# 2018 state of the air

**BC LUNG ASSOCIATION** CELEBRATING THE CLEAN AIR MONTH OF JUNE

## foreword

It is my pleasure and privilege to introduce my first State of the Air Report as the new President & CEO of the British Columbia Lung Association.

We regularly write about $PM_{2.5}$ concentrations in our province. Of all the air pollutants, $PM_{2.5}$ has the greatest impact on human health. Accordingly, this year we seek to demystify $PM_{2.5}$ by identifying the major types and primary sources, and by discussing the health effects of long-term exposure.

The frequency of wildfires, a major source of $PM_{2.5}$, is expected to increase with climate change. In this Report, we examine climate change's effect not only on weather patterns, but also on human health.

Last year's wildfire season was B.C.'s worst – with over a million hectares of forest burned and 200,000 tonnes of smoke emitted into the air. Needless to say, asthma patients were among the most affected. In the midst of this calamity, the BC Asthma Prediction System was launched. In this Report, you'll find information on how this valuable tool helped predict the health impact of wildfire smoke, providing emergency responders and medical personnel alike with useful information for public protection.

We live in an incredible era in which air quality monitors are affordable enough to allow members of the public to monitor local air quality (i.e., "citizen science"). Featured in this Report are the benefits and limitations of low-cost sensors.

This year, the 15th Annual BC Lung Association Air Quality & Health Workshop featured topics such as citizen science, climate change, environmental justice, and the integration of public health in air quality management. As in previous years, this Report summarizes highlights and key issues raised at the event attended by leading authorities in the field.

A report with this scope wouldn't have been possible without the hard work, commitment, and dedication of all those involved in its preparation. To the many individuals and agencies who once again made this year's State of the Air Report possible, a big THANK YOU!

CHRISTOPHER LAM
President and CEO, BC Lung Association

## contents

# CONNECTING CLIMATE CHANGE TO AIR QUALITY AND HEALTH

Climate change is both a global and a local challenge, and it is already affecting our planet and our province in profound ways, including effects on our health. The World Health Organization describes climate change as the greatest threat to global health in the 21st century.

The primary impact of climate change is the variability in local weather patterns. The "new normal" may be very unlike the past. Climate projections include warmer temperatures, sea level rise, and more frequent and severe weather events such as storms, heavy precipitation, flooding, mudslides, heat waves and wildfires. Areas of B.C. will experience longer, hotter, drier summers, while the fall and winter seasons will be warmer and wetter with decreased snowpack. Even if global greenhouse gas (GHG) emissions were cut drastically tomorrow, our province – and the rest of the globe – will inherit the impacts of the previous 150 years of human-generated GHG emissions, and the climate will continue to change.

Climate change affects health in many ways, and will place additional burdens on healthcare and emergency management systems. In B.C., recent heat waves, droughts and wildfires have generated or contributed to negative health outcomes, such as heat-related mortality, smoke-related asthma attacks, and stress-related mental health concerns. Rising temperatures could change the incidence and types of diseases that are present in B.C, and introduce new pests that affect food, crop production and forest health, impacting food and water security. The number, extent and duration of wildfires have increased and impacted air quality, causing increases in particulate matter and ground-level ozone, which can lead to respiratory and other illnesses. In B.C., there is direct evidence of the effects of wildfire smoke on the health of those exposed during wildfire events.

The number, extent, and duration of wildfires have increased and impacted air quality, causing increases in particulate matter and ground-level ozone, which can lead to respiratory and other illnesses.

Furthermore, the impacts of climate change are not felt equally, as some populations are more vulnerable than others. The very young, the elderly, or people with chronic health problems can be more vulnerable to heat or smoke exposure. Lower-income and homeless people will likely have fewer options to protect themselves from extreme weather events and have few resources to recover from their impacts.

Although climate change presents a significant challenge, B.C. is well-positioned to respond in many areas. All levels of government will need to enact policies and implement projects to reduce exposure to climate risks, and increase capacity to respond to emergency situations.

A collective response to climate change will not only have long-term benefits, but can also have shorter-term health co-benefits. There are many specific actions that can be taken by local, regional and provincial governments, public health, and other agencies, to mitigate and adapt to climate change. For example, air quality is improved by reduced fossil fuel use, while active modes of transportation such as walking, biking, and transit increase physical activity and well-being. Similarly, a larger amount of green space and a robust tree canopy in urban areas enhances resilience to extreme heat while also improving livability for residents. A cooperative approach such as this can help maximize the health co-benefits of climate change actions and policies.

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See the following sources for further information:

Province of BC, Climate Change, https://www2.gov.bc.ca/gov/content/environment/climate-change

BC Healthy Communities Society PlanH, Climate Action and Public Health, https://planh.ca/take-action/healthy-environments/natural-environments/page/climate-action-public-health

Metro Vancouver, Climate 2050 Discussion Paper, www.metrovancouver.org/services/air-quality/climate-action/climate2050

BCCDC, Air Quality: www.bccdc.ca/health-your-environment/air-quality

# NEW ASTHMA PREDICTION TOOL LAUNCHED DURING THE WORST WILDFIRE SEASON IN PROVINCIAL HISTORY

The wildfire season of 2017 was unprecedented in the history of British Columbia. The province was under a state of emergency for ten weeks, with more than 1300 fires displacing 65,000 people and burning 1.2 million hectares of forest and 300 buildings. In addition to the disruption and destruction caused by the direct threat of fire, approximately 200,000 tonnes of smoke were emitted into the atmosphere. This smoke had severe and long-lasting air quality impacts across the province, particularly in the interior. For example, daily fine particulate matter ($PM_{2.5}$) concentrations in Kamloops were higher than the provincial objective of 25 $\mu g/m^3$ on 33 of the 72 days during the state of emergency, with a maximum 24-hour concentration of 274 $\mu g/m^3$. In Prince George, the maximum 1-hour concentrations during one extreme event exceeded 1000 $\mu g/m^3$. Although air quality impacts were not so extreme on the south coast, the Lower Mainland was under Air Quality Advisory for an unprecedented 19 days.

