



Event Proceedings

North Central BC Clean Air Forum
March 6-7, 2013
Prince George, BC

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Download available electronic presentation files at <http://www.pgairquality.com>

Observer Notes

March 6: Main Session

Welcome and Opening Remarks

Terry Robert, Executive Director, Prince George Air Improvement Roundtable

- Welcome to all participants. Thank you for your attendance.
- How can we do more together?
- Let's take this opportunity to learn from our neighbours, discuss barriers to action, and build collaborative relationships.
- How can we advance change?

Mayor Shari Green, City of Prince George

- The City of Prince George is committed to supporting PGAIR. Council rejected a proposal to reduce funding to PGAIR because we highly value the work that the roundtable does for our community.
- Dust removal from Prince George roads continues to be a major issue. City of Prince George is committed to timely street sweeping and we have invested in new street sweeping equipment in order to contain dust.
- China's air quality is a recurring theme on the world stage; a major consideration for how air quality is and should be approached for Prince George's future. They are making changes to their infrastructure and moving heavy industry away from large population centres to improve their air but they have significantly larger challenges than the ones we face. Our air is nowhere near as polluted as the air in parts of China.

Terry Teegee, Tribal Chief, Carrier Sekani Tribal Council

- Welcome. We are on the traditional territory of the Lheidli T'enneh.
- My background as a Registered Forester, elected member of the Carrier Sekani Tribal Council and Member of the Fraser Basin Council, which contributes to PGAIR, means that I am very involved and interested in air quality issues in our city.
- The public and community should be presented with the information, made aware, and given the opportunity for involvement
- I am looking forward to discussions about health and the ways in which air quality affects our lives.

Terry Robert, Executive Director, PGAIR

- Building connections, networking, and creating trusting relationships between people are major focuses of this event.

Jennifer McGuire, Executive Director, Regional Operations, Ministry of Environment

- My work focuses on stewardship and building strong partnerships between stakeholders.
- Currently working on updating Open Burning Smoke Legislation. We are finishing follow-up on feedback for the 2010-2011 discussion paper and should have the new legislation in the fall of 2013.
- Support for the reduction of non-point source emissions
 - \$200,000 Woodstove Exchange Program that included initiatives in Prince George and Mackenzie.
 - PGAIR Burn-it-Clean pilot project

- BlueSky Western Canada Smoke Forecasting System is an ongoing research project used to track forest fires and plan prescribed burns. <http://www.bcairquality.ca/bluesky/>
- Today (March 6, 2013) Prince George is under a dust advisory so we are very aware of the reasons that we are gathered.
- We are doing our part to work together and find solutions.

Keynote Address

1. Air Quality in the BC Boondocks

Dr. Sarah Henderson, Environmental Health Scientist, BC Centre for Disease Control

- The word Boondocks in the title of this presentation is used affectionately to refer to areas outside of large urban centres.
- Prince George differs from major urban centres such as Vancouver because it has very different sources of air pollution.
- We are all humans. The health effects of air pollution are the same for everyone.
- Community Scale Exposure: Vancouver vs. Courtney, BC.
 - The air quality concerns in each of these communities are very different. Vancouver has high volumes of traffic, whereas Courtney has more dust and smoke.
- Most research is conducted in urban environments where traffic is a major air quality concern. These environments are easier to study because they contain many people.
- The traffic pollution in Prince George is different from large city traffic because there is a larger influence of trucking with diesel exhaust and road dust contributing significantly to air pollution.
- In smaller communities, livelihoods are often tied to industrial complexes that are large sources of air pollution. This leads to challenging conversations around air quality.
- Forest Fires
 - 4 of the worst fire seasons in history have occurred during the last decade.
 - Large amounts of beetle kill wood means that we can expect more bad fire seasons in the near future.
 - Urban areas are less affected by forest fire smoke pollution.
 - Forest fires represent some of the highest short-term particulate matter (PM) exposures and can have very severe and acute health effects.
- Residential Wood burning
 - Woodstoves have greater emissions than furnaces.
 - Wood is a cheaper way to heat homes.
 - Wood smoke is a major source of air pollutions during temperature inversions.
 - Banning wood burning is not a viable option so we have programs such as the Woodstove Exchange Program to help people purchase more efficient stoves.
 - We must educate people about how to dry and cure their wood for the most efficient burning and least emissions.
- Maintenance of large rural properties is a source of air pollution.
 - Sources include gas mowers, chainsaws, and tractors
- Cigarette smoking is the #1 source of air pollution exposure for people who smoke and a significant source for those around them.
 - In Vancouver ~15% of the population smokes.
 - In rural BC ~25% of the population smokes with some communities reaching ~50% smokers.
- Some aspects of Air Quality are THE SAME
- We use the same technology for air quality monitoring to capture general background concentrations.
 - The information is publicly available at www.BCAirQuality.ca
 - We are able assess and understand our own exposures.
- We must pay attention and think about personal exposure.

- My mission is to pay attention to how air pollution affects the health of Northern and rural populations. We are still lacking information.
- We can use information about forest fires and respiratory hospital admissions in children of rural industry driven communities to learn more about the health effects of air quality in these communities.

2. Air Quality and Community Health

Dr. Robert Oliphant, President and CEO, Asthma Society of Canada

- It feels good to be back in the North.
- The reason that we are gathered here today is not for aesthetics, economics, or social behavior, but for health.
- Thank you to PGAIR for 15 years of hard work towards cleaner air.
- Issues of Life and Breath
 - 3.2 million Canadians have asthma and I am one of them
 - Each person breathes 21,000 times each day
 - We use 14,400 litres of air each day
 - Asthmatics, children, the elderly, and cardiac patients are our early warning when air quality declines.
- In 2008,
 - 300 premature deaths due to air quality
 - 85% of deaths are the result of long term exposure
 - 15% are due to the acute effects of short term exposure
 - 8763 emergency room visits
 - 2,500,000 minor illnesses
- Smoking is an air quality issue!
- We all have to breathe and so we are all affected.
- Clean air and a healthy environment are vitally important.
- Air pollution is the largest trigger to asthma and related allergies.
- Asthma Society of Canada has a goal of helping asthmatics adapt to their environments and advocating for their health. We are a 50% medical and 50% air quality charity. The work that we do is increasingly environmental.
- An example of a recent issue that has affected asthmatics is airline policy surrounding pets on planes. Severe asthmatics can be very affected by pets so we advocated for them by asking the airlines to accommodate them by moving their seats further from the pets, providing advanced warning, and improving airplane air filtration.
- Air Quality Health Index (AQHI)
 - The AQHI is an important tool for asthmatics and can be used to increase awareness and advocate for air quality improvements.
 - Prince George is the only community monitored on the AQHI that is in the moderate risk zone today (March 6, 2013). All of the other communities are in the low risk zone.
 - There are concerns about the reliability of the AQHI and scientists are suggesting that some changes be made.
 - The AQHI shifts the burden of care onto asthmatics as they are responsible for altering their lives due to air quality.
- Communities must take responsibility for their air.
- Everyone deserves to have the opportunity to live, work, play, and enjoy healthy lives together.

Panel Discussion:

Question: What is your best piece of advice for airshed managers?

Answer: Maintain a focus on constant improvement and awareness of all sources.

Answer: Be vigilant about climate change. We are naïve about the impacts of ground level ozone and there continues to be major climate change denial among political leaders.

Question: What is the trend for rates of asthma in Canada?

Answer: Canada has the 5th largest prevalence of asthma in the world. Between 1985 and the early 2000's the rate of asthma diagnosis was decreasing but it has begun to increase since 2001. We are now seeing diagnosis rates comparable to rates from the 1990's. This could be the result of changes to diagnostics but also reflects increased exposure to air pollution. This trend is very concerning.

Answer: A recent UBC study found that the use of antibiotics in children under 1 year of age increases their risk of developing asthma.

Question: I am concerned about the denial of trans-atmospheric pollution from oil sands operations in Northern Alberta and industrial emissions from China. These fine particulates can travel thousands of kilometres and affect the air quality in our airshed. We need to think about the broader scale interconnectedness of this problem.

Answer: Good point. Siberian forest fire smoke is known to travel to North American airsheds. This issue is important and challenging to address.

Answer: It is a combination of the factories in China and the car that you drive locally that affects air quality. Similarly, pollen allergens can shift across the planet. Both global and local actions count.

Question: The Air Quality Health Index (AQHI) is very controversial. It is heavily weighted with ozone and particulate matter is rated low. I feel that the criteria should be changed to reflect the health risks of particulate matter.

Answer: There was recently a study examining the weighting system used by the AQHI but it is a very complex issue. For example, asthmatics are affected by temperature, humidity, particulate matter, pollen counts, and other factors, but the ways in which they are affected are highly individualized. People must know their own bodies and test themselves to determine when it is safe for them to exercise. All of the air quality monitoring systems are necessary but none are sufficient in isolation. The bigger issue is that the AQHI is very localized and may not be accurate for every situation as the air quality is significantly different on a highway than in a park within the same city. Everyone, especially asthmatics, must make an effort to understand the environment in which we live.

