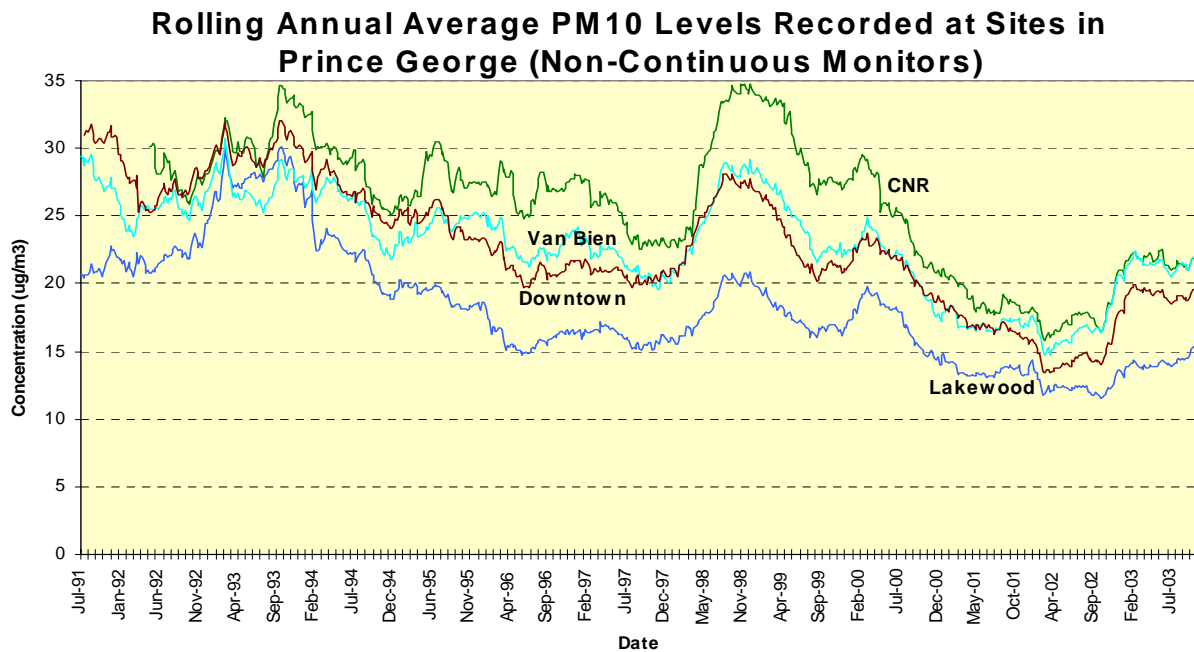




Figure 6:

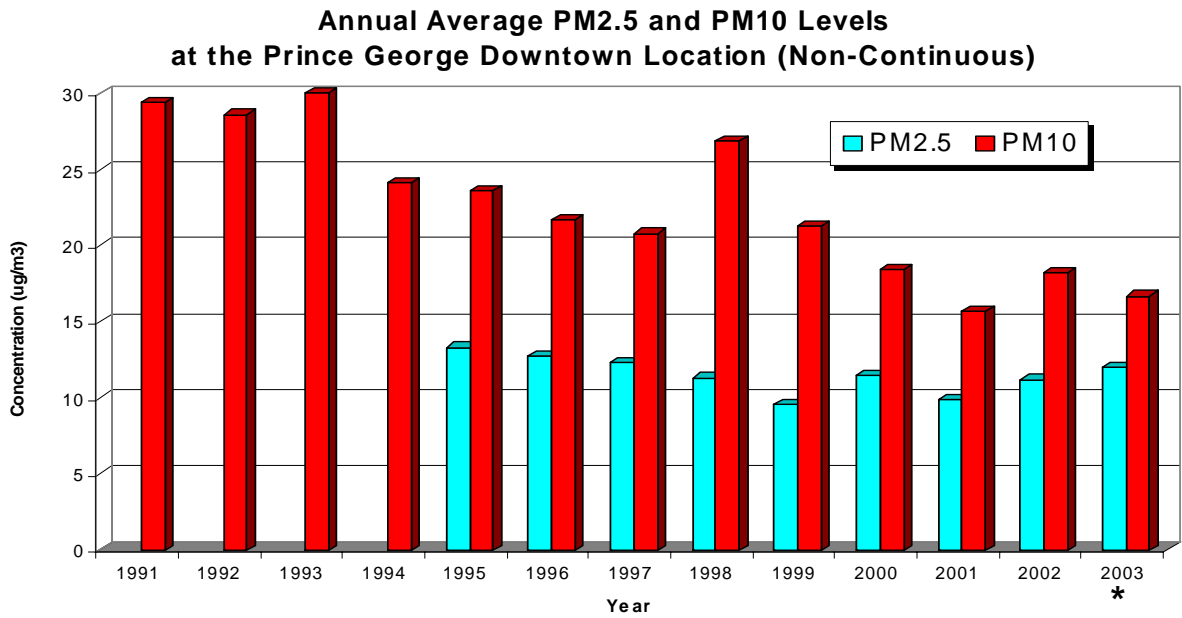


Figure 7:

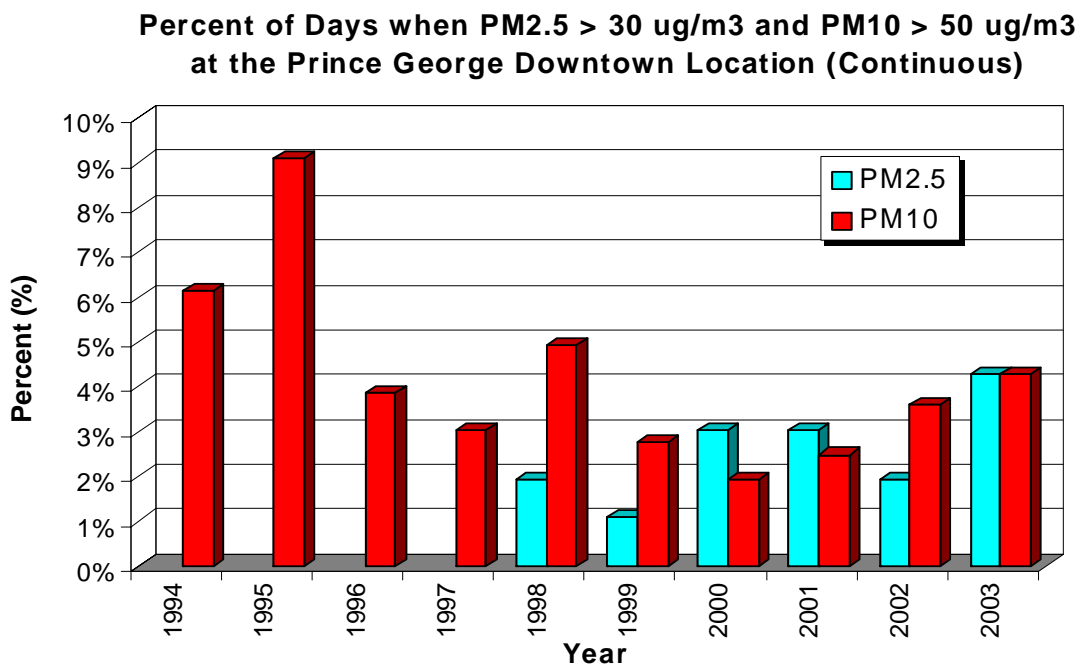


Figure 8:

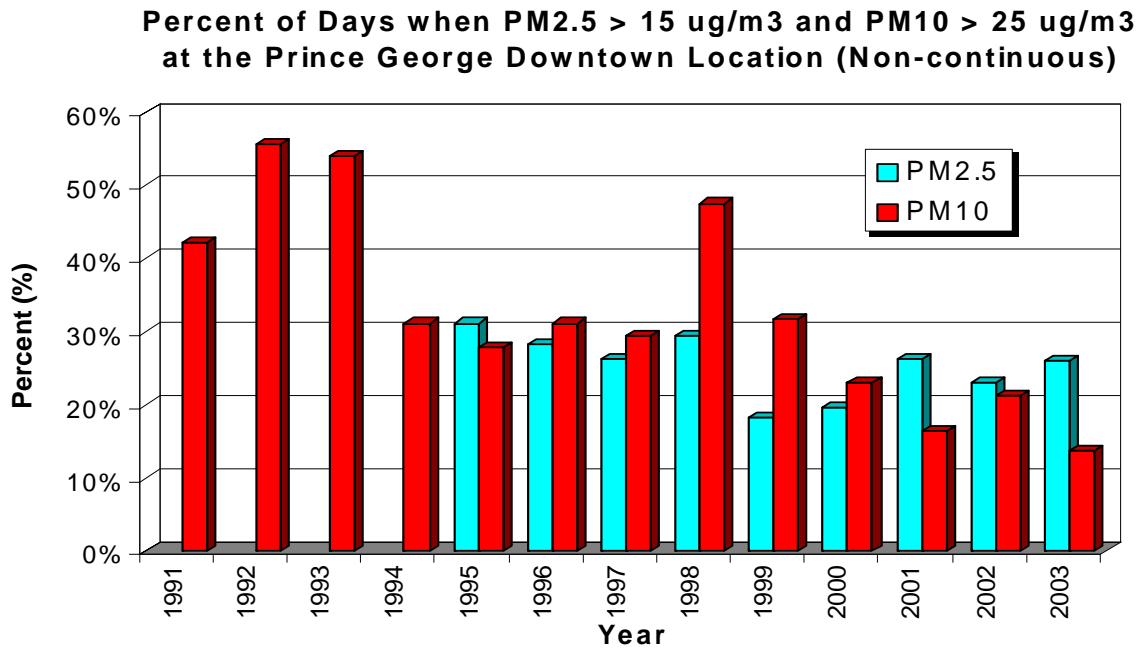


Figure 9:

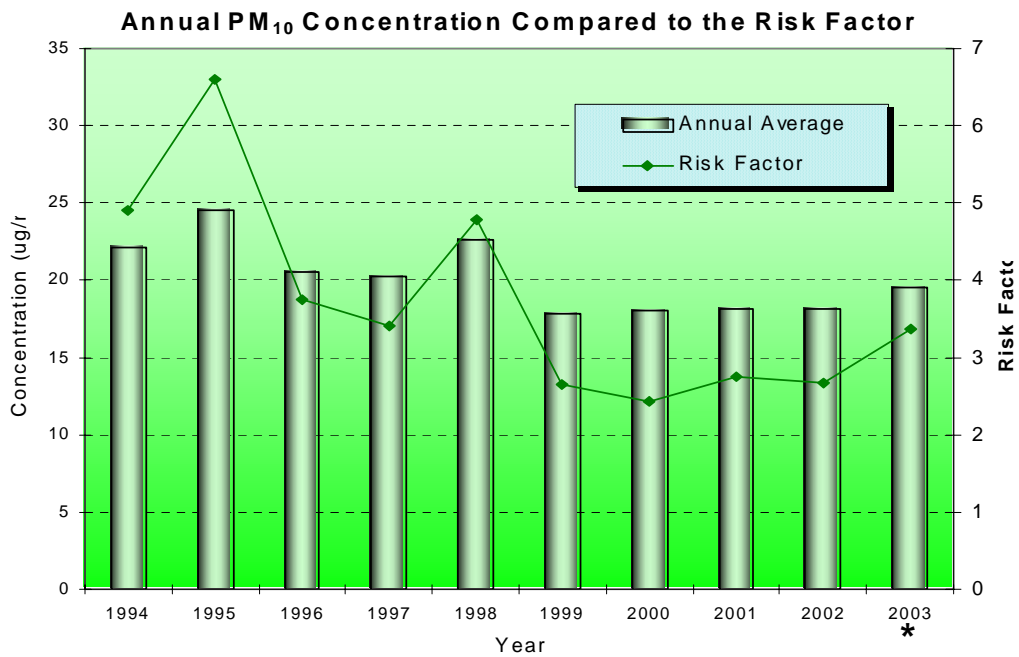


Figure 10:

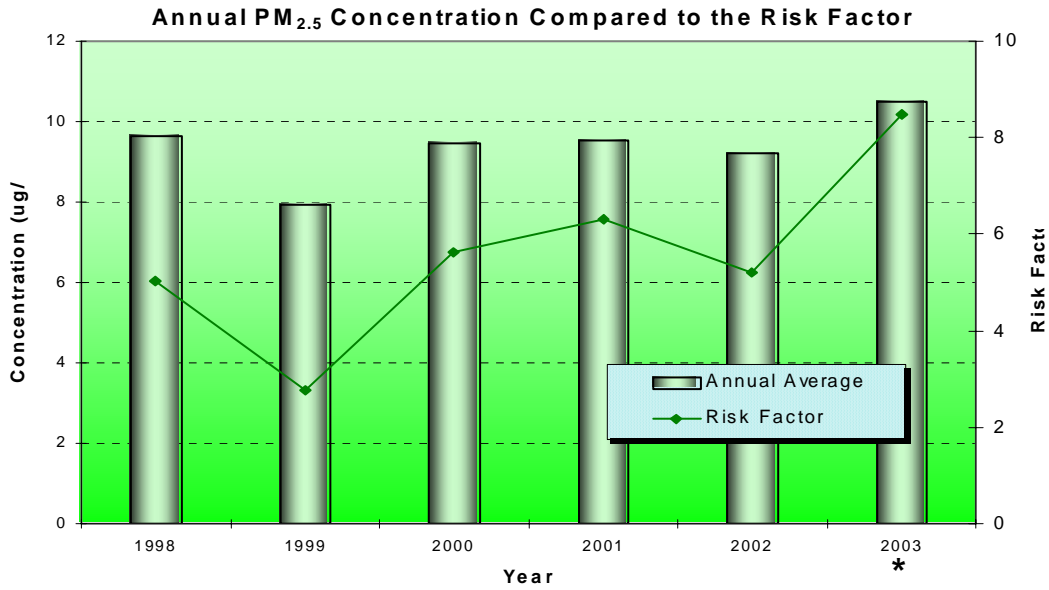


Figure 11:

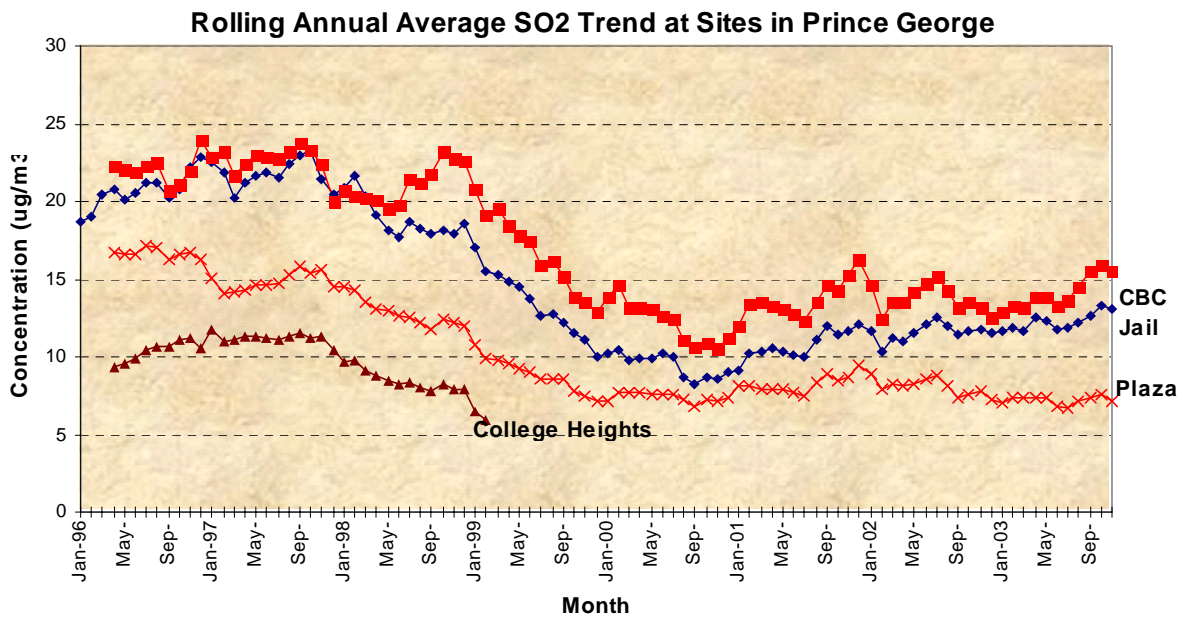
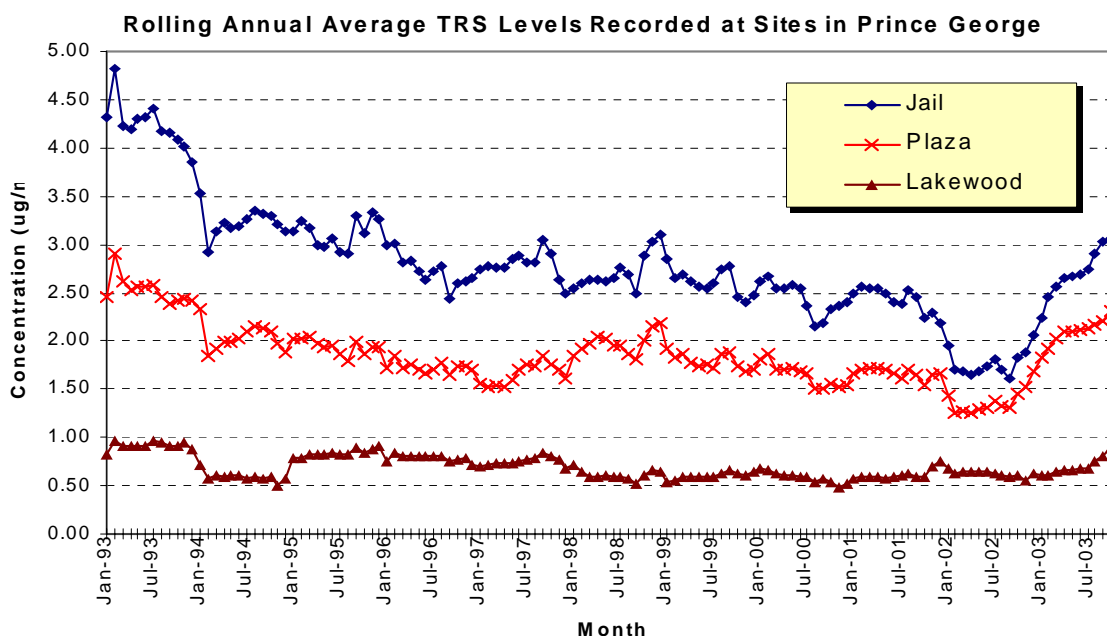


Figure 12:



### 3.0 RESPONSIBILITIES OF THE MANAGEMENT AGENCIES

26. Prior to finalizing the Management Plan, the management agencies reach an agreement on responsibilities for consultation and coordination of permitting, community planning, and other administrative and regulatory actions that may affect air quality; and

*Update 2004:* Recommendation Completed.

27. The management agencies establish an Air Quality Steering Committee to oversee the implementation of the Management Plan Actions and to establish subgroups as needed to manage specific tasks.

*Update 2004:* Recommendation Completed. This includes the Prince George Air Quality Implementation Committee with its two working groups- Monitoring and Research. The following is some additional information on role and structure of these committees and their working groups.

