BC Clean Air Research Fund

Final Report

April 1, 2013 to March 14, 2014

March 20, 2014

Vi LeBourdais,
250-579-5772

PROJECT OVERVIEW

Abstract

Air quality is an increasingly important topic among scientists, policy makers and the public. New research is continually emerging that shows the implications of poor air quality on human health and the environment.

Recognizing this, Whispering Pines/Clinton Indian Band (WPCIB) initiated this project, the *Whispering Pines Air Quality Management Strategy*, to develop a firm understanding of current air quality conditions and issues in the community. Through the development and implementation of the *Whispering Pines Air Quality Management Strategy* WPCIB is striving to achieve the following objectives:

- Develop a comprehensive understanding of local and regional air quality conditions and issues within the WPCIB community;
- Raise awareness of the air pollutant sources that contribute to air quality conditions in the community; and,
- Design a plan to improve air quality in the community that incorporates community input and knowledge.

Through the development of a community-based air quality management strategy WPCIB has brought together community members to discuss local and regional air quality issues and identify key actions that the community can take to improve local and regional air quality conditions.

The *Whispering Pines Air Quality Management Strategy* has proven to be a valuable initiative to help position the community to take a more proactive approach to air quality management issues that can affect community members and the local environment.

FINANCIAL OVERVIEW

Revenue Description

Table 1 Projected Total Project Revenue (cash and in-kind)

Organization	2012/13		2013/14		Total
	Cash	In-kind	Cash	In-kind	
BC CLEAR - Fraser Basin Council			$10,000		$10,000

Urban Systems		$1000			$1000
Other Organization:					
Other Organization:					
Other Organization:					
TOTAL					$11,000

Table 2 Actual Revenue for Reporting Period (cash and in-kind)

Organization	2012/13		2013/14		Total
	Cash	In-kind	Cash	In-kind	
BC CLEAR - Fraser Basin Council			$10,000		$10,000
Urban Systems		$1000			$1000
Other Organization:					
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Other Organization:					
TOTAL					$11,000

Note: Please attach copies of letters or agreements confirming additional funds.

Please explain revenue discrepancies (if any)

Expenses Description

Table 3 Projected Expenses for Reporting Period (cash and in-kind)

Project Costs	**Expenses**		
	All Sources		
	Cash	*In-kind*	*Total*
Salaries and fees	$9500		
Travel and accommodation	$100		
Equipment and supplies	$150		
Communications and outreach	$250		
Analysis			
TOTAL PROJECT COSTS	$10,000		

Table 4 Actual Expenses for Reporting Period (cash and in-kind)

Project Costs	**Expenses**		
	All Sources		
	Cash	*In-kind*	*Total*
Salaries and fees	$9500		
Travel and accommodation	$100		
Equipment and supplies	$150		
Communications and outreach	$250		
Analysis			
TOTAL PROJECT COSTS	$10,000		

Please explain expense discrepancies (if any)

RESULTS OVERVIEW

Activity Description

Table 5 Summary of Activities for the Reporting Period

Activity*	Completion Date	Description of Results
Air Quality Baseline Overview	October 15, 2013	See attached
Review of Key Air Quality Management Tool Options	October 15, 2013	See attached
Community/Stakeholder Consultation	October 19th, 2013	See attached
Community Air Quality Management Strategy	March 20, 2014	See attached

*As outlined in the project contribution agreement or contract.

Please explain activity discrepancies (if any)

Deliverable Description

Please include copies of all deliverables with the final report (e.g. publications, presentations, research reports, etc.). The final report will be considered incomplete without copies of the project deliverables.

Table 6 Summary of Key Deliverable Accomplishments for the Reporting period

Deliverable*	Description	Description of Results
Baseline Information on Whispering Pines/Clinton Indian Band and Kamloops Airshed	See attached	See attached
Whispering Pines Air Quality Management Strategy	See attached	See attached

*As outlined in the project contribution agreement or contract.

Please explain deliverables discrepancies (if any)

DELIVERABLES

Appendix 1: *insert title of deliverable (e.g. Draft Manuscript)*

Appendix 2: *insert title of deliverable (e.g. Research Report)*

URBAN systems

REPORT

Whispering Pines Air Quality Management Strategy

200 - 286 St. Paul Street, Kamloops, BC V2C 6G4 | T: 250.374.8311

March 2014

File: 1022.0020.01

Contents

This research was supported by a financial contribution from the BC Clean Air Research (BC CLEAR) Fund. BC CLEAR is sponsored by the BC Ministry of Environment, jointly managed with Metro Vancouver and Environment Canada. The Fraser Basin Council administers the program in partnership with the BC Lung Association.

List of Acronyms

- CWS Canada Wide Standards
- NO_x Nitrogen Oxides
- O_3 Ground-Level Ozone
- PM Particulate Matter
- $PM_{2.5}$ Fine Particulate Matter
- SO_2 Sulphur Dioxide
- TRS Total Reduced Sulphur
- WPCIB Whispering Pines/ Clinton Indian Band

1.0 Introduction

Air quality is an increasingly important topic among scientists, policy makers and the public. New research is continually emerging that shows the implications of poor air quality on human health and the environment.

Recognizing this, Whispering Pines/Clinton Indian Band (WPCIB) initiated this project, the *Whispering Pines Air Quality Management Strategy*, to develop a firm understanding of current air quality conditions and issues in the community. Through the development and implementation of the *Whispering Pines Air Quality Management Strategy* WPCIB is striving to achieve the following objectives:

- Develop a comprehensive understanding of local and regional air quality conditions and issues within the WPCIB community;
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Through the development of a community-based air quality management strategy WPCIB has brought together community members to discuss local and regional air quality issues and identify key actions that the community can take to improve local and regional air quality conditions.

The *Whispering Pines Air Quality Management Strategy* has proven to be a valuable initiative to help position the community to take a more proactive approach to air quality management issues that can affect community members and the local environment.

Overview of Strategy

Learning about and striving to improve air quality is an important responsibility for all community members of WPCIB. Improving air quality helps to protect the environment and the health and well-being of the community. It is an important part of a sustainable development process, and it offers a unique opportunity for the WPCIB community to link environmental protection along with economic development and community priories for future generations[1].

To help understand the current conditions of air quality, sources of air pollutants in WPCIB and key air quality management actions, this report provides baseline air quality information. More specifically, the provided baseline is intended to support the key short and long term actions identified in this strategy to further protect air quality conditions and human health in the community and regionally through:

[1] BC Ministry of the Environment. Provincial Framework for Airshed Planning. Accessed from http://www.bcairquality.ca/reports/pdfs/airshedplan_provframework.pdf

- Helping community members and leaders understand local air quality issues;
- Encouraging community members to take individual actions to protect air quality;
- Steering administrative decisions that have impacts on air quality; and
- Providing baseline data to assess the need for community initiatives that will increase air quality in Whispering Pines.

Therefore, the *Whispering Pines Air Quality Management Strategy* consists of two main components, including:

- An overview of the current air quality conditions in WPCIB and within the regional airshed; and,
- An action plan that highlights both short and long term actions which WPCIB may wish to pursue to protect local and regional air quality.

2.0 What are the Main Pollutants of Concern in an Airshed?

From a human health and environmental quality standpoint, the primary air pollutants of concern are: ground-level ozone (O_3), fine particulate matter ($PM_{2.5}$), total reduced sulphur (TRS), sulphur dioxide (SO_2), and nitrogen oxides (NO_x). These substances can negatively impact human health and environmental quality. Some of these pollutants can cause harm even at very low levels. The following table outlines the typical sources of these pollutants and their potential health impacts on humans:

Table 1: Pollutants of Concern in an Airshed[2]

Air pollutant	Sources	Potential Health Impacts
Ground-level ozone (O_3)	O_3 is formed at ground level by chemical reactions between Volatile Organic Compounds (VOCs) and Nitrogen Dioxide (NO_2) in the presence of sunlight. VOCs and NO_2 are released by burning coal, gasoline, and other fuels; and naturally by plants and trees.	The primary health impacts that can arise from O_3 include: • Worsening symptoms for people with asthma, Chronic Obstructive Pulmonary Disease (COPD) and other lung diseases, and for people with cardiovascular (heart) disease; • Swollen, irritated airways; • Irritation to eyes, nose and throat; • Coughing, wheezing; • Headaches; and • In the long term O_3 can cause permanent lung damage.
Fine Particulate Matter ($PM_{2.5}$)	The sources of $PM_{2.5}$ include combustion (vehicles, wood-burning), industrial activity, agricultural burning and reactions in the atmosphere involving NO_x and SO_2.	The primary health impacts that can arise from $PM_{2.5}$ include: • Aggravation of respiratory and cardiovascular disease, • Decreased lung function and increased respiratory symptoms, and • Increased susceptibility to respiratory infection and premature death (BC Lung State of the Air 2012 Report). Seniors, infants and those with pre-existing lung, heart and other illnesses are the most vulnerable.