Air Quality in North Central BC: Environmental Trends

3. Fostering Change: The Prince George Experience

Maureen Bilawchuk, Section Head, Ministry of Environment

- Change, be it good, bad, fast, or slow is inevitable but can be very intimidating.
- Small changes can have a cumulative effect that leads to a big difference.
- Prince George does not have a very good reputation for air quality.
- The sulphur smell in the air has been referred to as the “smell of money”
- What was acceptable in the past is no longer acceptable.
- Air quality management has become a public issue.
- Within the last 7 years we have seen measurable changes and have completed 7 of the 8 steps necessary to create lasting change.

1. Recognizing urgency.

- Newspaper articles and media coverage made us aware of the problems.
- 2. There is more than 1 issue.
 - We have to deal with geography and multiple sources.
 - Health, quality of life, and economic considerations.
 - PM_{2.5} has the greatest impact on health.
 - PM comes from industry, mobile sources, commercial, residential, and background.
- 3. Someone must take responsibility.
 - Overarching accountability
 - Media are responsible for keeping the issues at the forefront and maintaining urgency.
- 4. Vision and Strategy Development
- 5. Take Action
 - The Ministry of Environment tracked air quality complaints and followed up on them.
 - In 2007 asphalt complaints were very high but have since decreased significantly.
 - In 2012 we saw increased air quality complaints.
 - Odour complaints have increased in recent years while asphalt complaints have decreased.
 - Industry is responsible for only a fraction of PM_{2.5}.
 - We have seen a decreasing trend in loading since 2005 and we have seen a 27% reduction in PM from industrial sources in Prince George since that time.
 - Pulp mills represent 88% of the industrial fraction of PM but better technology, a reduction in operating hours, and elimination of some sources has enabled a decrease in pulp mill PM emissions.
 - The 2009 decrease in PM was due to the economic slowdown and subsequent increase in the number of pulp mill shut downs during that year.
 - The 2012 values are conservative estimates.
 - We see decreasing trends for both PM₁₀ and PM_{2.5} in Prince George.
- 6. Generating Wins
 - We must encourage hope and inspiration towards continued change.
 - We are on the right track.
- 7. Consolidate Gains
 - Awareness
 - Research
 - Creation of more stringent guidelines
 - Voluntary change by industry – over \$200,000,000 has been invested in pollution control.
- 8. Anchoring the Change
 - The status quo is not good enough.
 - The culture and social norms must change in order to create a community that is healthy and vibrant.

4. Overview of Environmental Trends

Dennis Fudge, Air Pollution Meteorologist, Ministry of Environment

- Over 200 compounds are monitored in Prince George including over 150 Volatile Organic Compounds (VOC's) that are sampled every 6 days.
- The highest 10 PM₁₀ concentration locations are located in North Central BC. Coastal areas have lower PM₁₀ concentrations because higher precipitation keeps the dust down.
- The Central Interior has the highest concentration of PM_{2.5}. The provincial objective for a 24-hour period is 25 µg/m³ and the annual average provincial objective is 8 µg/m³.
- The graph shows that we had a very good year for PM in 2011.
- In 2012, 5 sites exceeded 6 µg/m³ and 3 communities exceeded the provincial 24-hour average objective.
- Massive forest fires in the summer of 2010 can be seen on the graph as a spike in PM.
 - Burns Lake PM_{2.5} levels spiked from 6 µg/m³ to 9 µg/m³ during one forest fire episode.
 - These short-term spikes due to forest fires can obscure overall trends.

- We expect to see PM_{2.5} measurements skyrocket in the next 4 years as the Ministry of Environment switches to new monitors, which are more sensitive to PM_{2.5}.
- TRS – Total Reduced Sulphur
 - Prince George has the 3rd and 4th TRS on the graph presented.
 - We still have problems with this and plenty of work to do.
 - The number of episodes of high TRS concentrations was higher in 2012 than in the last 10 years.
 - The increase in TRS over the last 3 years can be accounted for by a change in the way that the data is archived. We are now able to measure and record to 0.1 µg/m³ and this increased accuracy has resulted in higher numbers.
 - The provincial objective for TRS is 5 ppb.
 - Prince George sites are by far the worst and we know that high background concentrations have a significant impact on this.
- Prince George has seen a dramatic decrease in SO₂ levels in recent years.

Panel Discussion:

Question: How can I find out the basis for industrial emissions estimates?

Answer: The concentration is regulated. The numbers presented were found by multiplying the concentration by the flow and then by the operating times. Permit requirements ensure that companies report this information and that is what we use for the estimates.

Question: Are stack emissions higher?

Answer: Yes they are. Normally mills can operate at lower concentrations for a safety factor but the permits must reflect the actual emissions.

Question: What is the basis of the provincial annual average target of 8 µg/m³ for PM_{2.5}?

Answer: The provincial objective of 8 µg/m³ and the long-term objective of 6 µg/m³ allow us to check effectiveness of our interventions in the ambient environment.

Question: Is there evidence that air quality has systemic effects on parts of your body other than the heart and lungs?

Moderator: Perhaps Dr. Michael Brauer will cover that information during tomorrow's session.

Question: What is your recommendation for policymakers in light of the trends presented? What preventative approach should we adopt and how can we maintain a sense of urgency?

Answer: I am sure that we can all relate to the fact that it is easier to inspire people to make large changes at the last minute or when there is a strong sense of urgency. We need to remember that small changes accumulate and are valuable. It is important for industry, city planners, and residents to know that continued focus on awareness and planning will have the ultimate effect on the future.

Moderator: Motivating continuous improvement in the absence of urgency or pressure is a good topic for us to consider as we continue with this forum.

Air Quality in North Central BC: Economic Considerations

Terry Robert, Executive Director, PGAIR

- We must continue to constantly reevaluate our assumptions and manage the harmony of our collective voices to create an informed dialogue.
- We must rely on economists for insights into the future because we cannot exist in isolation from the driving forces of the economy.

5. A Community Vision for Growth: Insights for Airshed Managers

Heather Oland, Chief Executive Officer, Initiatives Prince George

- The responsibility of Initiatives Prince George (IPG) is to facilitate economic growth, population growth, and increase the tax base.
- We do this by marketing and promoting Prince George.
- Prince George was barely affected by the 2008/2009 economic down turn and boasts an unemployment rate around 4%.
- There are over \$70 billion of resource related projects planned within the next 15 years.
- We are connected to global markets through our airport, rail, and expedient trucking routes.
- Prince George is the education, health, and cultural centre of Northern BC.
- Our resource-driven economy is diversified and resilient.
- Forest Sector
 - A driving force that has been strengthened by export to Asia starting in 2011.
 - We have diversified our wood products to include wood pellets.
 - UNBC is recognized as a Centre for Excellence in Bioenergy.
- Mining Sector
 - We supply and serve all mining activity in Northern British Columbia.
- Manufacturing Sector
 - We manufacture forest products and machinery.
- Construction
 - We have seen 11.9% growth in employment in the construction sector.
 - Increased building permits have been issued with the vast majority issued to the private sector.
- Education and Health Care
 - Our exceptional facilities including UNBC and the new Cancer Centre attract highly skilled workers and their families to the city.
- Growth, Opportunity, and Investment
 - We must continue to grow our population, attract skilled workers, and train people to take advantage of all of the opportunities that await us.
- Investment and Air Shed Management
 - IPG reviews the business plans of prospective businesses and facilitates essential linkages with the Ministry of Environment and Regional District of Fraser Fort George.
 - We can help businesses with high emissions to mitigate their impact and to choose locations that will have less effect on the Prince George airshed.
 - The City of Prince George has conducted long range planning to identify sites for new businesses including a large light industrial area out by the airport.

Discussion:

Moderator: What are the key challenges to realizing this economic vision?

Question: Based on anecdotal evidence, air quality seems to be a huge barrier for people considering moving into the community. What do you think about this?

Answer: It is certainly a perceived barrier. This concern is not mentioned as much for businesses but it is something that we need to understand. People frequently want to know whether or not the air is improving and how it will impact their health. Another common concern is crime rates and IPG was able to work with the RCMP to create a fact-sheet to dispel myths about crime in our city. Perhaps something similar could work for air quality.

Moderator: PGAIR is currently working to develop annual briefing notes about PM_{2.5} and TRS that will be used to educate the public and policy makers. They could be used as a tool to inform people and businesses considering a move to our city.

Question: Over the last decade, Prince George has received significant negative national press for poor air quality. Should we initiate a national media campaign to announce the improvements that we have made?

Answer: Difficult to get positive national media attention, but yes. The best thing to do is to share good news stories instead of reacting to negative news. Sometimes we are our own worst enemy for believing negative press. It is important to strike a balance between our sense of urgency in creating change and still promoting our city in a positive light.

Comment: The Canada Winter Games are coming to Prince George in 2015 and this will be a great platform for us to share our success stories.

Question: Facts are not always the truth; recent Enbridge Northern Gateway advertisements prove that. Facts can be driven and distorted by money and the other side, the truth, may not be heard.

Answer: We used the crime fact sheet not to distort the truth but to allow people to understand the facts in a way that is less sensationalized.

Moderator: We are always working in the absence of information and we have to do the best that we can with what we have. We are always trying to engage with the public and solve information and representation issues by educating people about the real situation. There is an underlying serious concern about air quality but our community has the capacity to solve just about anything. It is important that we are thoughtful about what information we share and how we do it.