Exposure to wildfire smoke has been associated with a wide range of health effects, especially for people with chronic respiratory conditions such as asthma. For the past several years, the British Columbia Centre for Disease Control (BCCDC) has been monitoring smoke and its health effects across the province using daily reports of asthma-related physician visits and dispensations of salbutamol sulfate (commercially known as Ventolin®). During the summer of 2017, the BCCDC launched a new tool called the BC Asthma Prediction System (BCAPS), which uses smoke forecasts for the next 48 hours to predict health impacts in the 16 provincial health service delivery areas (HSDA). The BCAPS tool integrates data from the air quality monitoring network, satellites, weather models, smoke forecasts, and health databases to provide medical health officers with useful information for public health protection.

The BCCDC generated BCAPS reports (see example in Figure 1) for every day of the 2017 wildfire season, starting on July 7. Although the quantitative evaluation of its predictive performance is still underway, qualitative review suggests that BCAPS did a good job of predicting the health effects of smoke across the province. Performance was particularly good under moderately smoky conditions, whereas BCAPS tended to overestimate the health effects under very smoky conditions. Emergency responders and public health authorities found the reports very useful, and the BCCDC plans to make the same information available to the general public through an online mapping system in future. We are all hoping for a much calmer wildfire season in 2018, but BCAPS has already been updated with lessons learned from last summer.

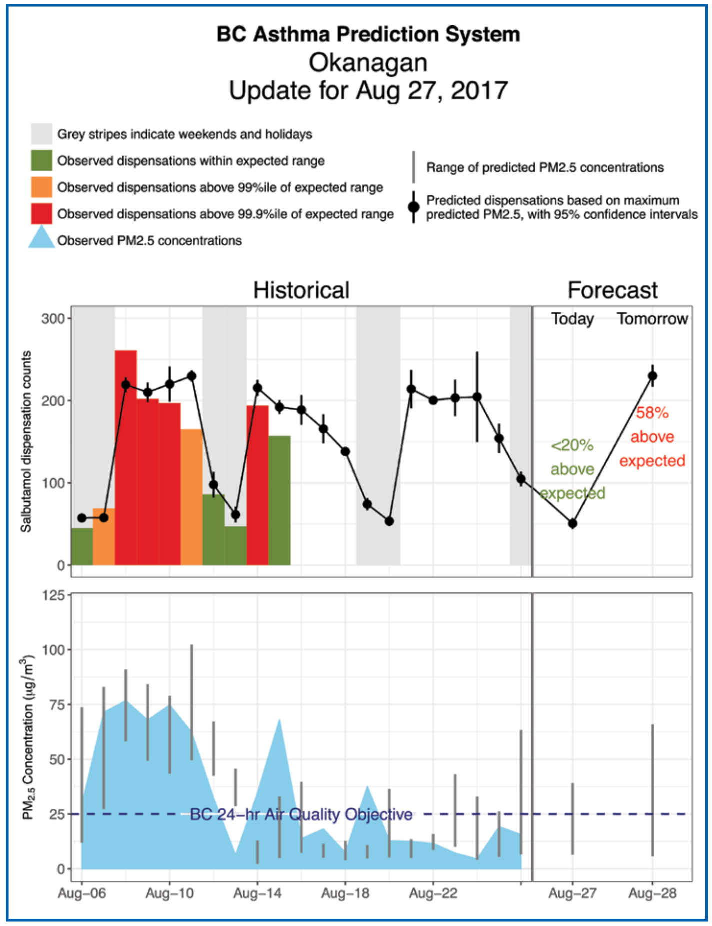



*Figure 1. Sample BCAPS report for the Okanagan HSDA, generated at 07:00 on August 27, 2017. The lower panel shows the observed and predicted daily concentrations of $PM_{2.5}$, with the observed values displayed as a polygon on the left and the range of predicted values displayed as a vertical line on the right. The maximum value within this range is used to generate the predicted health outcomes, ensuring that BCAPS reflects the worst-case scenario. The upper panel shows the observed and predicted Ventolin® dispensations, with the observed values displayed as bars on the left and the predicted values displayed as dots with 95% confidence intervals on the right. Green bars indicate that observations were within the expected range while orange and red indicate that they were outside the expected range. Ventolin® counts for August 16-26 were not yet available when the report was generated.*

# DEMYSTIFYING $PM_{2.5}$

## What is $PM_{2.5}$?

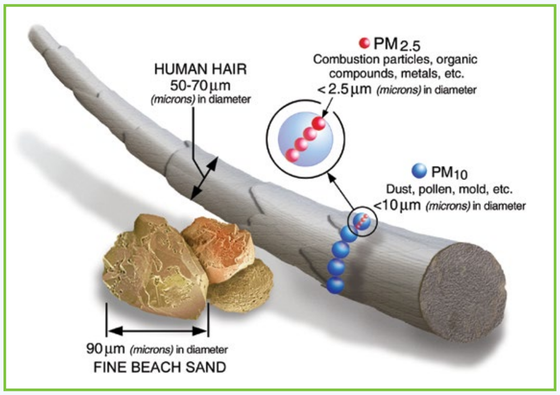
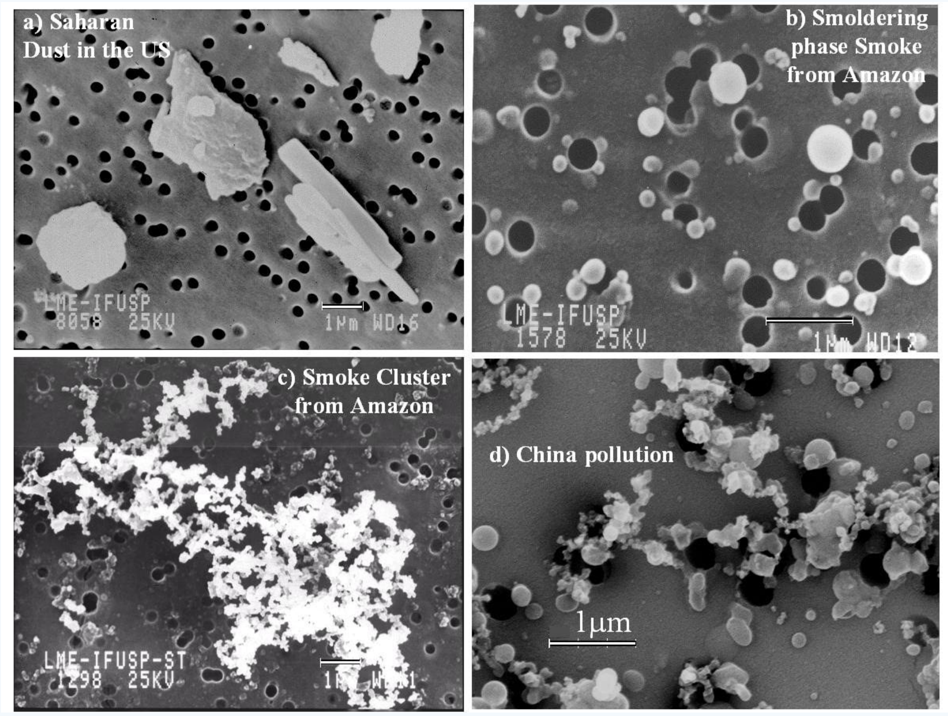