[2] Information in this table sources from:
The Lung Association (2012). Outdoor Air Quality: Air Pollutants and Your Health. Accessed from http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/pollutants-polluants_e.php
AND
City of Kamloops. (2012). City of Kamloops Airshed Management Plan. Accessed from: http://www.city.kamloops.bc.ca/environment/pdfs/13-05-AirshedManagementPlan.pdf

Table 1: Pollutants of Concern in an Airshed[3] (*cont'd*)

Air pollutant	Sources	Potential Health Impacts
Total Reduced Sulphur (TRS)	The primary sources of TRS include pulp and paper, industry processing, sewage treatment plants, the oil and gas industry (from the extraction and processing of sour gas), and natural sources include bogs and marshes.	The primary health impacts that can arise from TRS include: • Communities are likely to experience an unpleasant smell from TRS well before the levels are high enough to have any known clinical effect; • Prolonged exposure to even low levels of TRS may produce headaches and nausea; • While extremely high levels of TRS can be fatal, such ambient levels will occur only as a result of a major accident in certain types of oil and gas operations; and, • TRS is viewed as a nuisance more than a health problem.
Sulphur Dioxide (SO_2)	SO_2 is a gas released into the atmosphere as a result of the combustion of fossil fuels containing sulphur, as well as production processes using sulphur-containing raw materials, e.g., cement manufacturing and sulphuric-acid production. SO_2 also contributes to $PM_{2.5}$ formation.	The primary health impacts that can arise from SO_2 include: • Irritation in the nose and throat; • Breathing problems; • New cases of lung disease; • Worsening symptoms in people with asthma, COPD, and other long-term lung diseases; • Worsening cardiovascular (heart) disease; and, • Changes in the lung's natural defenses.
Nitrogen Oxides (NO_x)	NO_x is a generic term for a group of highly reactive gases containing nitrogen and oxygen. The primary sources are motor vehicles, electric utilities, and other industrial, commercial and residential sources that burn fuels. NO_x also contributes to $PM_{2.5}$ formation and can react with volatile organic compounds when it is sunny and warm, producing ground level ozone.	The primary health impacts that can arise from NO_x include: • Lower resistance to lung infections; • Shortness of breath and irritation of the upper airways, especially in people with lung disease, such as asthma and COPD; and, • A wide variety of other health and environmental impacts, including bronchial congestion and scarring of the lungs.

[3] Information in this table sources from:
The Lung Association (2012). Outdoor Air Quality: Air Pollutants and Your Health. Accessed from http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/pollutants-polluants_e.php AND
City of Kamloops. (2012). City of Kamloops Airshed Management Plan. Accessed from: http://www.city.kamloops.bc.ca/environment/pdfs/13-05-AirshedManagementPlan.pdf

Of the air pollutants listed in the above table, $PM_{2.5}$ and ground level ozone (O_3) are the most common and typically are of most concern in British Columbia. They are also measured most frequently by the BC Ministry of Environment. Therefore, these pollutants often form the basis of air quality assessments. In addition to the health impacts listed in the above table, it is important to carefully monitor PM and O_3 because they have the following serious environmental impacts.

- O_3 can cause damage to vegetation, agricultural crops, flowers, shrubs and forests by interfering with a plant's ability to grow. As a result, vegetation can become more susceptible to disease and pests. Ozone can also adversely affect ecological functions such as water movement, mineral nutrient cycling and habitats for various animal and plant species.
- Sulphur dioxide and nitrogen oxides are pollutants that contribute to acid deposition, more commonly known as "acid rain". Acid rain can alter the nutrient and chemical cycles in soils and surface water, and erode infrastructure.
- $PM_{2.5}$ is a major contributor to reduced visibility due to smog.

In addition to documented health and environmental impacts, evidence suggests that local economies can suffer as the health effects of O_3 and $PM_{2.5}$ can lead to absences at work and reduced productivity in the labour force. As well, it can lead to increased health care costs.

3.0 Defining Airsheds

In British Columbia an airshed is generally described as “an area where the movement of air (and, therefore, air pollutants) can be hindered by local geographical features such as mountains, and by weather conditions”[4].

Whispering Pines IR#4 is located approximately 40 kilometers north of Kamloops adjacent to the west bank of the North Thompson River. The landscape of IR#4 is flat with open grassy areas which are used for livestock and agricultural activities. There are also rolling mountains and steep slopes throughout the reserve.

WPCIB is just outside the boundaries of the Kamloops Airshed as shown in Figure 1.

Given the close proximity of WPCIB to the City of Kamloops, it is likely that WPCIB and the Kamloops Airshed share similar air quality conditions during the summer months. However, in the winter there are two key factors that likely differentiate air quality conditions between the two communities. These two factor include:

1. The Kamloops valley regularly experiences inversions that can trap air pollutants. According to the Ministry of Environment, the inversions often do not extend to WPCIB.
2. WPCIB community members rely heavily on wood for home heating. Such heating systems can create localized air quality issues in the winter.

According to the Canadian Wind Atlas, the winds are strongest in the winter and weakest in the summer in WPCIB. Figure 2 shows the wind rose data for the WPCIB area. It indicates that annually, the prevailing wind blows in alignment with the North Thompson Valley, either north to south or vice versa. In the winter, the prevailing winds come from the south and the southwest.

[4] BC Air Quality Website (2013). Accessed from http://www.bcairquality.ca/airsheds/bc-airsheds.html