Closing Remarks

Kristina Watt, Supervisor, City of Prince George

- Thank you for the presentations and discussions today
- Introduction of Andrew Casey
- Air quality is extremely important to our athletes and can have a profound affect on their performance.

Andrew Casey, Coach, Caledonia Nordic Ski Club

- I suffered from cold and exercise induced asthma as a child and the disease affected my ability to participate in sports.
- By analyzing my asthma triggers my parents and I were able to determine that the chlorine in the air at the swimming pool was affecting my breathing and so I switched to Nordic skiing.
- I was lucky to grow out of my asthma and compete full time for 10 years.
- When I was recruited to Prince George I was concerned about the negative stereotypes that the city has for air pollution and crime.
- Air pollution has a significant effect on athletes and the Prince George Nordic team has a higher number of asthmatic athletes than I have experienced with other teams in other places.

- We need to improve this situation for our children so that they do not have a negative association with physical activity.
- Prince George has the biggest cross country ski club in British Columbia and the largest skills development program for kids under the age of 10.
- We need clean air to continue the outdoor lifestyle that is so essential to our city.
- I am encouraged by what I have heard at this forum and the way that we are making air quality the top priority.

March 6: Public Session

Opening Remarks

Terry Robert, Executive Director, PGAIR

- We are pleased to have everyone in attendance this evening.
- This dialogue will give us an opportunity to provide information about air quality and will allow you to voice your concerns and have your questions answered.
- We need to find a way to be hard on the issues and soft on the people.

Jennifer McGuire, Executive Director, Regional Operations, Ministry of Environment

- This forum is a wonderful demonstration of partnerships and collaboration.
- I started my career here in Prince George and was responsible for checking emissions so this forum is like a homecoming for me.
- In the last several years we have seen small and incremental improvements in air quality.
- The BC Lung Association has recognized PGAIR as the 2012 Clean Air Champion. This is a wonderful accomplishment.
- The Ministry of Environment has several programs underway that address air quality including:
 - Woodstove Exchange Program – support for 40 stoves in Prince George and 25 stoves in Mackenzie
 - BC Clear Fund – funds research
 - BlueSky Western Canada Smoke Forecasting System - an ongoing research project used to track forest fires and plan prescribed burns. <http://www.bcairquality.ca/bluesky/>

Dr. Robert Oliphant, President and CEO, Asthma Society of Canada

- The Asthma Society of Canada considers itself to be a “health” charity instead of a “disease” charity because we strive to help people live healthy and active lives.
- The Asthma Society advocates for asthmatics and addresses polluters.
- Respiratory illness incidence is increasing in our country.
- We help people to make individual choices that will make our air cleaner and manage our bodies in the environment that we have.
- Some pollution sources are the responsibility of the individual such as wood burning and personal vehicle emissions. We can encourage people to change these behaviours.
- 3.2 million Canadians have asthma and 250,000 have asthma that is uncontrolled.
- 1-2 people die of asthma everyday
- 5900 people die prematurely due to poor air quality every year in Canada.
- Prince George is an exceptional model for our country for collaborative work on air quality.

6. Introduction to Air Quality and Airshed Management

Dr. Peter Jackson, Professor, University of Northern British Columbia

- What is air pollution and why should we worry?
 - The major air pollution health concern is particulate matter especially PM_{2.5} which is very fine particulate matter.
 - The odour that we smell in the air is from Total Reduced Sulphur (TRS)
- TRS – Total Reduced Sulphur
 - The human nose is extremely sensitive to TRS and can detect it at very low levels.
 - The ambient air concentration of TRS is mostly an odour concern and is not considered dangerous to health.
 - The major sources are pulp mills, sewage treatment, and gas and oil facilities.
 - We saw a decreasing trend in TRS around 1990 when the pulp mills took action to reduce TRS emissions.
 - Canfor invested significant money to remove further odourous TRS from the air in 2011. We are already able to see the benefit of recent mill upgrades.
 - TRS levels at the Plaza 400 monitoring site peak when the winds are coming from the direction of the pulp mills.
- Particulate Matter
 - PM₁₀ – Particulate matter with a maximum diameter of 10 micrometers.
 - PM_{2.5} is a subset of PM₁₀ that only includes particles with a maximum diameter of 2.5 micrometers.
 - PM_{2.5} is a major health concern because the small particles can penetrate deeply into the lungs.
 - Sources include dust, automotive exhaust, open burning, and forest fires.
 - Combustion particles are more dangerous than dust.
 - It is difficult to manage PM due to multiple sources.
- Western Canada has fairly clean air compared with Ontario, which is consistently above the provincial standard.
- Prince George, Williams Lake, and Quesnel frequently exceed the standard for PM_{2.5}. This is due to topography, geography, meteorology, and the resulting stagnant air.
- Small British Columbia interior towns have the highest PM concentrations.
- We have seen a downward trend in PM concentrations from 1998-2012.
- How can we improve air quality?
 - Continue to raise awareness of the problems
 - Develop a solution
 - Work to lower ambient levels
 - Recognize that solutions may not always be clear or obvious
 - All sources are important but their impact depends on where we are located.
 - A small source that is closer to the population may be more impactful than a large source located far away.
 - Modeling can help us determine which changes will have the most impact.
 - Everyone can help by reducing our personal sources such as vehicle emissions. We can carpool, take transit, walk or bike, and avoid idling.

7. Air Pollution, Public Health, and Your Health

Dr. Sarah Henderson, Environmental Health Scientist, BC Centre for Disease Control

- I am an Environmental Epidemiologist so my job is to track the health of entire populations of people as it is affected by environmental factors such as air quality.
- The picture in the slide show is of protestors wearing medical masks and practicing tai chi in Tiananmen Square, Beijing. The dangerously poor air quality in this picture is very obvious and reminds us that our problems could always be a lot worse.
- Air pollution sources are very complex and diverse. They include smoking, lawn mowers, forest fires, dust, and industry emissions.
- Particulate Matter is largely a product of incomplete combustion.

- Real scientific evidence demonstrates that PM_{2.5} can penetrate deep into the lungs. These particles are so small that we may not see or notice them.
- Long-term Concentrations
 - Long-term exposures are responsible for the bulk of the burden of disease caused by air quality.
 - Exposure over a long period of time keeps the body in a state of slight inflammation at all times and makes people more vulnerable to heart disease and chronic lung conditions.
 - Trends show a decrease in long-term concentrations.
- Short-term Fluctuations
 - Consist of a spike in concentration that lasts between an hour and a couple of days.
 - Forest fires in the summer of 2010 caused short-term PM_{2.5} to reach 100 µg/m³.
 - People with existing conditions are the most at risk to become more compromised by short-term fluctuations.
- Everyone is exposed to air pollution.
 - Exposure during pregnancy has been shown to affect unborn children in-vitro.
 - Infants and young children's lungs continue developing until the age of 8 and they breath more quickly than adults, resulting in increased exposure.
 - Teenagers may experience high air pollution exposure as they spend long periods of time outdoors playing sports and participating in other activities.
- Health Effects
 - There have been thousands of studies demonstrating the various health concerns of air pollution.
 - Health effects continue throughout life. For example: air quality has been associated with lung cancer.
 - Poor air quality is damaging to all of the systems of the body.
- How to protect yourself
 - Know how you feel and pay attention to your body.
 - Know the air that your breath. Air quality monitoring information is available at www.bcairquality.ca
- Exercise
 - Exercise is your best defense against poor health and the best possible thing for your body.
 - Healthy people are more resilient to air quality changes.
 - Heart and lung health for the rest of your life is dictated by the amount of exercise that your receive before the age of 12
 - Air pollution is much more dangerous for people who are already unhealthy or have underlying chronic conditions.
- Keep Climbing
 - We can improve both personally and as a group
 - New technologies such as electric cars, industrial scrubbers, and electric lawnmowers all contribute to incremental change.

Panel Discussion:

Question: Prince Rupert has announced an expected doubling of container traffic over the next couple of years. This will result in an increased number of cranes in the Prince George rail yard. How can we expect this to affect diesel particulate levels in our city?

Answer: Of course this is a concern. Increased noise is also a concern as it stresses the body. It will be important for us to investigate this and learn more. Diesel PM is a nasty type of PM with severe health effects.

Comment: Rail traffic increases may decrease road emissions if more goods are being transported by rail. CN Rail says that they have improved their emissions but it is essential for us to educate ourselves to understand the connection and mitigate potential impacts.

Question: What is the planning process and prospects for managing the impacts of increased rail emissions?

Answer: Rail emission modeling has shown emissions to be lower than previously expected so the increase might not be as damaging as we fear.

Answer: The rail system is federally regulated. The Canadian Rail Association and Environment Canada have been working on emissions concerns. CN Rail is currently testing a natural gas locomotive. The Coastal Health Region is looking to have more influence in these federal decisions and we could try for something similar.

Answer: Transporting goods by rail consumes less fuel than transportation by truck but older locomotives emit more diesel particulate than newer trucks. Some locomotives made in the 1950's are still in service and are highly polluting.

Question: Is there a health difference between dust and smoke PM_{2.5}?