*Figure 2 (left). Diagram showing the relative sizes of $PM_{2.5}$ (red spheres) and PM10 (blue spheres) compared with a human hair and grains of beach sand (source: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics).*

*Figure 3 (below). Types of $PM_{2.5}$ viewed under scanning electron microscope, including (a) Saharan dust, (b) smoke from a smoldering phase (i.e. low-temperature) fire in the Amazon, (c) smoke clusters from a flaming phase (i.e. high-temperature) in the Amazon, and (d) urban air pollution particles from China (source: http://alg.umbc.edu/usaq/images/Particles.jpg).*




Particulate matter (known as PM) refers to the mix of solid particles and liquid droplets found in the air. These particles vary in size, shape, and chemical composition. $PM_{2.5}$ includes all microscopic particles smaller than 2.5 micrometres in diameter, which is about 1/30 the width of a human hair. $PM_{10}$ refers to all particles smaller than 10 micrometres in diameter, including $PM_{2.5}$ (see Figure 2 for size comparisons).

$PM_{2.5}$ can come in a range of shapes, including spheres, cubes, and chained structures composed of elemental and organic carbon, sulphates, nitrates, ammonia, minerals, and trace metals. The size, shape, and composition reflect the source materials and the conditions under which the particles were formed and transformed in the atmosphere (see examples in Figure 3). Particle size is important because smaller particles can remain airborne longer and can penetrate further into the lungs. Larger particles settle out of the air due to gravity alone, but smaller particles can stay in the air for weeks before they are removed by precipitation or dry deposition.

## How is $PM_{2.5}$ measured?

The British Columbia Ministry of Environment and Climate Change Strategy and Metro Vancouver have responsibilities for monitoring $PM_{2.5}$ in the province and the Lower Mainland, respectively. Most measurements are made using continuous beta attenuation monitors (see Figure 4). A sample airstream is passed through a filter tape that collects $PM_{2.5}$, and then beta energy is directed through the soiled area. The beta attenuation is the difference between the energy directed at the tape and the energy that actually passes through the tape – more attenuation means more $PM_{2.5}$. These monitors are rigorously tested and operated to ensure that the measurements are accurate enough to be compared with regulatory standards. However, there are many different ways to monitor $PM_{2.5}$ with varying accuracy. Newer low-cost monitors shine light into the ambient air and use optical sensors to estimate particle density. Although these devices are not accurate enough for air quality regulation, they can be useful for understanding spatial and temporal patterns in $PM_{2.5}$ concentrations. For more information, see article "Citizen Science/Low-cost Sensors" on page 6.

## What are the sources of $PM_{2.5}$ in B.C.?

$PM_{2.5}$ can be either primary or secondary in origin. Primary $PM_{2.5}$ is emitted directly into the environment, whereas secondary $PM_{2.5}$ is formed in the atmosphere by complex chemical reactions between

*Figure 4. Filter tape in a Beta Attenuation Monitor (BAM). Each circular soiled mark on the left-hand tape reel represents one hour of $PM_{2.5}$ collected in a community impacted by residential woodsmoke. The right-hand tape reel is unsoiled, and the beta attenuation measurements are made by the central unit.*

compounds called precursors. Examples of precursors include inorganic gases like sulphur dioxide, nitrogen oxides and ammonia, and organic compounds like terpenes, pinenes, xylenes and toluene.

The major sources of $PM_{2.5}$ and its precursors are:

- Smoke from biomass burning, including residential wood burning, industrial boilers, outdoor pile burning, prescribed fires, and wildfires.
- Exhaust from cars, heavy trucks, off-road vehicles, and marine vessels.
- Emissions from industries such as mills, smelters, refineries, and mines.
- Emissions from agriculture and livestock.

Road dust and mechanically generated dust from mines, construction activities, agricultural tillage, and forestry harvesting are additional sources of particles, although these particles tend to be larger than $PM_{2.5}$.

## How is $PM_{2.5}$ from these sources different?

The chemical composition, size, and shape of different particles reflect their individual sources and other factors, such as location, season, and weather conditions. Smaller particles are typically produced by combustion or chemical reactions taking place in the air. Such particles have relatively large amounts of elemental and organic carbon, sulphates, nitrates, and ammonium ions. Larger particles are typically produced by mechanical activity, and have higher amounts of crustal elements such as iron and silicon. Where a certain chemical composition is unique to a specific source, this information can be used to track emissions from that source. For example, levoglucosan is formed by the combustion of cellulose, which makes it a useful indicator of burning wood.

## What are the health effects of $PM_{2.5}$?

Of all the different air pollutants, $PM_{2.5}$ has the largest impacts on human health. Inhaled $PM_{2.5}$ can travel deep into the lungs, where it causes irritation and inflammation. Simply put, the human immunological system perceives the particles as foreign invaders and mounts the same type of attack it would use against bacteria and viruses. However, $PM_{2.5}$ is different from biological invaders because it cannot be killed by the immune system, so the attack and resulting inflammation are sustained.