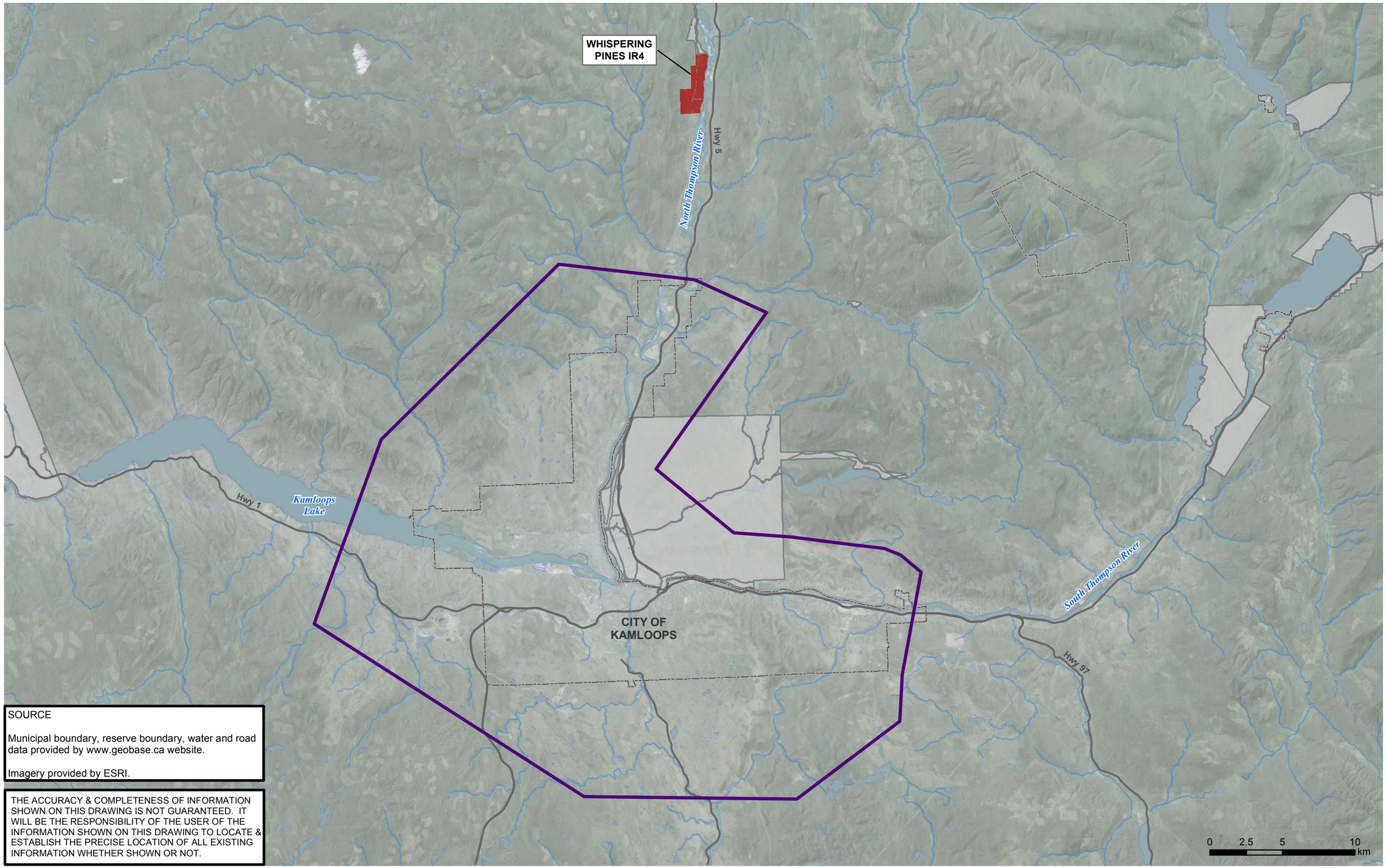
URBAN systems

WHISPERING PINES AIR QUALITY MANAGEMENT

DATE: OCTOBER 2013

WHISPERING PINES/CLINTON INDIAN BAND

1:250,000



Legend

- Approximate Kamloops Airshed Boundary
- Municipal Boundary
- Whispering Pines IR4
- Other First Nation reserve

SOURCE

Municipal boundary, reserve boundary, water and road data provided by www.geobase.ca website.

Imagery provided by ESRI.

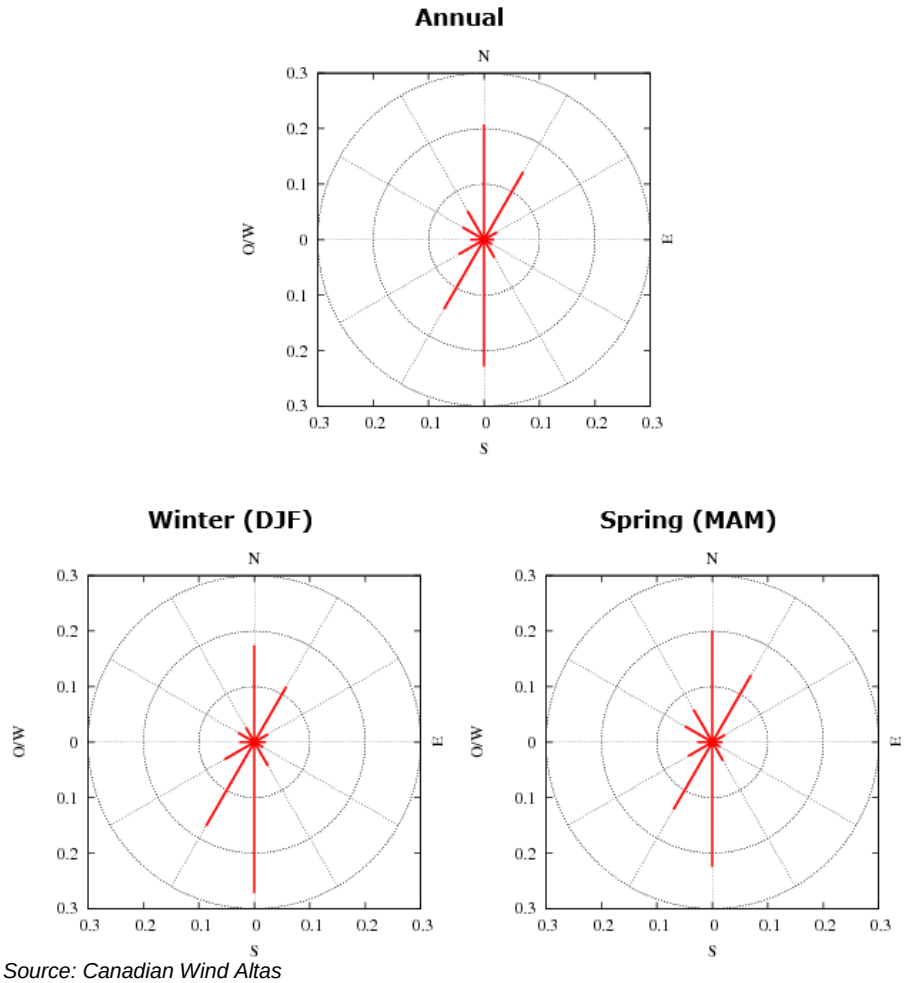
Document Path: U:\Projects_KAM\1022\0020\01D-Drafting-Design-Analysis\GIS\Projects\MXD\Current\Airshed Mapping.mxd

AIRSHED OVERVIEW

FIGURE

1

Figure 2: WPCIB Wind Rose



Source: Canadian Wind Altas

The topography in the Kamloops Airshed facilitates an east to west air movement, while the narrow valley farther up the North Thompson River, where WPCIB is located, restricts east/west air movement. Figure 1 (on the previous page) shows the boundary of the City of Kamloops, the Kamloops Airshed and the location of WPCIB and other areas First Nations.

4.0 Relevant Information on the Kamloops Area Airshed: Summertime Air Quality and Average Levels of PM and O_3

In 2000, the Canadian Council of Ministers of the Environment released *Canada Wide Standards* (CWS) for particulate matter (PM) and ozone. The standards are meant to act as a guide for communities to determine when a threshold has been reached and further action is needed. However, it is recognized that air pollutants such as PM and ozone pose risk to human health even when present at very small quantities. Ultimately, there are no "safe" levels of these pollutants. The standards are meant to represent a balance between the best health and environmental conditions possible and the short term feasibility of improving air quality. *This means that even if a community's air quality is below the CWS, there are still significant benefits related to further improving air quality.*

What are the Levels of Air Pollution in Kamloops?

Air quality in Kamloops is consistently below the Canada Wide Standards for $PM_{2.5}$ and ozone. Elevated levels of $PM_{2.5}$ can occur in the airshed. Most often these elevated levels result from forest fire smoke, for example the fires in 2003 and 2010[5]. Regional forest fires are highly likely to have an equal or comparable worsening air quality effect on WPCIB.

Although TRS is not considered to be a serious health threat, it does represent a nuisance, and the smell associated with TRS can have an impact on quality of life and tourism to the area. Therefore this air pollutant is important to measure, particularly in the Kamloops area where there are significant TRS emitting industries such as the pulp mill and wastewater treatment facility. TRS in WPCIB is likely to be at a lower level than the City of Kamloops. The levels of TRS in Kamloops peaked in 1982. In recent years the number of hours exceeding the ambient limits has drastically reduced to around 10% of the historic high of TRS. Furthermore, the City of Kamloops is undertaking a significant upgrade to its wastewater treatment facility. It is understood that this upgrade will help reduce TRS levels, therefore further reducing the likelihood of TRS nuisances in WPCIB.

What are the Levels of Pollution at the Closest Monitoring Station to WPCIB?

The closest air quality monitoring to WPCIB was at the Dunes Golf Course in the neighbourhood of Westsyde, City of Kamloops. The monitoring station was established for a 20 month period to measure local sources of $PM_{2.5}$ and PM_{10}. The monitoring station and associated air quality studies were

[5] City of Kamloops. (2012). City of Kamloops Airshed Management Plan. Accessed from: http://www.city.kamloops.bc.ca/environment/pdfs/13-05-AirshedManagementPlan.pdf

undertaken because there was concern that air quality was being negatively affected by the operations of Tolko Industries north of the Dunes, in Heffley.

Based on the collected data, it is evident that there are no significant differences in the air quality between the other air quality monitoring stations in Kamloops that of the Dunes station. Therefore, it is evident that the emissions from Tolko are insufficient to significantly influence air quality.

Overall, the air quality at the Dunes was very comparable to Kamloops. Over the 20 month period there was a very small difference between the Dunes than the other air quality monitoring stations in Kamloops. Appendix A shows the complete data set from this time period.

5.0 What are the Most Significant Pollutants in WPCIB?

At the onset of this research project, several potential air pollutant sources in WPCIB were identified by the WPCIB Administration, in partnership with Urban Systems. The potential air pollutants identified included:

- Highway 5 and railway across the North Thompson River;
- Tolko Industries in Heffley;
- The WPCIB motocross race track;
- Pollutants that may travel north from the City of Kamloops;
- Smoke from wood burning stoves and residential heating systems in WPCIB; and
- Forest fires and controlled burns.