Answer: PM_{2.5} has more health effects than PM₁₀. Fine particulates are more dangerous for any type of health concern and combustion particulates are more dangerous than dust. There is no strong evidence that long-term exposure to PM₁₀ has large health effects.

Question: Can we push CN to electrify trains or switch to lower emitting locomotives? Electric trains used to run to Tumbler Ridge and were the first electric locomotives in North America but they are no longer in service.

Moderator: We will take the message to CN and community counterparts.

Question: California has rules that hospitals and schools cannot be built close to highways. Does BC have anything similar or are we considering a similar law?

Answer: No law exists to my knowledge but it may be something to consider.

Industry Snapshots of Progress

8. Husky Prince George Refinery

Ed Debevc, Plant Manager, Husky Energy

- The Prince George Husky Refinery has a capacity of 12,000 barrels/day
- It is the smallest refinery in Canada at about a tenth the size of an average refinery.
- We produce gasoline and diesel.
- The refinery was built in 1967 and was originally designed for 7,500 barrels/day
- Husky purchased the refinery in 1976 and increased the production capacity of the facility.
- The Prince George refinery supplies Central and North BC.
- There are 100 full time employees
- A Clean Fuels Upgrade was completed in 2005-2006
 - Reduced sulphur in gasoline by 90%
 - Reduced sulphur in diesel by 97%
 - Used best available technology
 - Low NO_x burners
 - \$100 million investment
- In 2008, concerns were raised about odour emissions.
 - We conducted a study and shared our findings with the MOE
 - A wastewater treatment system upgrade was completed in 2011-2012

- We installed state of the art technology including covered system vapour recovery.
- The new system manages both TRS and Volatile Organic Compounds (VOC's)
- The project cost over \$15 million
- Refinery Leak Detection and Repair Program (LDAR)
 - Identify, quantify, and reduce fugitive emissions
 - In compliance with federal guidelines
 - Fully implemented in 2011
 - Monitors close to 10,000 points such as valves and flanges
 - Quantify and repair fugitive emissions
 - Reduces VOC's and secondary generation of PM
 - We achieved a 51% reduction from the previous year
- SO₂ Emission Reduction
 - We have been working on SO₂ reduction for a decade and have achieved a 70% reduction.
 - A 2012 trial identified an opportunity to further reduce our SO₂ emissions through an added catalyst.
 - We expect to see an improvement in 2013 once we implement this technology.

Questions:

Comment: I am impressed with the SO₂ reductions that you have achieved and as I understand - that you did not take it out of the fuels and release it into the air?

Answer: Yes, that's correct. We sell the recovered sulphur as a product.

9. Canfor Pulp and Paper

Martin Pudlas, VP Operations, Canfor Pulp Limited Partnership

- Canfor was able to access Federal Government Funds to participate in the PPGTP program.
- Received essential community support from PGAIR, PACHA, Northern Health, the City of Prince George, The Chamber of Commerce, Local Unions, CNC, and UNBC
- The project required a \$235 million capital investment
- Our employees put in an extraordinary effort to get this project completed.
- FP innovations Pulp and Paper research centre provided the science behind this project. Special thanks to Brian O'Connor.
- We achieved great success reducing at source particulate matter by over 90%.
- We have reduced fossil fuel usage by over 70% over the last 15 years.
- We now produce more green power and more pulp!
- The success of the projects was monitored by 2 ambient monitoring stations
 - We reduced odour by 60% in the first year
 - Some unexplained ambient PM spikes are still being researched.
- We received a PAPTAC Award for Best Environmental Strategy
- We have installed a permanent monitor on the roof of Exploration Place for continued monitoring. There will also be an interactive educational display about air quality with real-time data installed in the museum by Canfor.
- We are investing \$15.2 million to install an electrostatic precipitator on the last stack. This is the best available technology and will further reduce PM_{2.5} emissions.

Moderator: The announcement of the new electrostatic precipitator at Canfor is a wonderful announcement that will result in major air quality improvement. We must continue to strive for steady, relentless improvement.

Discussion:

Comment: We are promoting so many initiatives to the public so it is wonderful to hear from industry about what they are doing.

Question: Why don't we have more testing stations in outlying areas? Investors take a look at air quality and only have information from the bowl. We need to attract new employers and employees. I would like to see more testing stations outside of the bowl area.

Answer: Canfor is currently hiring 2 employees each week and it is very important to attract talent. There are currently monitors at the jail and Lakewood in addition to those in the bowl.

Comment: PGAIR is currently developing a long-term capital and operations plan for the ambient air monitoring network and could look at putting air quality monitoring stations outside of the bowl. We are making steady improvements.

Question: What will the monitoring station at Exploration Place be checking for? Will VOC's be monitored?

Answer: VOC's will not be monitored but windspeed, wind direction, humidity, PM_{2.5}, and TRS will be monitored.

10. Roundtable and Citizen Engagement

Tiffany Bonnett, Coordinator, Prince George Air Improvement Roundtable

- PGAIR (Prince George Air Improvement Roundtable) began as a community group in 1998 and became a registered non-profit in 2008.
- We currently have 18 members that include representatives from the public, local businesses, industry partners, community groups, government, UNBC, and Northern Health.
- All meetings are open to the public.
- Our funding is 25% local government, 25% provincial government, and 50% industry.
- It is our goal to leverage \$3 for each dollar that we receive from taxpayers.

- We created an air quality management plan and strive to continuously build capacity between stakeholders.
- The BC Air Quality Website www.bcairquality.ca provides information such as the Air Quality Health Index (AQHI) and an annual report comparing data.
- PGAIR supports air quality research in a collaborative fashion and helps make science-based recommendations to industry and the public.
- Our education and awareness working group conducts frequent dialogues where input and suggestions are welcome. They also manage the Woodstove Exchange Program.
- Our Idle Free Initiative included emissions testing for public vehicles and education resources for teachers.
- I encourage members of the public to become involved, participate in programs and meetings, volunteer, tell us about your own initiatives and how we can support that, and also by speaking to your elected officials, and reporting air quality concerns to the respective agencies.

Jacqueline Dockray, Resident, City of Prince George

- We are working to develop a Citizen's Toolkit, which will be an online resource providing how-to information for reporting air quality concerns.
- These reports are used to track air pollution management so providing people the means to make reports is very important.

- If you are reporting on dust, smoke, or odour you should contact the Ministry of Environment.
- If you are concerned about woodstoves, open burning, or fugitive dust you should contact the City of Prince George.

- RAPP line (Report All Poachers and Polluters) for outside the City and for situations that need immediate attention such as illegal dumping, emissions
- Clean Air Bylaw #8266 outlines the City of Prince George guidelines for responsible burning and other air quality concerns.
- We are all responsible for clean air.
- More information is available soon at www.pgairquality.com

Discussion:

Question: How does the Citizen's Toolkit tie in to other agencies?

Answer: Initially we will provide mechanisms to report. In the future we will try to use the information to inform future projects. This is something that we are currently developing.

Closing Remarks

Edward Hoffman, Regional Director, Ministry of Environment

- Thank you for attending and for your participation.
- Continuous improvement and small steps will improve our airshed for us and for future generations.
- Thank you to the District 57 Tapestry Singers for their musical performance

March 7: Main Session

Opening Remarks

Dr. William Osei, Medical Health Officer, Northern Health Authority

- If you don't like your food you can choose to eat something different. If you don't like your water you can buy bottled water. If your air is bad, what can you do?
- Welcome back everyone. Your participation in this forum is very important and I am enjoying the opportunity to connect with people who I don't see often.
- Prior to moving to Prince George, I worked with the Prince George Liaison at the CDC in Vancouver and he was very concerned about the poor air quality in Prince George.
- In 2008 I attended an air quality seminar organized by PACHA and I have continued to be involved with air quality.
- No one can be excused from responsibility for our air.
- I have made a personal secret commitment to improving air quality in Prince George and I would like to thank PACHA for their commitment to the cause.
- Health is a currency that allows you to meet or exceed your objectives in life.
- Northern Health cares about air quality and has thrown their weight behind every initiative.
 - We have hired 2 staff representatives for air quality
 - We have completed a study of wood burning hotspots in the city through a grant from the Fraser Basin Council.
 - We have developed a strong partnership with PGAIR
 - We supported the Canfor Black Gold Project
 - In 2011 we brought forward concerns about formaldehyde
- I am pleased to see everyone on board with air quality improvement and excited to see more public awareness than ever before.
- We are leading the north in this area and are sharing our improved practices throughout the region.
- We have seen gradual downward trends in particulate matter in Smithers, Houston and Prince George.
- The Northwood Pulp Mill has succeeded in reducing TRS by 70% and PM by 50%.

- There is much more that can be done but we are definitely headed in the right direction.
- Northern Health is proud to acknowledge the contributions of PGAIR, the City of Prince George, Industry partners, The Regional District of Fraser Fort George, The Fraser Basin Council, UNBC, PACHA, and all concerned citizens.
- Welcome to everyone and thank you for coming.