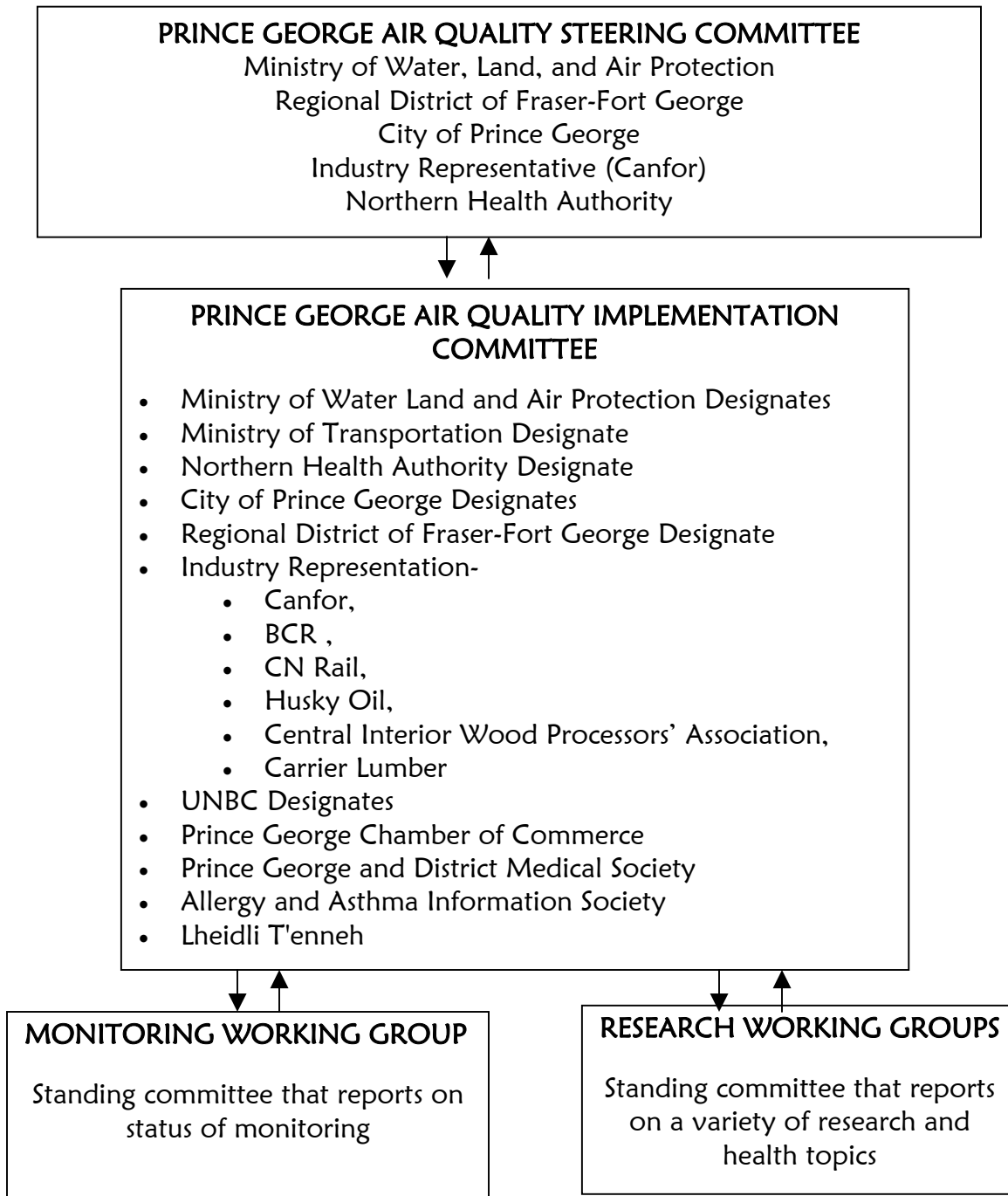
The Committee will provide recommendations to the Air Quality Management Steering Committee, including but not limited to:

- implementing the PGAQMP- Phase One;
- determining an annual operating budget including financial requirements for air quality research and monitoring;
- identifying opportunities for grant funding and other revenue sources;
- devising a five year capital plan, updated annually;

- identifying administrative and staff support requirements;
- developing a reporting and communication system;
- reviewing the PGAQM Plan- Phase One; and
- preparing further phases of the PGAQMP.