To determine the influence of each of these potential sources of pollutants, Ralph Adams from the Government of British Columbia, Ministry of the Environment was contacted. Mr. Adams provided expert advice to identify the highest risk pollutants in the area and provided expert opinion on potential air quality concerns to WPCIB. The following provides a summary overview of how each of the potential pollutant sources may or may not impact air quality of WPCIB:

Highway 5 and Railway Across the North Thompson River

The level and types of pollutants that result from highway and railway activities are unlikely to travel more than 100 or 200 meters. Given the location of residential homes in WPCIB, it is suggested that the pollutants from the highway and railway pollutants may affect community members who live closest to the North Thompson River. However, it is unlikely that these pollutants would significantly affect the whole community; especially those living further than 200 meters west of Highway 5 and the railway.

Tolko Industries in Heffley

Tolko Industries may also have an effect on air quality as WPCIB is located farther north than the Dunes (where there was little to no impact from the mill, as discussed above) and may experience more exposure to pollutants from the mill. However, it is unlikely that there would be a significant difference between the two locations.

The WPCIB Motocross Race Track

The WPCIB motocross race track represents a local source of $PM_{2.5}$ and other pollutants that are released from two and four stroke engines. It is unlikely these pollutants have a large impact on air quality given that motocross races and recreation occur only in the summer when air movement is greater, and the frequency of large motocross events is fairly low.

Therefore, the impacts would not extend to any smog related pollutants (like ground level ozone or O_3), and would be limited to direct impacts on those who are in close proximity or at the track already.

Pollutants that may Travel North from the City of Kamloops

As mentioned earlier, pollutants are unlikely to travel north to WPCIB from Kamloops in significant quantities. This is primarily because the prevailing winds travel east to west, and seldom blow from south to north. This means that WPCIB resembles Kamloops' air quality only when airflow in the area is very open in the summer. Summer air quality in Kamloops is generally good, except for forest fire episodes where WPCIB too would be impacted equally by the smoke if the fires are large enough. Winter pollutants often remain trapped in the Kamloops valley due to inversions and do not travel far.

Smoke from Wood Burning Stoves and Residential Heating Systems in WPCIB

Wood burning stoves are likely to have the most significant impact on local air quality conditions in WPCIB. Air does not travel far and can be come stagnant in the winter in WPCIB, as in Kamloops, and therefore the $PM_{2.5}$ pollutants that result from wood burning can remain localized. These pollutants can have an effect on human health.

It is important to note that many community members utilize wood for home heating due to availability and low operational costs relative to alternatives such as heating oil or electricity.

Forest Fires

Forest fire smoke greatly affects the air quality of Kamloops, and WPCIB. Even one heavy forest fire a year can drastically raise the average levels of air pollutants for a period of three years. In the recently released 2013 *State of the Air Report* by the BC Lung Association, forest fire smoke from as far away as Siberia was found to be affecting air quality in BC and causing smoky skies. Although forest fires represent sporadic and episodal deterioration of air quality, they represent sources of pollutants that community members should be aware of and plan for, particularly those who are the most vulnerable (Elders, young children and infants).

Stubble burning and controlled burns represent impacts from smoke that are similar, albeit on a much smaller scale than forest fires. However, many of the negative effects, especially if the burning is taking place close by, are the same.

The Proposed Ajax Mine[6]

Although this is not currently a source of air pollutants, WPCIB has expressed concern about the potential impact on the airshed of the proposed KGHM Ajax mine. The proposed KGHM project is to be an open pit gold and copper mine at the south end of Kamloops, near Knutsford, straddling the City boundary. WPCIB would like to expand their understanding of the potential impacts of this development. In particular, it is important to understand the scope of increased air pollution in the form of $PM_{2.5}$ and PM_{10}

[6] Note – the proposed Ajax Mine was not included in the inventory of potential pollutant sources in WPCIB until the community engagement session. Several community members, including Chief LeBourdais noted concern about the project and the need to consider it within the scope of the final report.

that may arise as a result of the dust from disturbed soils. WPCIB is also concerned about the presence of heavy metals in the soil in and around the proposed mine site that could become air borne if disturbed. While it is difficult to tell what impact this potential source of air pollution might have on WPCIB, it is important to WPCIB to have a full understanding of the scope of the potential impacts.

6.0 What Impacts can these Pollutants have on WPCIB Community Members?

Based on the collected information and associated analysis, forest fires and controlled burns, as well as wood burning stoves/residential heating systems are thought to be the primary sources of air pollution in WPCIB. Therefore the associated pollutants from these sources and their impacts will be the focus of this section. Learning more about these pollutant sources is key to better understanding how to control and manage them.

Wood Burning as a Primary Heat Source

Wood burning stoves and heating systems are likely to have the most significant impact on local air quality within WPCIB. Air does not travel far in the winter in WPCIB, as in Kamloops, and therefore the $PM_{2.5}$ that results from wood burning likely remains trapped in the local area. This can lead to adverse effects on the health of community members.

In WPCIB approximately 21 households in the community use wood for home heating. It was estimated that the average household burns around 8 cords of wood per year. One cord of dry wood weighs about 2000 pounds.[7] Therefore, the average annual total of wood burned for heat in WPCIB is around 337,176 pounds, or 152,940 kg. This fuel use results in the release of approximately 2,200 kg of $PM_{2.5}$.[8]

The Lung Association outlines the health impacts typically associated with wood burning[9]. These impacts can include:

- a reduction in disease resistance;
- the disruption of cellular membranes;
- depressed immune system activity;
- damage to layer of cells that protect and cleanse the airways;
- the disruption of enzyme levels, increased respiratory symptoms;
- increased hospital admissions for lower respiratory infections; and,
- exacerbation of asthma, and decreased breathing ability[9].

[7] OMNI Environmental Services, prepared for the US EPA. (1998). Residential Wood Combustion- $PM_{2.5}$ Emissions. Accessed from: www.epa.gov/ttnchie1/efdocs/rwc_pm25.pdf

[8] Ibid.

[9] The Lung Association (2012). Outdoor Air Quality: Heating Methods and Open Burning. Accessed from: http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/heating-chauffage_e.php

The pollutants that cause these impacts are most likely to affect young children, the elderly, and people with pre-existing health conditions. However, healthy people can experience health complications as well.

To help reduce air pollutants from wood burning, the Ministry of the Environment air quality specialist emphasized the importance of curing wood for at least six months. Also, it is important to note the harmful consequences of burning garbage. When combusted, the plastics, chemicals and compounds in garbage are extremely harmful to the environment and to human health in the area. It is much more environmentally friendly to dispose of waste properly in a TNRD transfer station.

Forest Fires and Controlled Burns as a Source of Pollutants in WPCIB

The climate in and around WPCIB and the Kamloops area lends itself to high risk forest fire conditions. Ultimately there is little that WPCIB or any of the surrounding communities can do to prevent naturally caused forest fires, however, education on the importance of preventing human caused forest fires can go a long way. Controlled burns are another fire issue that contributes to poor air quality and should be avoided as much as possible.

When forest fires or controlled burns do occur in the area, the Lung Association outlines potential health impacts to be aware of. If breathing difficulties develop, it is important to call a health care provider and consider temporarily moving to a cleaner area. For regularly healthy people wood and vegetation smoke can irritate eyes, lungs, throat and sinuses, increase the risk of heart attacks, trigger headaches and allergies and reduce lung function, especially in children.[10] For someone with lung disease, smoke can cause all of the above sooner and it can trigger asthma attacks and pneumonia.

[10] The Lung Association. (2013). Forest Fires and Lung Health. Accessed from: http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/forest_fires-feux_de_forret_e.php

7.0 WPCIB Community Engagement

On October 19, 2013 a community engagement session took place to allow WPCIB residents and Council to learn more about WPCIB air quality and to talk about potential sources of pollutants. As part of the consultation, participants filled out a survey on air quality in WPCIB, sources of pollutants and what the next steps should be to achieve better air quality. A total of 18 surveys were completed (representing approximately 33% of the total registered community members living on-reserve). The survey provided at the session and the associated tabulated results are included in Appendix B of this report. Appendix C of this report includes the presentation used to facilitate the community engagement session.

Air Quality: Level of Concern

The first question of the survey asked participants whether they are concerned about air quality issues in WPCIB. Approximately half (55%) of participants indicated they are concerned about air quality issues, while 6 participants (33%) said no. Two respondents were not sure.