Exploring Solutions: Industry Snapshots

11. Asphalt, Cement and Gravel Sector

Carrie Comack, Columbia Bitulithic

- We have installed a Bag House dust collector. The gas stream is pulled through the bags by negative pressure causing dust to gather on the outside of the hanging bags. The system automatically switches from filtering to cleaning. When cleaning, compressed air releases the dust from the bags and allows it to drop into the hopper. We are currently working to develop systems to store the collected dust.
- Road dust is another big concern. We are planning to use a product called Dust-off which is a brine made up of 29-32% magnesium chloride and 68-71% water that is sprayed on the roads to keep dust out of the air.
- This anti-corrosive dust suppressant should cause the dust to stay stuck onto the roads, improve visibility, reduce accidents, stabilize roads, and reduce the need for repairs.
- Dust contributes to wear and tear of working parts and the use of Dust-off should reduce maintenance costs for equipment.
- We plan to reduce fugitive dust emissions 50-70% and are looking forward to bringing our emissions numbers down dramatically in the next few years.

12. Primary Wood Processors

Martin Meyer, Carrier Lumber

- The most recent improvement to wood processors is the shutdown of most of the beehive burners in BC. This has had a profound effect on the reduction of PM.
- Incinerator regulations require that all remaining beehive burners be removed by 2016.
- Wood residues that would have previously been burned have been diverted to wood pellets and heating creating more value.
- Carrier lumber is active within PGAIR and works with the Ambient Air Working Group.
- We have reduced our PM emissions by replacing old equipment and by paving the yard to reduce dust.
- There is an idling restriction protocol in place to avoid excess vehicle emissions.
- We are a member of the Carbon Offset Cooperative
- Our Air Quality Advisory Action Plan regulates activities and ensures no yard sweeping or dust raising activities during air quality advisories.
- We plan to improve the efficiency of our mobile equipment and look for opportunities to decrease wood dust inside the mill with water sprinkling.

13. Pulp and Paper Sector

Adam Lancaster, Canfor Pulp Limited Partnership

- Canfor has 3 facilities in Prince George
- Our successful application for Green Transformation funding helped speed up our implementation of environmental projects.
- Of the \$170 million spent on the project \$122 million was from a government grant.
- FP Innovations was contracted to diagnose significant odour sources and help us determine the best plan of action.
- In all we treated 26 stacks and achieved a 60% odour reduction.
- There has also been a major air quality improvement inside the mill.

- The Northwood mill also benefitted from a recovery boiler upgrade that decreased TRS and PM by approximately 90%.
- The boiler upgrade also increased bioenergy production, decreased the use of fossil fuels, and increased pulp production.
- The effluent temperature was decreased.
- Pulp Stock transfer increased the amounts of both pulp and biofuel produced.
- Canfor set up 2 temporary monitoring stations at a farm outside of the city and at Exploration Place. We will install a permanent monitor at Exploration Place to continue to monitor. This will cost approximately \$50,000. We have also designed an interactive kiosk on air quality that will have a real-time display and will be installed at Exploration Place.
- The Prince George Pulp Power Boiler Precipitator
 - Will be completed in the 4th quarter of 2013
 - This project will install a power boiler precipitator on the stack that is currently the largest source of downtown particulate matter at Canfor.
 - We will use best available technology and expect a PM reduction of approximately 50%.

Moderator: This is a significant announcement. Thank you for that.

14. Wood-based Biomass Sector

Kevin Brown, Pacific BioEnergy

- Pacific BioEnergy processes slash piles also known as fibre piles into chips for wood pellet production. This process creates a valuable product out of something that would have otherwise been burned.
- Wood pellets also improve air quality by reducing our reliance on coal. 25% of coal can be replaced with wood pellets.
- We do not use any binders, resins, or chemicals in the production of our wood pellets.
- We also take dust from other mills and dry it. What is released is mostly steam and we use a wet electrostatic precipitator to reduce PM.
- Wood pellets are transported by rail to Vancouver and are sold in Belgium, France, Germany and other European countries.
- Improvements
 - We installed a Wet Electrostatic Precipitator in 2010 to reduce PM emissions.
 - We also installed concrete blocks to contain fibre and restrict sawdust from blowing into the air.
 - Pacific BioEnergy sprays our roads with a calcium spray for dust reduction.
 - We use a larger track mover to move rail cars in order to reduce diesel emissions.
- Our goal is to bring more bioenergy use to Canada.

15. Fossil Fuel-refining Sector

Ed Debevc, Plant Manager, Husky Energy

- The Prince George Husky Refinery is currently producing 12,000 barrels/day
- We are Canada's smallest refinery.
- The PG refinery is small in size but comparable in complexity to the other 16 refineries.
- Products are supplied to Central and Northern BC
- The Prince George refinery provides fulltime employment to 100 people.
- A Clean Fuels Upgrade was completed in 2005-2006
 - Reduced sulphur in gasoline by 90%
 - Reduced sulphur in diesel by 97%
 - Used best available technology
- Recent Initiatives:
 - Installation of low NO_x burners on furnaces

- Addition of floating roofs on storage tanks
- Efforts have been made to lower emissions from vehicles
- Wastewater Treatment Upgrade
 - In 2008 a study of the plant was conducted in response to concerns that were raised about TRS odour.
 - The findings were reported to the Ministry of Environment and we made the decision to make improvements to our wastewater treatment facility.
 - The Wastewater Treatment Upgrade was completed in 2012 and includes a state of the art closed vapour recovery system for fugitive emissions including TRS and VOC's.
 - The cost for this project was \$15 million.
- Refinery Leak Detection and Repair Program (LDAR)
 - A corporate initiative to quantify and reduce fugitive emissions.
 - First implemented in 2011.
 - Quantifies emissions from about 10,000 points including pumps, valves, and flanges.
 - The full detection program is repeated annually to identify repairs and maintenance needs.
 - LDAR has reduced fugitive emissions by 51% over the previous year and this has resulted in significant reduction of PM and VOC's.
- SO₂ Emission Reduction Initiative
 - We have been working to reduce SO₂ for the past decade.
 - In 2012 we completed a successful trial of a catalyst additive to capture sulphur as a sulphur product.
 - We have achieved a 70% reduction from 2002-2012.

Panel Discussion:

Question: Do asphalt companies have plans to work on the smell?

Answer: Lafarge is looking for more ways to work on odour with Aztec through an internal audit process. We are looking for ways to continue to improve efficiency in this area.

Question: Different dust suppressant products such as road tar and lignins from pulp mills were previously mixed with dioxins. Will new dust suppressants have the potential to damage the watershed?

Answer: Every choice has positive and negative effects. These trade-offs create an interesting sustainability dialogue and we must strive to manage risks as well as possible.

Answer: The magnesium chloride that is used in the dust suppressant is approved for use on organic foods. It is designed to pull dust out of the air and onto the ground.

Question: Thank you for sharing and congratulations on the work that you have done so far. How do you share these successes and positive stories with the public?

Answer: PGAIR works with industry to develop briefing notes, which are short, concise updates on air quality. We can use them to share what is being done and motivate public action.

Answer: We can share success by continuing dialogues like this one, attending forums, and sending press releases. People are beginning to recognize the improvements that we have made.

Answer: Industry seeks "social license" to operate. There is a suggested partnership and good communication is key. Public events like this one and community groups provide us with great opportunities to tell our stories. We also employ both traditional and social media and present quarterly reports to the community.

Moderator: It can be challenging to share and form partnerships but we need to know and trust each other to create real, long-term solutions.

Exploring Solutions: Community Snapshots

16. BVLD – A Brief History

Ben Weinstein, BVLD Airshed Management Society & BC Ministry of Environment

- Our airshed is bound by the Bulkley Valley and the Lakes District and covers over 20,000 km².
- The mountainous terrain of the area allows smoke to travel long distances and the area is currently under dust advisory (March 7, 2013).
 - 2003 – Created an emission inventory
 - 2004 – Incorporated into a non-profit society
 - 2004-2009 – Implementation of the air quality management plan including the woodstove exchange program and bylaw implementation
 - 20,000 fibre piles are burned annually
 - Started an anti-idling campaign
 - 2006 – Became a registered charity
 - 2012 – Created a new airshed plan and are currently seeking implementation funding.
- We have exchanged 650 woodstoves
- Our extreme outreach program includes a demo trailer and burn-it-smart nights
- We have participated in excellent university research including spatial mapping of communities.
- We created a kids colouring book about air quality
- Engaging industry and other partners to deal with smoke management
- Strive to get everyone on board with best practices
- The Custom Venting Forecasting System was started in the BVLD and is now province-wide.
- There has been a decrease in air quality episodes in our airshed.
- Our challenges include board fatigue, and the difficulty of distributing responsibilities between volunteer and paid staff.
- Overall we have seen big improvements in the BVLD.

17. Quesnel

Tracy Bond, Quesnel Air Quality Roundtable

- Our roundtable was originally started by two women. They gave 32 presentations throughout the community in their first year to share information about air quality.
- We are made up of a committed group of collaborative and active members.
- We have a strong partnership with the Baker Creek Enhancement Society.
- Participate in the woodstove exchange program and community planning.
- We are utilizing social media campaigns to encourage behaviour change during inversions.
- During a recent 5-year review of our industry partners we have found that everyone has done something but not everyone has done everything that they indicated they would do. We still have room for improvement.
- We have improved our air quality to better than provincial standards.