In places with higher long-term $PM_{2.5}$ concentrations, this sustained inflammation causes higher rates of chronic diseases in the exposed population, particularly heart disease. On days when $PM_{2.5}$ concentrations are higher, the additional inflammation means that people with chronic diseases may have more symptoms and are at higher risk of needing acute medical care. In general, about 80% of the health burden attributable to $PM_{2.5}$ is caused by long-term background exposures while 20% is caused by short-term daily fluctuations.

There have been thousands of studies on the health effects of long-term exposure to $PM_{2.5}$, and all of the evidence suggests that cleaner air translates into better health with no threshold for the effect. This is why B.C.'s approach is to strive for continuous improvement, even though our air quality is very good compared with many other places.

## Does $PM_{2.5}$ from different sources have different health effects?

Most research into the health effects of $PM_{2.5}$ has been conducted using data that reflect the contributions from all sources. A much smaller number of studies have examined the health effects of $PM_{2.5}$ from specific sources, such as forest fires or residential woodsmoke, or have examined the health effects of specific constituents, such as elemental carbon. Although there may be some variation in the effects of different sources and constituents, the overall evidence indicates that all $PM_{2.5}$ is harmful to human health. As such, the best policy for public health is to continuously reduce emissions from and exposure to $PM_{2.5}$ and its precursors from all provincial sources.

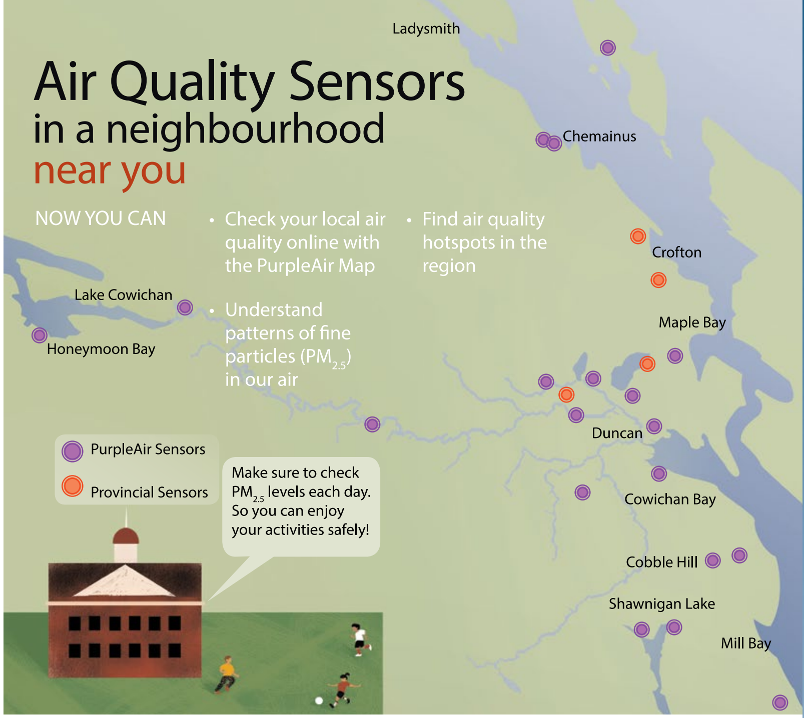
# CITIZEN SCIENCE/ LOW-COST SENSORS

One exciting air quality development in recent years has been the proliferation of "low-cost" or "next generation" air pollution sensors. These instruments may lead to more localized measurements of air pollution and to more air quality monitoring in areas currently without measurements. The availability of low-cost sensors also supports applications of "citizen science" whereby members of the public collect their own data to inform themselves and their communities of local air quality levels. These efforts can help increase awareness of local air quality concerns and stimulate innovative solutions to address challenges. Further, low-cost sensors may be deployed in very large numbers to develop high-resolution networks to provide more refined information on how air pollution varies over space and time.

Although many relatively inexpensive sensors are available, it is important for users to understand the limitations of specific devices and to use the appropriate sensor for their situation and specific goals. Those using or considering low-cost sensors should ask some key questions before purchasing and collecting measurements: Do the sensors actually measure what the manufacturers claim? Is their performance well-documented? If so, were the trials conducted under laboratory or real-world conditions? The South Coast Air Quality Management District (http://www.aqmd. gov/aq-spec) conducts sensor performance tests under real-world conditions in southern California and provides a resource guide for potential users. In addition, the U.S. Environmental Protection Agency offers extensive materials on sensor performance and use in their Air Sensor Toolbox (https://www.epa.gov/air-sensor-toolbox). As with conventional high-performance air quality monitoring equipment used by the B.C. Ministry of Environment and Climate Change Strategy and Metro Vancouver, low-cost sensors require maintenance and regular calibration because their performance degrades over time. Many of these sensors perform poorly in high relative humidity and low temperatures, which is of particular relevance to British Columbia, as these weather conditions are observed in the region during certain times of year.

> It is important for users to understand the limitations of specific devices and to use the appropriate sensor for their situations and specific goals

Despite these potential limitations, low-cost sensors can provide unique and useful information about air pollution levels. Especially when deployed as part of a local network of tens or hundreds of sensors, they can be used to understand changes in pollutant concentrations over small spatial areas and short time periods. However, it is important to consider the larger context of any such data. A short spike (seconds to minutes) in levels measured by a single sensor may indicate a malfunction or a temporary increase in localized air pollution, where the latter has little relevance for air quality management unless it affects a large population or occurs regularly. Depending on the sensor manufacturer, individual users may or may not have direct access to their data. Many units directly stream data to a central server in which post-processing is applied to produce a networked map of measurements.