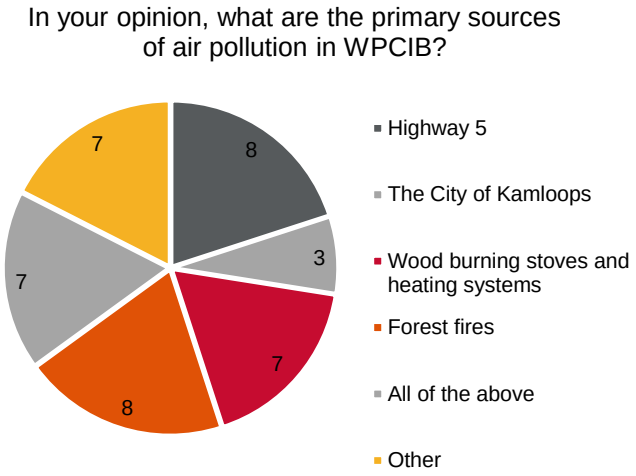
Presence of Respiratory Illnesses

Participants were asked about the occurrence of respiratory illness. Most participants (78%) indicated that they do not have any respiratory illnesses. Four people or 22% selected yes, specifying that they have respiratory problems.

Sources of Air Pollution

In question 3, participants identified the main sources of air pollution in WPCIB from the inventory of key pollutant sources in the community (as inventoried in Section 5 of this report). Participants could select more than one response, and many selected multiple sources. As shown in Figure 3, overall, there was an even distribution of responses, with 7 or 8 people selecting every option: Highway 5, wood burning stoves and heating systems, forest fires, all of the above, and "other." One exception was the City of Kamloops as a source of air pollution, which was selected by only 3 people. Some of the participants who selected "other" wrote comments. "Other" sources identified in the survey included: the motocross/4 by 4 track; the railway; the Domtar pulp mill in the City of Kamloops; and global air pollution.

Figure 3: Community Survey Response Distribution on Perceived Air Pollutant Sources



Pulp mill/Sewage Treatment Air Pollution

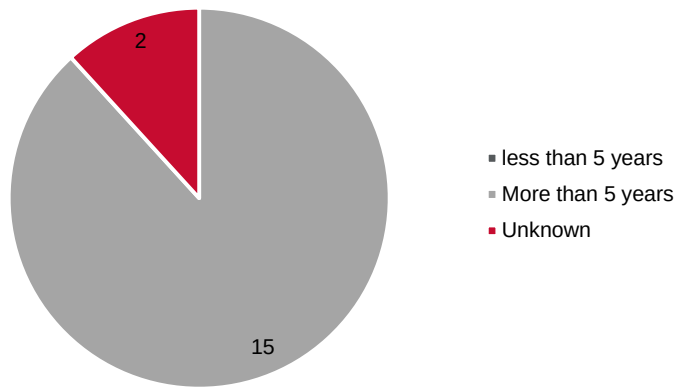
More than half of the survey participants (60%) indicated that they do not smell the pulp mill or Kamloops sewage treatment in WPCIB. The other 40% indicated that they could smell it sometimes. No one expressed that that could smell it "regularly."

Use of Wood as Primary Heating Source and Age of System

Everyone who completed the survey confirmed they burn wood to heat their homes, and in all circumstances the wood burning systems were older than 5 years old. There were two participants who did not know the age of their stove, or, indicated it was older than five years but unsure how much older.

These results suggest that a key action for WPCIB to pursue to help maintain air quality in the community is maintaining and upgrading residential wood burning stoves. This is discussed in further detail in the following section of this report.

Figure 4: Community Use and Age of Wood Burning Appliances



Seasonal Air Quality

Responses were split almost evenly on whether the air quality was worse in the summer or winter. A slight majority (53%) thought the air quality was worse in the summer.

Perceived need for Air Quality Monitoring

Question 7 asked participants if they would like to see a localized air quality monitoring station established. The majority of the respondents (56%) suggested their interest was dependant on the cost. Six respondents (38%) indicated that they would like to see an air quality monitoring station, while only 1 participant responded "No."

Collaborative Air Quality Management

The last question asked whether participants, "Would support greater collaboration between WPCIB and other regional stakeholders to support better air quality management?" The majority of participants said yes to this question (81%). "No" was not selected by any of the participants, while 3 people (18%) suggested they didn't know if they would support this initiative.

8.0 WPCIB Air Quality Management Actions

Based on the examination of potential air sources and the community survey responses, it is likely that there are two primary sources of air pollutants in WPCIB. These include: wood burning for heat in the winter, and forest fires in the summer. There are other regional sources of air pollutants, however their impact on the community and surrounding environment are likely insignificant at the time of the completion of this report.

To assist WPCIB in managing air quality, an inventory of potential short and long term management actions for the two key sources of pollutants in WPCIB and more broadly, regional air quality protection, are offered below.

Short Term Action 1: Support Best Practices in Residential Wood Burning for Heat

This action is likely to be the most important and beneficial action for WPCIB to pursue in support of air quality management. In support of this action there are a number of key steps that WPCIB should consider pursuing, including:

1. *Inform Community Members of Best Practices:* The Lung Association sets out some guidelines that community members can take to reduce their impact if they must heat with wood. These include:
    - Burn small, hot fires - they produce much less smoke than ones that are left to smoulder;
    - Do not burn "green" or wet wood which produces significantly more smoke;
    - Soft woods like pine produce more emissions and deposits inside your chimney;
    - Firewood should be seasoned for at least six months;
    - Wood should be split into pieces that are 10-15cm (4-6in) in diameter as fires burn better with more surface area exposed to the flame;
    - Never burn garbage, plastics, cardboard or styrofoam, this will result in poisonous emissions;
    - Never burn wood that has been taken from salt water because chlorine combines with the smoke to produce dioxins and furans, which are dangerous carcinogens;
    - Burning treated or painted wood, particleboard or plywood, wood treated with varnishes and sealants, wood from orchards sprayed with pesticides and pressure-treated wood causes health hazards and releases toxic chemicals;
    - Store wood outside, off the ground and covered;
    - Bring it into your home as needed as the excess moisture found in green wood increases the relative humidity of the indoor air, which can lead to mold and mildew growth;

- High-efficiency wood stoves, fireplaces or inserts will burn most of the smoke right in the firebox and can cut emissions by up to 90 percent;
- High-efficiency stoves can use a third less wood to get the same amount of heat;
- Reduce your heating needs by making your house more energy efficient; and
- All wood-burning appliances should be installed by professionals and inspected and cleaned at least once a year by a technician certified under the Wood Energy Technical Training (WETT) Program.

2. *Support the Upgrade of Heating Units:* This can be accomplished through several means:
   - Undertake a rebate or woodstove exchange program in partnership with a senior government partner such as Aboriginal Affairs and Northern Development Canada or the Government of British Columbia's Ministry of Environment; and
   - Encourage the replacement of old wood burning stoves by educating WPCIB members on the benefits of upgrading to more efficient and clean burning stoves.
3. *Support the Upgrade of Fuel Type (eg. pellets):* Pellets produce less emissions when used as fuel for heat. It may be possible for WPCIB to purchase pellets in bulk to help lower the cost premium of pellets products over traditional fire wood. This is contingent on a sufficient number of homes using pellets as the primary fuel supply.
4. *Fuel Switch When Cost Effective:* From an air quality perspective the use of electricity and certain fossil fuels (eg. propane) can be advantageous. However, these fuels can be more expensive for space heating relative to biomass heating options. Therefore, it will be important to weigh the benefits and costs associated with different home heating fuels.

Appendix D provides a community hand-out to inform members about the best practices they can follow when using wood to heat their homes. It is recommended that this be made available to community members in hard copy and posted on the WPCIB website.

Short Term Action 2: Forest Fire Health Impact Mitigation

In order to prevent serious problems related to forest fire and controlled burn smoke, the general recommendations are:

- Remain indoors;
- Keep doors, windows and fireplace dampers shut;
- Use air conditioners on the recirculation setting so outside air will not be moved inside;
- Refrain from exercising outdoors;
- Take extra precaution with children, who are more susceptible to smoke because their breathing systems are still developing and they breathe in more air (and therefore more smoke) than adults;

- Older adults are more likely to have heart or lung disease, which can make them more susceptible to smoke. Extra precaution should also be taken during forest fire season;
- Keep your windows and vents closed while driving. Again, only use air conditioning in the "recirculate" setting; and
- Pay attention to air quality reports on the local news channel or websites.