Peter Walsh, Quesnel Air Quality Roundtable

- We all need good air all of the time.
- Provincial support is lacking and there is currently no Ministry of Environment budget for Quesnel.
- New monitoring equipment was approved in November but has yet to be installed.

- Imagine what we could do with a 20 times larger budget to mirror the 20 times increase in container traffic.
- A 20 times increase in through traffic will only cause increased air pollution and Quesnel will not benefit from increased economic activity.

18. Williams Lake

Bert Groenenberg, Williams Lake Air Quality Roundtable

- The Williams Lake Roundtable meets twice annually and includes members from industry, government, and environmental societies.
- Members provide reports on projects that are completed, in progress, and planned.
- Williams Lake started with the worst PM₁₀ in BC but we have seen some improvements over the years.
 - In 1993 there was a plan to remove beehive burners by building a biomass generating plant. It operates 7 months out of the year.
 - West Fraser Plywood installed a scrubber and bag houses.
 - No Idling signs have been placed around the city.
 - There has been a reduction in track-out, increased use of load covers, and decrease in fugitive dust.
 - Containing of chip facilities is underway.
 - We are planning to reassess the situation and set goals for further improvement.

19. Prince George

Sherry MacIntyre, Prince George Air Improvement Roundtable

- All of the roundtables that are represented here at the forum are dealing with similar issues.
- PGAIR is a nonprofit society that is coordinated by the Fraser Basin Council.
- Our policy is collaboration and working together because we all breathe the same air and are responsible for it.
- We have set ambitious targets for 2016 but once we achieve those there will always be greater goals to strive for.
- It is our greatest ambition to provide clean air for the people of Prince George and to keep everyone as healthy as possible.

Discussion:

Comment: Ben Weinstein said that 650 woodstoves have been exchanged but there are over 4000 stoves out there in the BVLD that could be replaced. There is plenty more work to do.

Question: How can we communicate better amongst the roundtables?

Answer: We could plan conference calls and webinars to facilitate more frequent contact. Time and funding are major issues as the people involved are already overworked. It is very helpful when we can put everything on our websites to facilitate easy sharing of information.

Question: Is there anyone not currently at the table who could come to the table?

Answer: CN Rail could be involved in more of the roundtables as they are currently only participating with PGAIR. The federal government especially Environment and Health Canada should be more engaged with local roundtables. Rail and ports are federally regulated so we need to share information and work together in order to mitigate these impacts. It is also important to continue to reach out and engage First Nations especially since some First Nations communities are located in airsheds with high PM_{2.5} concentrations.

20. Airshed Management Tools: Modelling

Dr. Peter Jackson, Professor, University of Northern British Columbia

- We have developed some very sophisticated modeling tools to link sources to the problem and identify potential mitigation strategies.
- We must model not only the amount of emissions but the end impact by incorporating information about the distance between the source and receptors and the elevation in order to draw a link between the source and the receptor.
- The goal is to reduce ambient levels of particular pollutants for health, environment, and quality of life.
- Receptor Modeling
 - Particles are collected and the species are analyzed and linked to the source by their species.
 - We can use this method to get a general idea of sources over time but it is data driven and unspecific.
- Dispersion Modeling: PGAIR research working group project at UNBC
 - Has three components; emission inventory, meteorological model, and dispersion model.
 - By conducting a source emissions inventory, we can determine the levels of contribution from each source and make a specific connection to the source.
 - The strengths of dispersion modeling are that we can create a strong link between the source and the ambient air and the information can be used for science-based decisions on emission reduction.
 - Unfortunately, creating an inventory of PM is very complex due to many sources and the information can never be completely accurate. Some sources are poorly characterized or unmeasured.
 - The emissions estimates have a direct correlation to the outcome.
 - The Air Quest model uses information for 2003-2005 that is based on the 2010 Stantech dataset. The model includes over 300 Gb of data.
 - Predictions and measurements have been consistently close, showing us that the model is accurate.
 - Observed and modeled conditions at the Plaza 400 monitoring site are similar.
 - The dispersion model shows more road dust than other models.
- Air Quest
 - Web-based modeling tool built on a GIS platform that is capable of conducting spatial or detailed monitoring station analysis.
 - Statistical scenarios can be created and published to other users or the public.
 - Emissions are adjustable by category or by permitted emissions. The 33 different permitted facilities can be adjusted individually.
 - Models can choose specific time periods or all three years (2003-2005).
 - The GIS platform allows us to access provincial GIS layers and all BC provincial permit information, meteorological stations, etc...
 - The model evaluation is designed to compare model results with known data.

Discussion:

Question: What do the shades of grey in the model represent?

Answer: They represent PM_{2.5} levels with the darker grey representing lower pollution and the lighter representing higher pollution concentration.

Question: Which sites are covered by the model?

Answer: The monitoring locations shown on the graph including Lakewood, Plaza, and several others.

- We can create a variety of reports from the model such as:
 - Calendar Plot – darker coloured days are more polluted days.
 - Pollution Rose – depicts pollution by wind direction.
 - Percentile Rose – shows the source pollution level as a percentile.
 - Model Comparison – generates a comparison graph of observed vs. modeled data to track the success of the model.
 - Pie Charts and Box Plots can also be easily generated.
- If you are interested in working with the model you may email me at peter.jackson@unbc.ca to get an account and try it out.

Question: How would the results change with a more recent dataset?

Answer: We are currently undergoing revisions which will determine the change between 2005 and 2014 conditions based on 2003-2005 meteorology. The 2014 scenario will be available soon.

Question: Can you add a new source to the model?

Answer: Yes, the dispersion model could be run with a new source.

Question: Could this be applied in another area other than Prince George?

Answer: Yes, the program could be altered to represent other locations.

Question: How would you adjust for new technology on a single stack?

Answer: You would use source calculations but it would not be 100% accurate. That is a limitation of the model.

21. Effectiveness of Actions to Improve Air Quality: Does Airshed Management Really Work?

Dr. Michael Brauer, Professor, University of British Columbia

- This presentation will focus on health because that is the most important reason for us to work to improve our air.
- Modeling does not get enough attention and we often don't go back to the original models to determine whether or not our plan was successful.
- We need to be able to provide these comparisons in order to develop the best possible policies.
- It is essential that we conduct a cost analysis to avoid the high cost of implementing ineffective measures.
- With any policy change or initiative there is the possibility of unintended consequences and the response is not always linear or expected.
- Models also provide us with information that we can use to demonstrate the value of our projects to stakeholders.

- The individual risk of exposure to air pollution is small but since we have a large population that is exposed there is a large population risk. We are all exposed to the air.
- Threshold or safe levels do not apply to air quality because each individual has an individual response and some are extremely sensitive to air pollution.
- It is scientifically shown that people die earlier in more polluted cities. 3.2 million deaths are attributed to air pollution annually, making it the 9th global risk factor for death.

- In Canada, air pollution is the 8th risk factor for death and 7000 annual deaths are attributed to PM_{2.5} with 350 attributed to ozone exposure.
- Actions that we take to improve air quality will benefit everyone.

Examples:

- A strike at a Utah Valley Steel Mill caused decreased concentrations of PM_{2.5}. Respiratory hospital emissions decreased during the strike. In this case, when air quality improved, health improved.
- In Dublin, Ireland the banning of coal resulted in a 15% decrease in respiratory death, 10% decrease in cardiac death, and 6% decrease in overall death.
- Hong Kong is another example where a decrease in the sulphur content of the fuel increased measurable health outcomes.
- In the US, a reduction in PM was shown to have statistically increased life expectancy with 15% of the increase directly attributable to PM reductions.
- Air quality regulations are the most costly federal legislation but they can have the most benefit to the entire population. The benefit to cost ratio for these regulations is between 4:1 and 30:1. This is considered good value for the money.
- Sometimes we do not achieve what we set out to.
 - During the Atlanta Olympics a 22% decrease in traffic counts seemed to be the cause of a 44% decrease in asthma admissions but the health improvement was seen throughout the region and was eventually linked to a meteorological phenomenon. In this case, traffic reduction measures may not have had any effect on health.
- We must consider the impacts of actions that may have improved health as a side effect.
 - The implementation of the E-Z Pass transponder program on the New Jersey Turnpike meant that cars no longer had to idle at toll booths and resulted in a 10% reduction in premature births to mothers living within 2km of the toll plaza.
- There can also be unintended consequences to new initiatives.
 - The United Kingdom program to tax new cars based on their CO₂ emissions caused many people to start driving diesel vehicles with emissions that are much more damaging to health. This resulted in 90 additional air pollution deaths per year. People also bought much smaller cars, which resulted in more fatalities in crashes with larger, older vehicles. This initiative may have been more effective if the tax had been applied to annual insurance instead of only to new car sales.
- Modeling is a very important tool and the real benefits have exceeded the expected benefits in all cases.
- On the local scale, residential wood smoke is the low-hanging fruit as far as the cost-benefit ratio. Reducing wood burning will have a great impact on the air quality and should not be too expensive.
- Traffic related air pollution can be addressed collaboratively with initiatives that promote active living such as bike to work week.
- In a community in Tasmania all woodstoves were replaced with electric furnaces. This resulted in a 40% decrease in winter particulate matter and a 20-30% decrease in respiratory and cardiac death. Comparisons were made to a nearby control community to demonstrate the effectiveness of this initiative.
- In Libby, Montana 95% of woodstoves were exchanged resulting in a 30% decrease in winter PM_{2.5}. Unfortunately, the benefit was not statistically significant and though some reductions in health impacts were observed, the results were not consistent.