*(Above: Air quality sensor network in the Cowichan Valley Regional District: https://www.cvrd.bc.ca/DocumentCenter/View/84361/CVRD-AQ-Sensor-Network-Poster)*

To date, these data have not been integrated with government air quality monitoring stations. However, there is potential for these approaches to improve our understanding of air quality, particularly where a government site serves as a high-quality data node to help calibrate a larger network of low-cost sensors. As one example, as part of the Cowichan Air Quality Partnership on Vancouver Island, the Ministry of Environment and Climate Change Strategy partnered with local government and a local air quality advocacy group (Fresh Air Cowichan Team) to purchase and install a network of 19 low-cost PurpleAir sensors across the valley. These sensors are used to augment the regulatory network that is currently in place and provides specific information to the public on spatial differences in $PM_{2.5}$ concentration across the valley, how different activities affect neighbourhood air quality throughout the year and for identification of possible hotspots where air quality is degraded more often than in other neighbourhoods. Online resources continue to be developed to direct the public to best use low-cost sensor data (https://www.cvrd.bc.ca/2187/Air-Quality-Sensor-Network). Future plans include developing an integrated map of the Cowichan Valley that includes hourly and daily values of $PM_{2.5}$ from both regulatory and PurpleAir sensors all on one map.

In the Lower Mainland, Metro Vancouver is partnering with agencies, such as Vancouver Coastal Health Authority, to develop a pilot study – the AirAware project – to evaluate the performance of these low-cost air pollution sensors. The study will invite individuals who already own a sensor, as well as new participants, to co-locate their sensors at Metro Vancouver air monitoring stations so that data can be compared. The next phase will help participants set up their monitors in a location of their choice to interpret the data. Public resources will be created to outline general usage, strengths, and limitations of low-cost air pollution sensors. Contact AQInfo@metrovancouver.org to find out more.

# HIGHLIGHTS FROM THE AIR QUALITY AND HEALTH WORKSHOP


The 15th annual BC Lung Association's Air Quality and Health Workshop was held on February 5, 2018 with the theme "The Future of Air Quality Management for Improved Public Health". The primary focus for the day was current and emerging issues in air quality management, including climate change, citizen science, environmental justice and the integration of public health in air quality management. Podcast interviews were also conducted with each speaker and these are posted on the BC Lung Association website (https://bc.lung.ca/protect-your-lungs/air-quality-lung-health/air-quality-health-workshop).

To begin the day, Cecelia Wyss of the Squamish Nation welcomed participants to Tsleil-Waututh territory. Dr. Dan Costa, who recently retired from the U.S. Environmental Protection Agency, gave the opening keynote presentation with an overview of the history and evolution of air quality management in the United States, including a summary of indicators of success. He concluded with a summary of current and emerging issues, such as the next generation of air monitoring, wildfires, disproportionate health impacts and climate change. Dr. Allen Robinson from Carnegie Mellon University then presented on air quality in a changing climate. He discussed climate penalties, projected further reductions in anthropogenic emissions and provided examples of climate change initiatives with unintended health costs.

Dr. Jeff Brook from the University of Toronto Dalla Lana School of Public

**Air quality management case studies were presented for a variety of cities both large and small, ranging from local to international.**

Health spoke about recent advances in atmospheric science that may influence how air quality is managed. Topics covered included improvements to models and emissions data, advances in characterization of air quality data and the use of oxidative potential to better characterize the health risk of different types of particulate matter. Dr. Rick Burnett of Health Canada wrapped up the morning with a talk on the changing public health burden, including temporal and spatial trends in contaminant concentrations, as well as trends in incidence of disease and mortality.

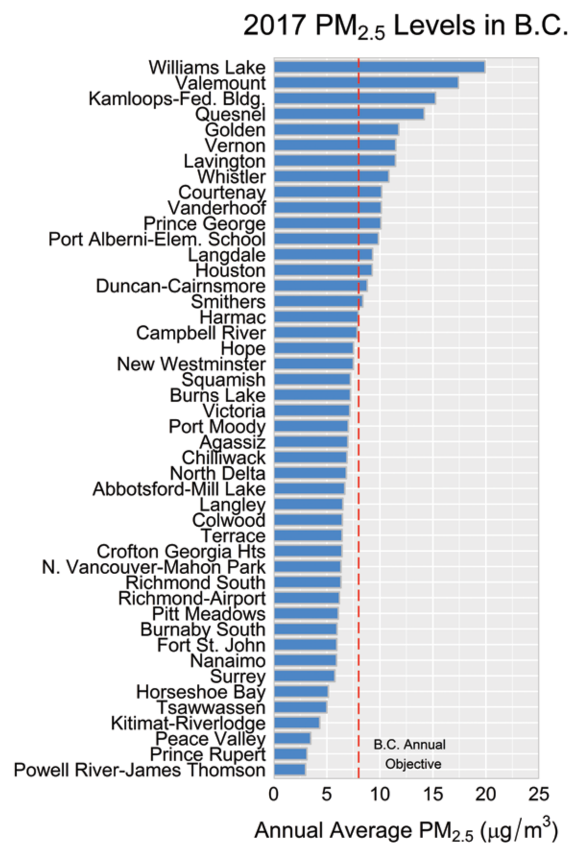
After lunch, air quality management case studies were presented for a variety of cities, both large and small, ranging from local to international. Kim Menounos of the Fraser Basin Council spoke about successes and challenges in air quality management in Prince George and she provided a summary of research, education and outreach activities undertaken in the community. Roger Quan provided an overview of air quality management in Metro Vancouver, including an overview of the Integrated Air Quality and GHG Management Plan and a discussion of current initiatives and emerging issues. Dr. Henry Hilken of the Bay Area Air Quality Management District spoke about the focus areas of the Bay Area Air Quality Management Plan: reducing ozone and fine particulate levels throughout the region and addressing health inequities and climate change. Elliot Treharne of the Greater London Authority described initiatives taken in London, England to reduce emissions associated with transportation. Katherine Trought of Environment Canterbury spoke about residential wood smoke as the primary source of air pollution in Canterbury and the various approaches taken by Environment Canterbury to address the issue.