The Committee will also educate, inform, and receive input from the community about air quality matters.

### Prince George Air Quality Implementation Committee Structure



## 4.0 FUNDING NEEDS AND COST SHARING

28. Sharing of current and future monitoring costs be based on emission contributions to the airshed, and other factors contributing to unacceptable air quality.

**Update 2004:** The recommendation is still under review and its implementation will begin once the Monitoring Working Group has been finalized.

### SUMMARY

The Prince George Air Quality Management Plan- Phase One has been a document from which government agencies, the residents of Prince George, and local industry have been working from to implement its recommendations. The completion or initiation of these recommendations has occurred through innovation of ideas and processes and teamwork by the various members.

There have been a number of recommendations from the Prince George Air Quality Management Plan that have been completed since its approval in 1998. The following are a number of those recommendations:

- the elimination of burning in Beehive Burners;
- the Canfor upgrade of Intercon power boiler;
- the creation and approval of the Clean Air Bylaw which deals with issues of open burning, woodburning, and streetsweeping in the City of Prince George;
- the expansion and enhancement of the City of Prince George's winter abrasives and streetsweeping programs to assist in decreasing levels of coarse particulates in the spring;
- paving and dust suppression at both the CN Rail and BC Rail works yards have been completed;
- the identification of new areas for heavy industrial development, taking potential air quality effects into account;
- the establishment of an Air Quality Steering Committee to oversee the implementation of the Management Plan Actions; and,
- the creation and implementation of a Research Plan by the Prince George Air Quality Implementation Committee- Research Working Group.

The next steps in the Prince George air quality planning process are to begin work on Phase Two of the Plan and continue the work of those recommendations already in progress. Public consultations and workshops will be held to incorporate community concerns and actions into Phase Two and generate feedback on those recommendations suggested by the Prince George Implementation Committee.

## APPENDIX A: GLOSSARY OF TERMS

### Acceptable Air Quality is:

The level of a particular air contaminant that meets an ambient air quality objective.

### An Air Contaminant is:

An airborne substance that, when present in the air in sufficient concentrations, is capable of causing human health and other harmful environmental effects

### Air Quality is:

The physical and chemical characteristics of ambient (outside) air that determine its acceptability for human use and environmental protection. Air Quality is generally defined by numerical criteria for individual contaminants, based on human health or other environmental studies. Air quality includes smell and taste as well as the chemical composition of air.

### An Air Quality Advisory is:

A notice issued by MELP indicating that an ambient air quality objective has been exceeded, or is predicted to be exceeded, and that current meteorological conditions are predicted to continue for the next six hours or more. Notices are issued to advise the public to heed those precautions that are appropriate to the pollution levels, and to advise or require industry and other source owner, including the public, to take appropriate emission reduction measures.

### Air Quality Management is:

Administrative activities carried out to implement an air quality management plan, including amendment of permits for industrial and other point contaminant sources, establishment of by-laws and other local and regional regulatory controls on mobile and area contaminant sources, and public education on ways to reduce and eliminate use of air contaminants in everyday activities.

### An Air Quality Management Plan is:

A blueprint for managing community development and for controlling air contaminant sources so as to improve or maintain air quality for the protection of human health and the environment in an airshed.

An Ambient Air Quality Objective is:

A numerical, non-legal guideline defining an acceptable level of an air contaminant in ambient air. Various levels (A, B and C) are used to define various endpoints (or protection criteria) and degrees of protection. Different averaging periods (1-hour, 24-hour, annual) are also used to indicate the exposure period that is most critical to preventing each defined effect. For example, if protection of vegetation from reduced growth rates is the endpoint, then the Level A, 1-hour SO<sub>2</sub> objective must be attained.