Resources such as The Lung Association, and Clean Air BC websites have many great tips about how to manage during times when smoke is present in the area, and manage lung health, even for those with pre-existing conditions:

- http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/forest_fires-feux_de_forret_e.php
- http://www.cleanairbc.com/default.cfm

Wildfire Smoke Forecasts are available for Western Canada. The system uses wildfire information and weather forecasts to predict the location and amount of smoke over Western Canada up to 2 days into the future. This information can be accessed at:

- http://www.bcairquality.ca/bluesky/west/index.html

It is therefore recommended that WPCIB monitor forest fire events and their impact on local air quality. Further, it is suggested that the WPCIB issue advisories to the community during periods of poor air quality and apply key strategies for protecting the health of its members.

Short Term Action 3: Participate in the Ajax Mine Environmental Assessment and Project Review Process

As noted above, the proposed Ajax Mine and its potential impacts to local and regional air quality are of concern to WPCIB, its leadership and community members. Currently, the proponent (KGHM) has decided to amend its application to the Federal Canadian Environmental Assessment Agency and the BC Environmental Assessment Office. It is understood that KGHM will re-submit its application to the above mentioned agencies in the next 4-12 months. It will be important for WPCIB to monitor the timing of the application and associated environmental assessment processes. Doing so will provide opportunity for WPCIB to be informed about the anticipated impacts of the project to local and regional air quality and provide comment to proponent and approving agencies.

Short Term Action 4: Engage with the City of Kamloops and other Regional Stakeholders to Protect Air Quality

The City of Kamloops is continually working to implement their Airshed Management Plan. Given the influence of the City on WPCIB's local air quality during certain times of the year, it would be

advantageous for the WPCIB leadership or administration to engage the City in discussion about air quality. It is likely that such conversations will provide opportunity for:

- Knowledge and information sharing;
- Collaboration on regional air quality management initiatives; and,
- Continually stress the importance of air quality to senior government and industry, and advocate for improvements to regulations, incentives, and other mechanisms that will support improvements in air quality.

Long Term Action 1: Collect Further Information on Air Quality

WPCIB is taking a proactive step by developing an *Air Quality Management Strategy* and engaging community members in discussions about air quality issues.

Based on the research and analysis completed to date, it is possible to determine the most likely air quality pollutants and conditions in WPCIB during certain seasons. However, the best determinates of actual air quality and pollutant problems can only be achieved through direct monitoring in the community.

The Ministry of Environment recommends that $PM_{2.5}$ measurements would provide the most relevant air quality information to WPCIB. In order to undertake monitoring such as this there are a number of options:

1. Hire a consulting company to undertake the monitoring;
2. Engage AANDC, the Ministry of Health and the Ministry of the Environment to provide support for measuring air quality, by providing equipment, time and expertise.; or
3. Engage the Ministry of the Environment to use the instruments they already have, when they are next available, to measure air quality in WPCIB. There would be costs associated with this option for the filter changers, and the cost of the filters.

Chief and Council should make a recommendation on whether WPCIB should move forward with monitoring or an education program. Air quality management programs should focus on two or three of the most logical strategy options, in this case, bringing awareness to wood burning practices and forest fire air quality safety. These programs could be provided in a number of formats, including an education campaign, support for upgrading outdated wood burning stoves, or pursuing further research.

Long Term Action 2: Pursue Additional Air Quality Management Funding

There are several options that WPCIB may wish to pursue to access funding to further air quality management.

Partnerships with key stakeholders: There may be an opportunity to share the cost of examining and improving air quality in the region with other key stakeholders. For example, Prince George Air Improvement Roundtable (PGAIR) uses this structure. PGAIR is a not-for-profit society that is concerned with researching and monitoring air quality and making recommendations for improvement and education in Prince George. The funding structure of this multi-stakeholder agency is shared, 25% local government funding, 25% provincial government funding, and 50% industry funding. The budget varies each year from $90,000 to $500,000 per year.

First Nations Health Authority Environmental Contaminants Program: This program supports First Nations projects (to a maximum amount of $50,000) that explore the link between environmental health and environmental contaminates. The funding supports environmental research and encourages community-informed work that incorporates traditional and Indigenous ways of knowing into empirical science. http://www.fnha.ca/what-we-do/environmental-health/environmental-contaminants-program

9.0 Conclusion

Air quality is an increasingly important topic among scientists, policy makers and the public. New research is continually emerging that shows the implications of poor air quality on human health and the environment.

This report provides a basis for which WPCIB can support a variety of actions to protect air quality conditions in the community and regionally. Through the development of the *Whispering Pines Air Quality Management Strategy*, WPCIB has:

- Developed a comprehensive understanding of local air quality issues and baseline conditions within the WPCIB community;
- Increased awareness of the air pollutant sources that contribute to air quality issues in the community; and
- Developed an inventory of key actions that WPCIB can pursue to improve air quality in the community – this will incorporate community input and knowledge into local air management solutions.

By implementing this strategy WPCIB will be better positioned to take a proactive approach to air quality management issues that can affect community members and the local environment.

Appendix A

Partisol Data at the Dunes Compared to Other Kamloops Air Quality Monitoring Stations

Partisol Data at the Dunes compared to other Kamloops air quality monitoring stations

(units measured in µ/ m^3)

Date	Kamloops Brocklehurst (24 hour average)	Kamloops Pacific Way (24 hour average)	Kamloops Dunes (24 hour average)	Average across Kamloops area (24 hour average)	Difference (Dunes) (24 hour average)
3-Feb-04	9.0	8.6	9.2	8.9	0.3
9-Feb-04	4.3	4.4	8.1	5.6	2.5
15-Feb-04	6.6	4.6	15.5	8.9	6.6
21-Feb-04	6.6	13.2	11.4	10.4	1.0
27-Feb-04	10.8	14.4	18.9	14.7	4.2
4-Mar-04	5.0		15.4	10.2	5.2
10-Mar-04	4.0	2.3	5.4	3.9	1.5
16-Mar-04	4.0	2.3	5.7	4.0	1.7
22-Mar-04	7.0	4.2	5.2	5.5	-0.3
28-Mar-04	3.0	2.0	3.8	2.9	0.9
3-Apr-04	6.0	2.0	4.1	4.0	0.1
9-Apr-04	5.0	4.6	6.2	5.3	0.9
15-Apr-04	2.0	2.0	2.0	2.0	0.0
21-Apr-04	2.0	3.3	2.3	2.5	-0.2
27-Apr-04	3.0	2.0	3.3	2.8	0.5
3-May-04	3.0	3.8	4.3	3.7	0.6
9-May-04	2.0	2.0	3.5	2.5	1.0
15-May-04	6.0	6.3	5.1	5.8	-0.7
21-May-04	4.0	2.0	3.3	3.1	0.2
27-May-04	2.0	5.4	2.0	3.1	-1.1
2-Jun-04	3.0	2.0	2.0	2.3	-0.3
8-Jun-04	4.0	4.4	4.8	4.4	0.4
14-Jun-04	3.0	2.0	3.0	2.7	0.3
20-Jun-04	10.0	12.4	8.4	10.3	-1.9
26-Jun-04	10.0	7.2	7.8	8.3	-0.5
2-Jul-04	7.0	3.4	5.3	5.2	0.1
8-Jul-04	3.0	2.0	2.0	2.3	-0.3
14-Jul-04	6.0	6.9	8.6	7.2	1.4
20-Jul-04	3.0	2.0	2.0	2.3	-0.3
26-Jul-04	7.0	4.6	5.1	5.6	-0.5
1-Aug-04	10.0	8.2	6.8	8.3	-1.5
7-Aug-04	4.0	2.0	2.0	2.7	-0.7
13-Aug-04	16.0	11.3	10.4	12.6	-2.2
19-Aug-04	16.0	19.7	14.9	16.9	-2.0
25-Aug-04	2.0	2.0	2.0	2.0	0.0
31-Aug-04	3.0	2.0	4.8	3.3	1.5
6-Sep-04	3.0	3.9	2.0	3.0	-1.0
12-Sep-04	1.0	4.9	9.0	5.0	4.0
18-Sep-04	1.0	2.2	11.3	4.8	6.5
24-Sep-04	7.0	2.0	7.7	5.6	2.1
30-Sep-04	6.0	5.7	10.7	7.5	3.2
6-Oct-04	3.0	2.0	2.0	2.3	-0.3
12-Oct-04	6.0	6.9	10.0	7.6	2.4
18-Oct-04	4.0	4.9	2.6	3.8	-1.2
24-Oct-04	4.0	2.8	2.8	3.2	-0.4
30-Oct-04	3.0	4.4	3.0	3.5	-0.5
5-Nov-04		10.0	15.9	13.0	3.0
11-Nov-04		20.8	13.1	17.0	-3.9
17-Nov-04		2.8	7.8	5.3	2.5