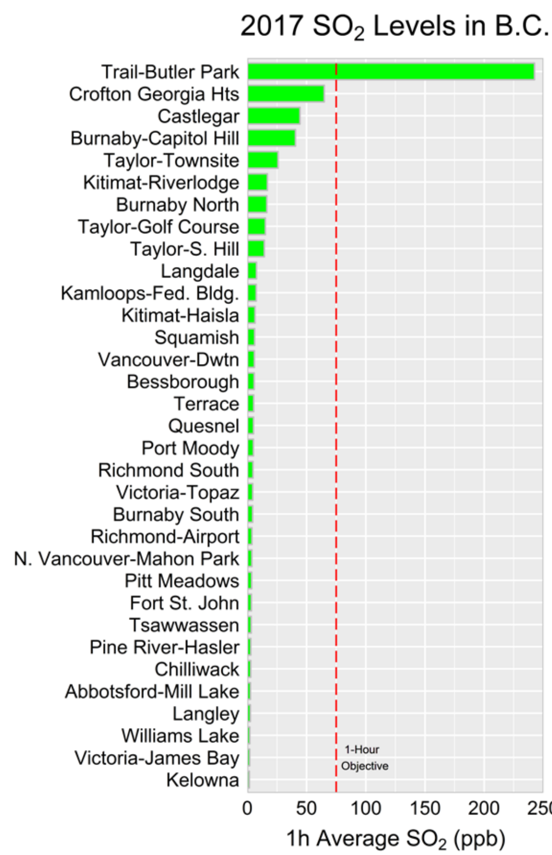
Following the case studies, Dr. Paul Hasselback of Island Health Authority spoke about the role of public health in air quality management and discussed emerging challenges such as conflict resolutions over the "right" to clean air, incorporating new science, environmental equity and the role of citizen science and advocacy. Finally, Glen Okrainetz wrapped up the day with a summary of the highlights and key issues raised. In particular, he noted the need to communicate science more effectively to the public, the commonality of residential wood smoke as an issue in all communities, environmental justice and citizen science as emerging issues in many communities and the importance for participation and engagement of public health practitioners and agencies.

# HOW DOES B.C. MEASURE UP?

The air quality story of 2017 was the wildfire season -- one of the longest and most destructive in B.C. history. A wet spring led to rapid vegetation growth and a record-high buildup of combustion fuels in areas like the Cariboo region. This was followed by one of the driest summers experienced in much of B.C. A series of lightning strikes between July 6 and 8 touched off over 160 wildfires – the largest of which burned for most of the summer. These included the Plateau Complex in the Chilcotin (545,151 ha), the Hanceville Complex (241,160 ha) around Hanceville, Riske Creek and Alexis Creek, the Elephant Hill fire near Ashcroft (191,865 ha), and the Central Cariboo Complex (31,181 ha) that triggered an evacuation notice for the city of Williams Lake and surrounding areas. These fires were huge (the Plateau Complex was the largest in recorded B.C. history), produced enormous amounts of smoke, and affected air quality locally, regionally and beyond.

In the following sections, air quality data from B.C. monitoring sites are summarized and compared against provincial or national objectives that provide a benchmark for assessing air quality. Data from all available monitoring sites are summarized in the Technical Appendix.

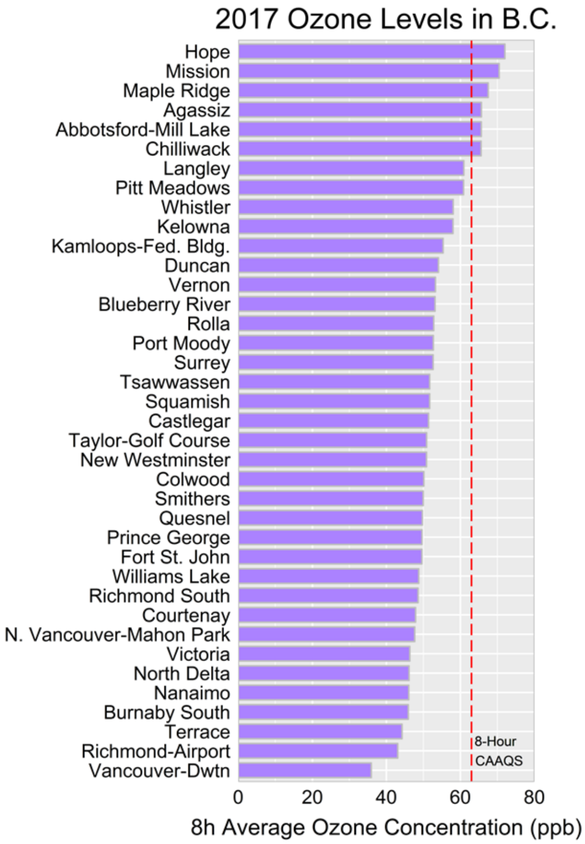


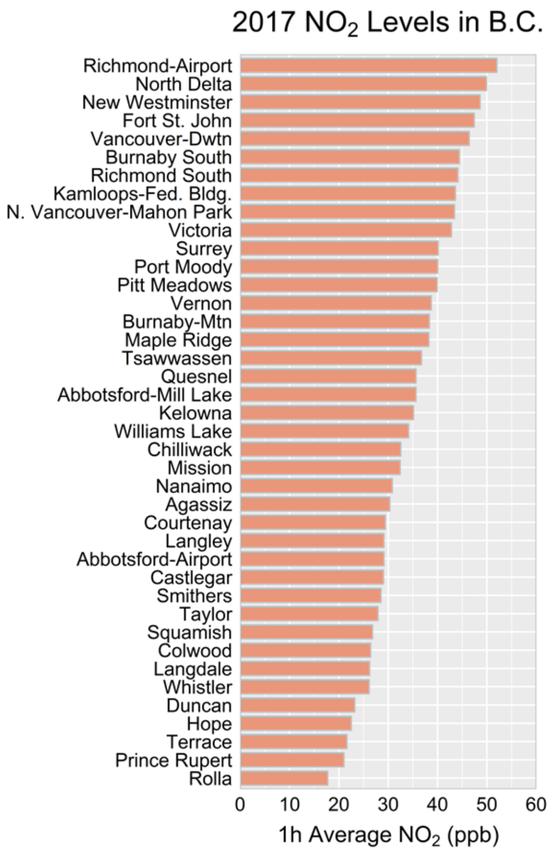




## $PM_{2.5}$ Fine Particulate Matter

Fine particulate matter ($PM_{2.5}$) refers to microscopic particles that are 2.5 micrometres or smaller in diameter. More information on the sources of $PM_{2.5}$ and its effects on human health are provided in the article "Demystifying $PM_{2.5}$" on page 4.