- In Greece, severe economic concerns have caused people to burn wood to heat their homes because it is much cheaper. Large increases in PM_{2.5} will likely result in health concerns.
- We can analyze the health and air quality benefits of the woodstove exchange program in the Bulkley Valley, where 650 stoves have been exchanged. Despite this success, woodsmoke pollution actually increased last year and more woodstoves are being sold. People generally burn more wood when other fuel becomes more expensive.
- Household air filtration with a portable HEPA filter is a good option for people concerned about the health of the air in their homes. These filters provide a 60% decrease in PM_{2.5} and have been shown to improve endothelial function and decrease inflammatory markers.
- The graph depicting road proximity and cardiovascular deaths allows us to see that moving away from a major road drops your risk of cardiovascular death almost to the baseline. In this case, removing yourself from the source results in a significant health benefit.
- The municipality of Munich, Germany turned their freeway into an underground tunnel with air filtration and built a park on top of it. The air quality was improved with the added benefit of making the land near the freeway more desirable for development.
- Just because something should work doesn't mean that it will. The opposite is also true!
- Overnight changes are unrealistic and non-linear relationships are increasingly being discovered. In these situations we must go all the way to get the maximum benefit.

Discussion:

Question: Am I correct in thinking that the creosote and diesel soaked soil kicked up by rail is a more toxic particulate matter due to absorbed pollutants? I am concerned about the predicted 800% increase in rail traffic. Am I correct to be concerned?

Answer: Yes. We need to take measurements now in order to determine the impact of the increase. We must take a systematic approach and put the pressure on the rail companies to mitigate health risks.

Question: Among the list of risk factors for cardiovascular disease, many are self-imposed such as obesity, smoking, and alcohol consumption. Since we have no control over our air quality, does that make it a more significant or concerning risk factor?

Answer: I think that that is a cheap way out. I don't believe that air quality is that different from that perspective. I don't think that people pollute because they want to.

22. Group A: Planning for Air Quality

Joan Chess, Sustainability Facilitator, Smart Planning for Communities, Fraser Basin Council

- Inter-jurisdictional planning
- Complex: many other facets/groups
- Considerations in planning for healthy transportation
- BC Climate Action, policies, reducing solid waste, wood stove exchange...
- Efforts to locate industrial uses in Prince George airshed with following considerations:
 - Look for heavy industrial land outside the city
 - For new industrial development
- 8 acres initially

- #1: Hart North most preferable
 - 36km north, outside city
 - Access to CN Rail and Hwy 97
 - Oil pipeline
 - 2km from Fraser River (water supply)
 - Geotechnical positive for construction
 - Historical plan for it already in place (makes transition much easier)
 - Main benefit:
 - Air quality modeling: emissions wouldn't affect city
- What a community plan is:
 - Prince George has one official plan (15 years)
 - Number of levels/issues (not just air quality, water conservation...)
 - Zoning/re-zoning (types of uses)
 - What community said it wanted to see in specific zones/locations
 - Whether to advance or not, still up to Council in the end
 - 2012: Recent plan review
 - Clean air
 - Partnerships/collaboration extremely important
 - Future land use (industrial: light, medium, heavy)
 - Relationship between community members, stakeholders, economy...
 - Important to discuss what (e.g. business) is attracted to the city
 - Development permit process
 - Visual corridors (how it "looks" on the site)
 - Can't get into emissions
 - Local governments limited with legal issues (e.g. where they can legally "go")
 - Parking/loading requirements
 - Requested maintenance to reduce dust
 - The Prince George Plan:
 - Specific area
 - Airport Logistics Park
 - For light industrial
 - City does not support heavy industry within city limits
 - Dispersion modelling
 - Successes across different jurisdictions? Barriers?

Discussion:

Q. Was anything, like the expansion of Prince George, taken into account?

A. At 35km away, difficult to do... When looking for alternate industrial sites, it was not a consideration.

Q. 2km from Fraser River is not far. What about leachates? PM's can travel thousands of kilometres. What about the workers in these zones? Are these issues actually looked at/considered?

A. Yes, for land use:

- Location most important to consider... as it can be changed easily, prior to committing.
- Risk considers population base around it...
- Seeking minimal impact on receptors (the people)

- Attempt to minimize impact when dealing with new industry...
 - Technology
 - New processes

Q. Pushing residential areas into these zones, clear-cutting. considering what has always been there - Complaints?

- A. Was discussed during layout talks. People were most concerned with noise (most immediate issues).
- Discussion:
 - That's how neighbourhood layout was designed/planned for
 - For air quality and planning:
 - Ministry of Environment Handbook: "Develop with Care"
 - Buffer areas
 - Historically around roads, railways

23. Group B: Fostering Behaviour Change

Rebecca Freedman, Environmental Management Analyst, BC Ministry of Environment

- Community based social marketing and non-point source emissions specialist
- Point source emissions were a big focus in the 1990's but we are now considering the importance of non-point source emissions to overall air quality.
- Behaviour change addresses non-point source emissions. These behaviour changes include vehicle idle reduction, woodstove exchange, and a review of the open burning smoke regulation.
- The new Clean Communities mandate is to use innovative programs to enact change. We are using community based social marketing, seeking policy change, and ensuring that we are able to provide meaningful records and information to document our success.
- Social Marketing uses many of the tactics employed in traditional marketing
 - Community Based Social Marketing utilizes a proven suite of tools to address barriers to compliance. Often used in health care and environmental initiatives, community based social marketing is a combination of psychology and marketing to encourage people to adopt healthier behaviours.
 - A recent campaign is the grants for woodstove exchange where a dedicated community coordinator provides educational resources and financial incentives to encourage people to switch to a higher efficiency woodstove.
 - HAST (Hub Active School Travel) is a program that is linked to idle reduction measures and encourages students to walk or bike to school. The program is supported by an online toolkit in addition to signs, decals, and keychains that are available to participating schools.
 - At the community level, the Idle Free Ambassador program provides signs and support materials to communities looking to reduce vehicle idling.
 - The Idle Free campaign is currently undergoing an evaluation. You can access the online survey to help us make decisions about future projects.

Discussion Question 1: What is Working?

Comment: In Abbotsford, the Ministry of Environment has created a pledge program where people publicly pledge compliance to environmental actions. Neighbours can pledge to stop burning wood.

Comment: PGAIR started doing social media this past year. It took off on its own and we are using both facebook and twitter. Community members have started sharing photos and stories on the site making it very interactive.

Comment: Experiential learning is very powerful. Providing people with the opportunity to use a wood moisture meter is more impactful than simply telling them that they should dry their wood. Small children are also a powerful way to share environmental information. A great example of this is recycling education in schools where children go home and teach their parents how to recycle.

Comment: In the Cariboo Chilcotin region they have created riparian maps that use colours to represent individual species such as certain fish or frogs that may be charismatic to the public. We can also strive to find things that motivate people and also meet the need. For example, many people want to keep gulls off their lawns.

Comment: The HASTE active ways to get to school programs has great information and several different programs for different commitment levels. They provide free signs for the school and for the walking school bus program. In order to make this more accessible for the schools that I was working with I decided to bulk order the signs and distribute them to the schools myself. Sometimes you have to tweak the program a little to make it work for you.

Comment: Fostering air quality in homes, and outdoors in Burns Lake should include schools adopting a curriculum covering all aspects of air quality. We need to educate kids and have them take the information home. Kids are a real incentive to their parents to change their behaviours.

Discussion Question 2: Sharing of Resources

Comment: PGAIR has generated many materials for our Burn-it-Clean campaign including woodburning toolkits that were handed out to residents. These resources are available to other coordinators who are interested. We will also be sharing the results of our pilot project this spring.

Comment: Sharing resources and information is especially critical with the limited funding that we have. Williams Lake is supported by the work that is done in Prince George. We should let each other know when something new is going on so we don't reinvent the wheel yet again.

Comment: The Burn-it-Clean pilot project conducted in Prince George included surveys and lots of information that will be valuable. Sharing information about the barriers to behaviour change is very important.

Comment: There is a new platform out of Vancouver called FaceSpeak that is used for local consultation within a geographic sense. This could be a good resource for us and I am planning to look into it further.

Comment: We can gather our business cards at this event in order to create a listserv and share information.

Discussion Question 3: Emerging or Inadequately Addressed Issues

Comment: Replacing old stoves with approved stoves does not solve the problem. We need to address education on how to use stoves properly.

Facilitator: Please note that the questions found in the handout can be responded to by email to the contact people listed. Please send your input and share with colleagues.