An Emission Factor is:

A numerical factor derived from actual emission measurements from similar sources and normally expressed in a form that allows it to be applied to all similar sources (e.g. kilograms per tonne of finished product). The level of uncertainty in applying emission factors depends on how similar the characteristics of a particular source are to those sources on which the factor is based.

An Episode is:

A period of unacceptable air quality, when ambient levels of a particular air contaminant exceed an ambient air quality objective or objectives. For example, a PM<sub>10</sub> episode is defined in this airshed as two or more consecutive days of exceedance of the 24 hour, Level B objective.

Lowest Achievable Discharge Rate is:

A comparable jurisdiction's most stringent authorized discharge limitation, unless such limitation is demonstrated to be unachievable, or the most stringent discharge limitation that is achieved in practice, whichever is most stringent. (MELP Standards and Guidelines Policy - October 7, 1997)

O<sub>3</sub> is:

Groundlevel ozone, which is a compound formed in the lower atmosphere through the reaction of NO<sub>2</sub> and other airborne substances, in the presence of ultraviolet light. Reactions between VOC and other highly reactive compounds (free radicals) form NO<sub>2</sub> from NO to increase the formation of ozone. Ozone formed at ground level can cause effects on human health and vegetation, whereas O<sub>3</sub> formed in the upper atmosphere protects the earth from excessive ultraviolet light levels.



Open Burning is:

The combustion of materials, including garden and lawn clippings and tree prunings, without control of the combustion air, and without a stack or chimney to vent the products of combustion to the atmosphere. Open burning does not include use of barbeques .

A Permissible Exceedance Level is:

The maximum frequency that an air quality objective is allowed to be exceeded (in hours per year or percentage of time, for example) before actions to reduce emissions are required. Exceedances caused by extreme meteorology may be permitted, and the level of permissible exceedances may depend on whether an objective is Level A, B or C.

Permitted Emission Sources are:

Releases of contaminants under MELP *Waste Management Act* emission permits, including mostly industrial sources.

PM<sub>10</sub> is:

Fine particulate matter with a maximum particle diameter of 10 microns ( $\mu\text{m}$  = one millionth of a meter). Includes particles that are inhalable into the lungs.

PM<sub>2.5</sub> is:

Ultra-fine particulate matter with a maximum particle diameter of 2.5  $\mu\text{m}$ . The main particulate component of woodsmoke and vehicle emissions.

The Prince George Airshed is:

The mass of air contained within the municipal boundaries of Prince George and the immediate surrounding communities of the Regional District, and particularly that air mass contained and affected by the natural topographical features at the confluence of the Nechako and Fraser Rivers.

NO<sub>x</sub> is:

Nitrogen oxides, includes nitric oxide (NO) and nitrogen dioxide (NO<sub>x</sub>), and are formed during combustion of fuels from reaction between oxygen and atmospheric nitrogen gas (N<sub>2</sub>).

SO<sub>2</sub> is:

Sulphur dioxide, formed from the incineration of TRS during combustion of fuels, and pulping chemicals, and the flaring of hydrogen sulphide during oil and gas processing and refining.

TRS is:

Total reduced sulphur, which includes hydrogen sulphide, dimethyl sulphide and disulphide, and methyl mercaptan, is formed in the absence of oxygen during pulping processes and released primarily from effluent disposal, and is entrained in oil and gas deposits and released during transport, gas processing and oil refining.

VOC is:

Volatile organic compounds, or carbon containing compounds, are hydrocarbons that form gases when released from combustion, industrial processes, and evaporation of liquid fuel. Natural biological sources release most of the VOC, although man-made sources may predominate in urban airsheds. Some VOC have direct health and environmental effects, other compounds react with other atmospheric gases to promote ozone formation.

Wood burning is:

Combustion of a solid wood fuel.