In 2017, $PM_{2.5}$ was continuously monitored at more than 65 stations in 52 communities. Annual average concentrations ranged from 3.0 µg/m³ in Powell River to 19.9 µg/m³ in Williams Lake. A total of 17 monitored communities exceeded the provincial annual objective of 8 µg/m³ and 39 exceeded the daily objective of 25 µg/m³. Wildfire smoke was a large factor across the central interior and southern B.C. Hardest hit were Williams Lake and Kamloops, where $PM_{2.5}$ concentrations in July and August averaged 71 and 48 µg/m³, respectively, compared to 3.8 and 5.6 µg/m³ over the same period during the previous year. Outside of the wildfire season, the highest $PM_{2.5}$ levels continue to be observed in Valemount, Houston and Vanderhoof, which typically see elevated $PM_{2.5}$ levels during stagnant wintertime periods.




## $SO_2$ Sulphur Dioxide

Sulphur dioxide ($SO_2$) is a colourless gas with a pungent odour at higher concentrations. Short-term exposures can aggravate asthma and increase respiratory symptoms. Major sources in B.C. include metal smelting facilities, the upstream oil and gas industry, pulp mills and marine vessels.

In 2017, $SO_2$ was monitored at over 50 stations in B.C. $SO_2$ levels at the majority of sites were lower than 10 ppb. Daily 1-hour maximum concentrations ranged from 2 ppb in Victoria-James Bay, Langley, Abbotsford, Kelowna and Williams Lake to a high of 249 ppb in Trail.[1] The only community to exceed the provincial objective of 75 ppb was Trail, which is home to one of the largest lead-zinc smelters in the world. Work is underway to replace three older acid plants (which convert $SO_2$ to sulphuric acid) to a new acid plant by 2019. This is expected to result in a 5% improvement in $SO_2$ emissions, in addition to the 15% improvement from an earlier acid plant that became operational in 2014.

## $O_3$ Ground-level Ozone

Ground-level ozone ($O_3$) is a reactive gas that is formed in the air from reactions involving nitrogen oxides (NOx) and hydrocarbons in the presence of sunlight. Motor vehicles are a major source of both NOx and hydrocarbons. Ozone directly affects both human health and vegetation. Short-term ozone exposure is associated with breathing difficulties, aggravation of asthma symptoms and other lung diseases and premature death. There is growing evidence that long-term exposures can cause the development of respiratory effects, especially in the young and elderly.

Ozone was monitored at 47 sites in 2017. The majority of these sites were located within the Lower Fraser Valley. Eight-hour ozone concentrations ranged from 35 ppb in Vancouver-Dwtn to 72 ppb in Hope. Ten monitoring sites in the Lower Fraser Valley exceeded the level of the Canadian Ambient Air Quality Standard (CAAQS) of 63 ppb. It is believed that the warm, sunny conditions, together with intermittent wildfire smoke, helped to boost ozone levels during the summer of 2017.

## $NO_2$ Nitrogen Dioxide

Nitrogen dioxide ($NO_2$) is a reddish-brown gas that is associated with high-temperature combustion. Most $NO_2$ is formed in the atmosphere following reactions involving nitrogen oxide (NO) and ozone. Major sources of NO include motor vehicles and industrial processes. Short-term $NO_2$ exposures are associated with respiratory illness. There is growing evidence that links long-term $NO_2$ exposure to cardiovascular mortality, cancer and reproductive effects.

In 2017, $NO_2$ was monitored at over 50 sites, the majority of which were in the Lower Fraser Valley. One-hour concentrations ranged from 18 ppb in Rolla (in Northeast B.C.) to 52 ppb at the Richmond-Airport site. All sites were below the interim provincial objective of 100 ppb and the level of the new national standard of 60 ppb. Recent data from the near-road monitoring station on Clark Drive in East Vancouver (not shown here) indicates that higher $NO_2$ concentrations may be observed in areas heavily influenced by traffic emissions.

1 Based on annual 97.5th percentile of daily one-hour maximum. Provincial objective of 75 ppb is based on a similar form, averaged over three years (2016-2018).

2 Based on annual 4th highest daily 8-hour maximum over one year. The national standard is based on this form, averaged over three years.

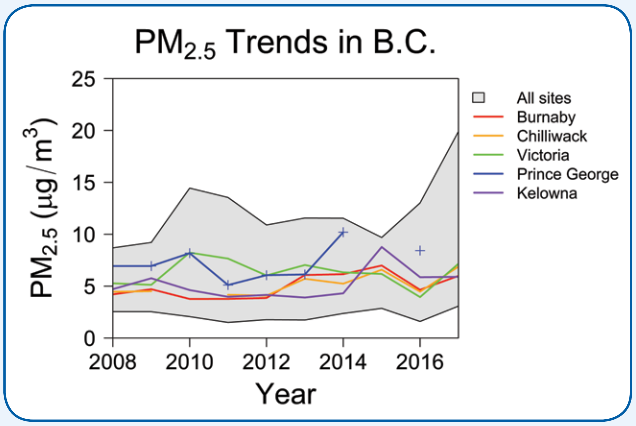
3 Based on annual 98th percentile of daily 1-hour maximum over one year. The national standard is based on this form, averaged over three years.