Group C: Air Quality and Energy

24. Solar, Geothermal, and Wood Heating

Dan Veller, Fraser Plumbing and Heating

- How about us?
 - Old, inefficient models should be changed

- Lowers utility bills
 - Lowers carbon footprint
 - 65-90% more efficient when “on-demand” utility devices
- Use alternate heat sources, as opposed to furnace
- Wood-stove, fireplace, furnaces can all be upgraded
- Air source heat pumps doubles efficiency of natural gas
- Geothermal heating/cooling
 - Hot water can also be generated
 - Pipes will never freeze
 - Excavates large areas to lay pipes and coils
 - Areas with limited space can use “slinky system”
 - Drills like a water-well application
- Solar:
 - An array generates DC power, then convert to AC
 - Can receive credit for surplus from Hydro companies
 - Lack of solar grid = battery powered backup
 - Solar = zero carbon footprint
 - 25+ years life-expectancy

25. Bioenergy at UNBC

David Claus, Assistant Director, Facilities Management, University of Northern British Columbia

- Why biomass at UNBC?
 - Heating/cooling
 - Electrical distribution
 - Cogen ready = generate heat and electric at the same time
 - One point source
- Residential wood fiber
 - Hog fuel
 - Pellets
 - Local by-product
- Why biomass?
 - “Green” university
 - Industry
 - Public, economic, and academic impact
 - 2 systems:
 - Pellet: heats forestry greenhouse
 - Bioenergy: gasification system
- Emissions:
- High temperature filter system
 - Replaced cloth filters

- Cartridges with stainless steel
- Tests confirm 6-10 mg/m³ range
- Still some impurities with filter
- Gasification: heats wood without enough O₂ for combustion
- Pulls out most PM's
- Tar buildup: costly, time-consuming

Q. What are the toxic chemicals in the ash? How to dispose of them?

A. Challenging...

- To landfill, temporarily
- UNBC has had tests completed (whatever is in the wood)
- Burning -> type of ash -> high pH -> other minerals...
- Type of material depicts impact
- UNBC wood comes from saw mills, not through salt-water

Q. Have you considered a dryer for fuel moisture?

A. Ash carry-over tends to fuse into glass. Moist fuel helps in gasification system.

Q. How long until UNBC gets money back?

A. Operating costs are lower than before, though not enough to pay back capital costs for many years.

Q. How many trucks full of hog fuel do you truck in?

A. 2-3 per day, during peak season, then 2-3 per week, during the summer.

Q. Fuel supply – how are these costs going with hog fuel, wood waste? Price has gone up for these materials.

A. Stable. Five-year contract, but higher than should be. Fuel cost when originally scoping project was 1/10th current cost.

Q. Typical investment of the different technologies? (e.g. Solar panels)

A. Very low in B.C., no pay back. In Ontario, very high.

- No carbon footprint, but negative investment in B.C.

Group D: Transportation

26. Non-road Diesel Emission Regulation

Ray Robb, Environmental Regulation and Enforcement Division Manager, Metro Vancouver Regional District

- Diesel particulate is a serious health concern. Many studies have shown that diesel particles are small enough to reach the alveoli of the lungs. These particles have an incredibly large surface area and can absorb many carcinogens. Activated carbon in particular is very porous and is known to absorb large amounts of chemicals.
- We need to improve regulation for non-road diesel emissions from equipment such as bulldozers, excavators, backhoes, forklifts, and locomotives.
- Diesel represents 2/3 of the cancer risk from hazardous air pollutants. Similarly, the human immune response to particles in the lungs causes plaque to form in the arteries leading to atherosclerosis and cardiac disease.
- Metro Vancouver has pledged to reduce diesel emissions by 75%. We have begun attributing the external cost of diesel to health into the bid process at a rate of \$1 million per tonne.
- Diesel particulate is black and it absorbs light making it a short-term climate forcer that contributes to the warming of the planet. Diesel particulate is second only to CO₂ for climate effects. Reducing diesel particulate should be a cheap and easy solution.
- Tier 2 and 3 engines produce ¼ of the diesel particulate emissions of tier 0 engines produced between 1996 and 2000. Tier 4 engines (2010 onwards) are even more efficient and have emissions of only 1/50 of those of tier 0 engines.

- It is imperative that we get rid of the old inefficient and high polluting engines.
- In metro Vancouver we require operators to pay a fee for tier 0 engines and they must be labeled and registered. When you reduce your emissions you get your money back up to 80% of the fees for the last three years.
- The compliance and emissions reductions have been much better than expected. The program is regarded as fair to everyone.

27. Move cleaner. Get the credit.

MaryAnne Arcand, CEO, Carbon Offset Aggregation Cooperative

- The Prince George Carbon Offset Aggregation Cooperative is the first program of its kind in the world. Our goal is to reduce, track, verify, and carbon offset diesel consumption through incentives that pay you to go green!
- There are currently 88,000 diesel trucks in BC and about the same number of yellow iron machines such as excavators.
- Awareness is simply not enough to get people to change their behaviour.
- Vehicle emissions are a significant contributor to climate change with 37% of global greenhouse gases coming from vehicle emissions. Trucking rigs burn approximately ten times the fuel that a car does.
- Operating in a fuel efficient way SAVES money by reducing the need for fuel, new tires, repairs, and maintenance. These factors are affected by the number of hours that the engine is running. Reduced idling also means an increased resale value.
- Each motor is individually tracked to determine what each driver is doing. Drivers are rewarded for their eco-driving practices.
- An example of the success that can be achieved is the reduction of fuel consumption of the I-5 by 33% when a Harley Davidson motorcycle was given away monthly as an incentive to the most eco-friendly truck driver. This program saves \$1 million each month in fuel costs.
- It is important to incentivize the program and show people what is in it for them. Some operators even give a percentage of the fuel savings back to their drivers in cash.
- It is relatively easy to reduce fuel consumption by 10% immediately.
- Our project is the only carbon protocol of its type in the world and we will be paid royalties from anyone who implements this idea anywhere in the world.
- We are currently in discussion with school buses, municipalities, and mining companies and are developing a protocol for switching to biofuel. We also plan to bid on a contract to reforest beetle kill areas in December of next year.
- Our system is applicable anywhere diesel is burned and has the unique feature that we send exception reports whenever there is excessive idling or tailgating detected.

28. Championing Integrated Air Quality through Partnerships and Fleet Management

Terry Hawkes and Scott Bone, City of Prince George

- Partnerships and Fleet Management
 - E3 Fleet Program
 - Green Fleet Strategic Plan
 - Street sweeping and road dust
- 2008: E3 Fleet Program – Energy, Efficiency, Excellence
 - External audit – 6 month review
 - We achieved a silver award because of our 77% rating and have a commitment to go for gold at our next review. If we achieve this goal we will be the second community in the province to attain a gold award.
- Green Fleet Strategic Plan
 - GHG reductions through technology and operations changes.

- Examination of alternative fuels
 - Expand and measure fleet idling policies
 - Driver efficiency training including fire department and RCMP
 - Contracts require no idling on city property
 - We have purchased 2 hybrid Ford Escapes that have decreased fuel consumption by 35% for an annual savings of \$3500. They are covered in advertisements making them a driving billboard for hybrid technology.
 - The city has purchased an electric vehicle with a gas tax rebate of \$60,000 for the vehicle and four charging stations. We partnered with Northern Health and UNBC. We are the only municipality north of Vancouver to have an electric vehicle.
 - We received community work funding to convert gasoline vehicles to propane.
 - The annual fuel budget for the City of Prince George is \$1.4 million so we are motivated to find ways to become more fuel efficient.
 - GPS Test Pilot Project will be conducted to determine whether or not using GPS can save fuel and reduce emissions. 50 vehicles will be given GPS units for the pilot project.
 - We were the first municipality north of Vancouver to use biodiesel but our supply chain dried up. We would like to find opportunities to implement this program again.
- Street Sweeping
 - In the last year we have moved away from using sand on the streets and are now using a more solid fraction with bigger stones to reduce the amount of road dust.
 - The city has 3 mechanical sweepers and 1 regenerative vacuum sweeper. We try to sweep when it is raining or we spray water to keep down the dust.
 - Mechanical sweepers are capable of picking up fine PM.

Discussion:

Question: I am interested in the process of converting gasoline engines to propane and natural gas and was wondering if something similar can be done to upgrade old diesel engines.

Response: There is a company called Westport that is partnered with Cummings to convert diesel engines to natural gas and it is definitely an area to watch. Many of the solid waste trucks in the lower mainland run on natural gas.

At this time old diesel engines are difficult to retrofit but fuel injection can be improved or filters added. Tier 2 can be improved to tier 4 standards using these retrofits.

Closing Remarks

Art Kaehn, Chair, Fraser Fort George Regional District

- Attendance at this forum has given me an appreciation of the challenges faced by each community.
- It is wonderful to see representatives from each of the different communities collaborating and cultivating fellowship and supports.
- Thank you to PGAIR for coordinating this event.

Charles Jago, Chair, Fraser Basin Council

- Thank you for the very intelligent presentations and high level discussion
- This forum is a living and breathing example of synergistic relationships between organizations.
- Our complex society demands that we collaborate and work together.
- We must pass on a world of better quality to those who follow us.
- I would like to take this opportunity to extend my thanks to the PGAIR planning committee and the Ministry of Environment. Thanks to Terry Robert for leadership and representation of the Fraser Basin Council commitment to collaborative governance.