Date	Kamloops Brocklehurst (24 hour average)	Kamloops Pacific Way (24 hour average)	Kamloops Dunes (24 hour average)	Average across Kamloops area (24 hour average)	Difference (Dunes) (24 hour average)
23-Nov-04		13.5	8.0	10.8	-2.8
29-Nov-04	4.0	4.9	5.3	4.7	0.6
5-Dec-04	1.0	2.0	6.3	3.1	3.2
11-Dec-04	3.0	8.6	2.9	4.8	-1.9
17-Dec-04	8.0	5.2	12.0	8.4	3.6
23-Dec-04	4.0	8.8	2.7	5.2	-2.5
29-Dec-04	8.0	11.4	10.1	9.8	0.3
4-Jan-05	4	3	6	4.4	1.9
10-Jan-05	6	24	7	12.4	-5.4
16-Jan-05	4	6	8	5.8	1.8
22-Jan-05	2	6	11	6.2	4.7
28-Jan-05	4	6	10	6.6	3.0
3-Feb-05	3		5	3.9	0.9
9-Feb-05	8	5	13	8.8	4.2
15-Feb-05	8	9	10	9.0	1.0
21-Feb-05	12	14	14	13.3	0.7
27-Feb-05	8	8	8	7.8	-0.3
5-Mar-05	3	2	3	2.6	0.1
11-Mar-05	8	4	14	8.5	5.5
17-Mar-05	2	3	4	2.8	1.2
23-Mar-05	3	3	8	4.6	2.9
29-Mar-05	3	2	3	2.6	0.3
4-Apr-05	2	7	5	4.8	0.2
10-Apr-05	3	7	7	5.7	1.2
16-Apr-05	1	5	4	3.2	0.8
22-Apr-05	6	6	7	6.3	0.7
28-Apr-05	4	4	9	5.8	3.3
4-May-05	3	9	6	5.9	0.0
10-May-05	4	11	8	7.7	0.5
16-May-05	3	7	5	4.9	-0.4
22-May-05	2	3	3	2.6	0.8
28-May-05	7	7	12	8.8	3.2
3-Jun-05	1	5	5	3.5	1.0
9-Jun-05	1	3	4	2.6	1.4
15-Jun-05	2	2	2	2.0	0.0
21-Jun-05	7	11	3	7.1	-3.8
27-Jun-05	3	2	2	2.4	-0.4
3-Jul-05	3	7	2	4.0	-2.0
9-Jul-05	2	3	2	2.3	-0.3
15-Jul-05	5	6	8	6.2	2.0
21-Jul-05	4	9	9	7.3	1.7
27-Jul-05	6	11	7	8.0	-1.1
2-Aug-05	2	2	2	2.1	-0.1
8-Aug-05	5	10	8	7.8	0.5
14-Aug-05	12	13	14	13.0	1.0
20-Aug-05	7	4	7	5.9	0.6
26-Aug-05	10	4	11	8.4	2.6
1-Sep-05	3	3	9	5.0	4.0
7-Sep-05	6	8	5	6.2	-1.2
13-Sep-05	5	9	7	6.9	-0.2
19-Sep-05	3	3	2	2.5	-0.5
Average difference at the Dunes					0.7

Appendix B

WPCIB Community Survey Questions and Tabulated Responses

Whispering Pines/Clinton Indian Band

Air Quality Management Survey

1. Are you concerned about air quality issues in WPCIB?
    - Yes
    - No
    - Not sure

2. Do you suffer from any respiratory illness, such as asthma?
    - Yes
    - No
    - I would prefer not to share this information

3. In your opinion, what are the primary sources of air pollution in WPCIB?
    - Highway 5
    - The City of Kamloops
    - Wood burning stoves and heating systems
    - Forest fires
    - All of the above
    - Other

4. Can you smell the pulp mill/ Kamloops sewage treatment center in WPCIB?
    - Never
    - Sometimes
    - Regularly

5. Do you burn wood to heat your home? If yes, how old is your wood burning system?
    - Less than 5 years
    - More than 5 years
    - Unknown

6. Do you find the air quality is worse in the:
    - Summer (outside of forest fire incidents)

- Winter

7. Would you like to see a more localized air quality monitoring station established?
   - Yes
   - No
   - Depends on the cost

8. Would you support greater collaboration between WPCIB and other regional stakeholders to support better air quality management?
   - Yes
   - No
   - Do not know

	Are you concerned about Air quality issues in WPCIB?
Yes	10
No	6
Not Sure	2

	Do you suffer from any respiratory illness, such as asthma?
Yes	4
No	14
I would prefer not to share this information	

	In your opinion, what are the primary sources of air pollution in WPCIB?
Highway 5	8
The City of Kamloops	3
Wood burning stoves and heating systems	7
Forest fires	8
All of the above	7
Other	7

	Can you smell the pulp mill/ Kamloops sewage treatment center in WPCIB?
Never	11
Sometimes	7
Regularly	

	Do you burn wood to heat your home? If yes, how old is yourwood burning system?
less than 5 years	
More than 5 years	15
Unknown	2

	Do you find the air quality is worse in the:
Summer (outside of forest fire incidents)	9
Winter	8

	Would you like to see a more localized air quality monitoring station established?
Yes	6
No	1
Depends on the cost	9

	Would you support greater collaboration between WPCIB and other regional stakeholders to support better air quality management?
Yes	13
No	
Do not know	3

Comments

What about geothermal heating systems?

Would like to **have** an Air Quality system set up monthly, now Oct 31st 2013, to continue 2 years after Ajax has been operational to quality control pollutants in the air. International pollution is also a source of air quality pollution

	Other sources of pollution
China, Japan, USA	x2
Rail	
Pulpmill, City traffic emissions	
Motocross	x4

Appendix C

Community Engagement Presentation

Whispering Pines / Clinton Indian Band

Air Quality Management Strategy

John Kenney

October 19, 2013

Overview of Presentation

- Project purpose
- Kamloops Air Quality
- Main Air Pollutants in WPCIB
- WPCIB Air Quality
- Next Steps
- Survey Questions

Project Purpose

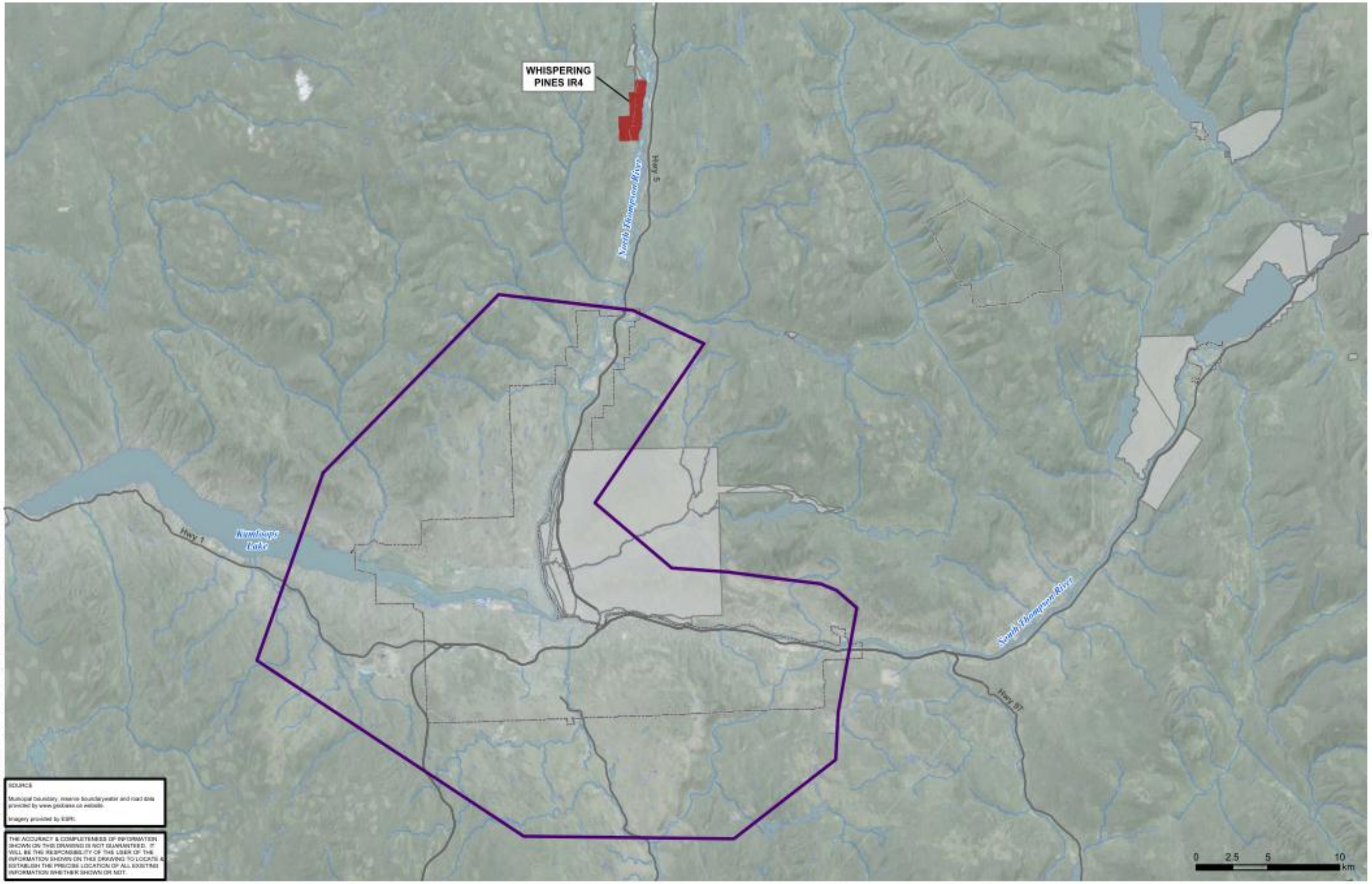
- Develop baseline data:
  - Understand air quality in WPCIB based on Kamloops conditions
  - Implications of poor air quality/ pollutants
  - Assess the need for actions that will improve air quality
- Encourage community members to take individual action to maintain good air quality
- Steer administrative decisions that may influence air quality

WHISPERING PINES AIR QUALITY MANAGEMENT

DATE: OCTOBER 2013

WHISPERING PINES/CLINTON INDIAN BAND

1:250,000



SOURCE

Municipal boundary, reserve boundary/water and road data provided by www.geobase.ca website.

Imagery provided by ESRI.

THE ACCURACY & COMPLETENESS OF INFORMATION SHOWN ON THIS DRAWING IS NOT GUARANTEED. IT WILL BE THE RESPONSIBILITY OF THE USER OF THE INFORMATION SHOWN ON THIS DRAWING TO LOCATE & ESTABLISH THE PRECISE LOCATION OF ALL EXISTING INFORMATION WHETHER SHOWN OR NOT.

Legend

- Approximate Kamloops Airshed Boundary
- Municipal Boundary
- Whispering Pines IR4
- Other First Nation reserve

AIRSHED OVERVIEW

FIGURE

1

A Proxy: Kamloops Airshed Overview

- $PM_{2.5}$ and ozone consistently below Canada Wide Standards
- Elevated levels of these pollutants result from forest fires (2003 and 2010)
- ORSG does exceed BC standards for a number of hours every year
  - Peak ORSG was in 1982, steady decline since then

Main Air Pollutants in WPCIB

Pollutant

- Fine Particulate Matter ($PM_{2.5}$)
- Ground Level Ozone (GLO)
- Odorous Reduced Sulphur Gas (ORSG)

Source of Pollutant

- Road dust, road construction, fertilizers and pesticides, wood burning
- Burning coal, gasoline and other fuels, and naturally by plants and trees
- Pulp and paper industry, sewage treatment, oil and gas industry, marshes and bogs

Impact of Pollutants

Health

- Worsen asthma, lung diseases and heart diseases
- Swollen irritates airways
- Irritated eyes, nose and throat
- Coughing, wheezing
- Headaches
- Lung damage

Environmental

- Damage vegetation, crops and forest growth
- Affect mineral nutrient cycle and some habitats for animals and plants
- Certain pollutants contribute to acid rain
- Reduced visibility and smog

Key Pollutant Sources in WPCIB

- Highway 5
- Tolko Industries
- Motocross Track
- Pollutants travelling north from Kamloops
- Wood burning for space heating
- Forest Fires

WPCIB Air Quality

- Currently no air quality monitoring
- Summer
  - Likely very similar to City of Kamloops
- Winter
  - Inversions may trap wood smoke in WPCIB, causing air quality to be worse than the City
- Year-round
  - Likely low levels of ORSG

WPCIB Air Quality Issues

- Wood burning for heat
  - Experienced primarily in winter months
  - Approximately 21 households rely on wood for space heating
  - Community uses over 153,000 kg of wood/year
  - Cost effective, but results in significant amount of PM 2.5
- Forest fires and controlled burns
  - Event/response based with limited control of occurrence/impact

Next Steps

- Conduct survey (today)
- Refine inventory of potential air quality management tools
- Develop the *Whispering Pines Air Quality Management Strategy*

To be completed end of November 2013

Discussion on Survey Questions

- Are you concerned about air quality issues in WPCIB?
- Do you suffer from any respiratory illness, such as asthma?
- In your opinion, what are the primary sources of air pollution in WPCIB?
- Can you smell the pulp mill/ Kamloops sewage treatment center in WPCIB?
- Do you burn wood to heat your home? If yes, how old is your wood burning system?
- Do you find the air quality is worse in the:
  - Summer?
  - Winter?
- Would you like to see a more localized air quality monitoring station established?
- Would you support greater collaboration between WPCIB and other regional stakeholders to support better air quality management?

Appendix D

Community Outreach Pamphlet: Keeping Our Air Clean – Best Practices for Residential Wood Burning

20 THINGS YOU CAN DO TO KEEP OUR AIR CLEAN WHILE STAYING WARM:

Whispering Pines / Clinton Indian Band

1. Burn small, hot fires - they produce much less smoke than ones that are left to smoulder.
2. Do not burn “green” or wet wood which produces significantly more smoke.
3. Soft woods like pine produce more emissions and deposits inside your chimney, try to burn harder wood whenever possible.
4. Firewood should be seasoned for at least six months.
5. Wood should be split into pieces that are 10-15cm (4-6in) in diameter as fires burn better with more surface area exposed to the flame.
6. Never burn garbage, plastics, cardboard or Styrofoam, this will result in poisonous emissions.
7. Extend your fire. To achieve a longer-lasting fire – to heat the house overnight or while you are away – rake the coals toward the air inlet and use larger pieces of wood placed compactly in the firebox.
8. Burning treated or painted wood, particleboard or plywood, wood treated with varnishes and sealants, wood from orchards sprayed with pesticides and pressure-treated wood causes health hazards and releases toxic chemicals.
9. Store wood outside, off the ground and covered.
10. Bring it into your home as needed as the excess moisture found in green wood increases the relative humidity of the indoor air, which can lead to mold and mildew growth.
11. High-efficiency wood stoves, fireplaces or inserts will burn most of the smoke right in the firebox and can cut emissions by up to 90 percent.
12. High-efficiency stoves can use a third less wood to get the same amount of heat.
13. Reduce your heating needs and make your house more energy efficient by insulating walls, caulking windows and repairing weather stripping around the doors.
14. All wood-burning appliances should be installed by professionals and inspected and cleaned at least once a year by a technician certified under the Wood Energy Technical Training (WETT) Program.
15. Use a thermometer. A thermometer helps you use your wood burner more effectively, particularly if you can’t view the fire through glass doors.
16. Feed it regularly with split wood and never let it smoulder.
17. A smouldering fire creates more smoke.
18. Don’t overload your stove or fireplace. Air should move around inside for a cleaner burn.
19. When freshly cut, wood moisture can be up to 60%. You can tell wood is dry when the end grain has checks (cracks) the wood is much lighter in weight and the wood ignites and burns easily without smoldering.
20. Use a moisture meter to ensure wood is dry enough.

For more wood burning tips please visit:

The BC Lung Association, Wood Burning and Your Health www.bc.lung.ca/airquality/wood_burning.html

The Prince George Air Improvement Roundtable www.pgairquality.com/burn-it-clean

Bulkley Valley Lakes District Airshed Management Society Clean Air Plan www.cleanairplan.ca/documents/woodguide.pdf)