TRENDS

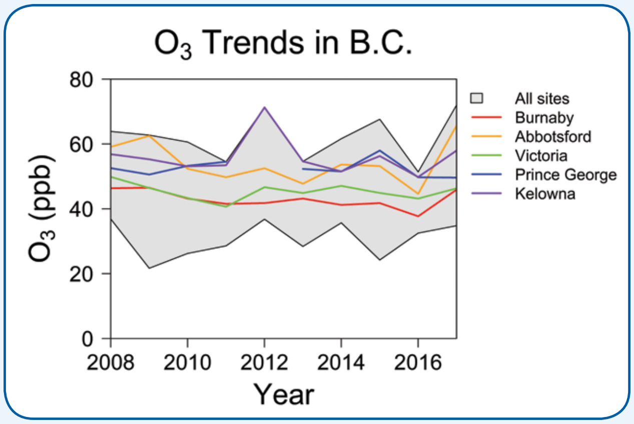
# AIR POLLUTION THROUGH THE YEARS

We look at trends in air pollution levels to assess the effectiveness of actions to improve air quality and to determine the need for additional work. The following figures provide 10-year trends in annual concentrations in the most heavily populated areas of the province, and the minimum and maximum concentrations across all B.C. sites.

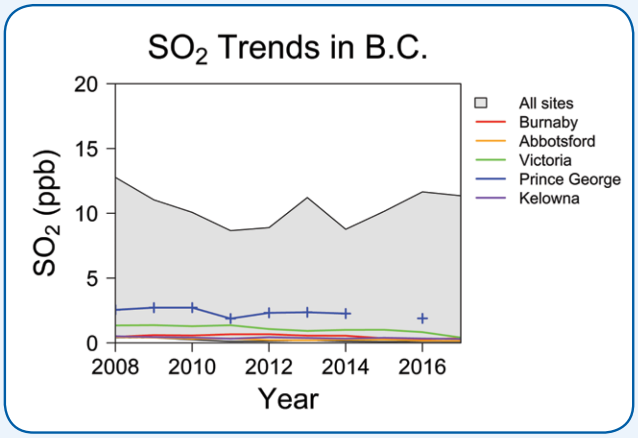
**$PM_{2.5}$ levels** (shown as annual average) are influenced by a number of different factors. These include: the weather, emissions and changes in monitoring technology. Wildfires have been a large influence in recent years, including 2014 in Prince George, 2015 in Kelowna and especially 2017 over much of the southern half of the province that brought record-breaking $PM_{2.5}$ levels in communities like Williams Lake and Quesnel.



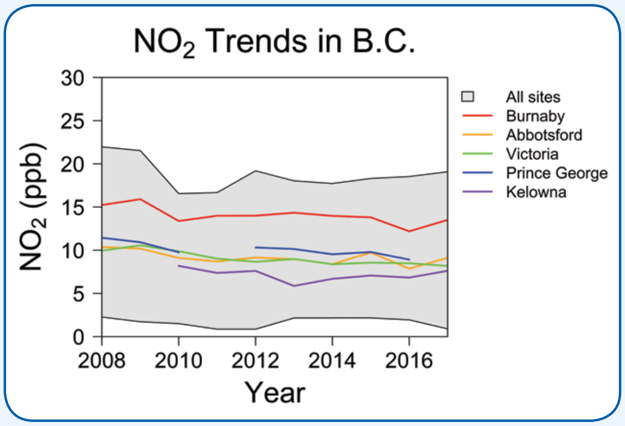

**Ozone levels** (shown as 4th highest daily 8 hour maxima) are also affected by wildfire smoke. Studies showed that Siberian smoke helped to boost ozone levels in Kelowna and southwest B.C. during the summer of 2012. Still to be evaluated is the influence of 2017 wildfires on ozone levels in the Southern Interior and especially the Lower Fraser Valley, where several monitoring sites recorded among the highest ozone levels seen over the past decade.




**$SO_2$ levels** (shown as annual average) remain low in urban areas. This is a result of ongoing efforts to reduce the sulphur content in motor vehicle and marine fuels, and a reduction of emissions from the petroleum refining and cement industries.




**$NO_2$ levels** (shown as annual average) have generally declined over the past 10 years in urban areas, although there is evidence that trends have bottomed out or have begun to creep upward in more recent years. Improvements have largely been due to more stringent vehicle emission standards and the former AirCare vehicle inspection and maintenance program in the Lower Fraser Valley. The introduction of Tier3 vehicle emissions standards, beginning in 2017, are expected to result in further improvements over the coming decade.




*1 Teakles, A.D., So, R., Ainslie, B. et al. (2017) Impacts of the July 2012 Siberian fire plume on air quality in the Pacific Northwest. Atmos. Chem. Phys. 17, pp. 2593-2611.*

# AIR ZONES REPORTS FOR B.C.

In 2012, the Canadian Council of Ministers of the Environment (CCME) with the exception of Quebec, agreed to implement a new and more comprehensive Air Quality Management System (AQMS) to guide air quality work across the country. Under this system, more stringent air quality standards have been adopted to drive improvements in air quality to better protect human health and the environment. The new air quality standards will be achieved through emission reductions from industry, transportation and other key sources, using air zone management as the basis for monitoring, reporting and taking action on air quality for Canadians. Air zones are geographical areas with similar air quality issues.

In 2014, the B.C. Ministry of Environment & Climate Change Strategy identified seven broad air zones across the province, and has since produced air zone reports for six of the air zones where sufficient data were available. In each report, levels of fine particulate matter ($PM_{2.5}$) and ground-level ozone at individual monitoring stations are compared to the Canadian Ambient Air Quality Standards (CAAQS). Colour-coded management levels (in increasing stringency: green, yellow, orange and red) are then assigned on the basis of air quality levels after external influences like wildfire smoke have been removed. Results from the most recent report for 2014-2016 are summarized in Figures 5 and 6. The Georgia Strait and Central Interior Air Zones were assigned red management levels on the basis of high $PM_{2.5}$ concentrations in Courtenay, Port Alberni, Houston and Vanderhoof. This means that these communities are a high priority for action on $PM_{2.5}$ levels. Examples of activities that individual communities have taken on, with support from the Ministry and other stakeholders, include air quality studies, emission inventories, woodstove exchange and education programs. For more information, see individual air zone reports or the Ministry's "Air Zone Management Response" (https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/air-zone-reports/air_zone_management_response_-_final_09152017.pdf).

New air zone reports will be prepared later this year based on the most recent data from 2015-2017.


*Figure 5: Air zone management levels for ground-level ozone based on 2014-2016 data. (Source: http://www.env.gov.bc.ca/soe/indicators/air/ozone.html)*

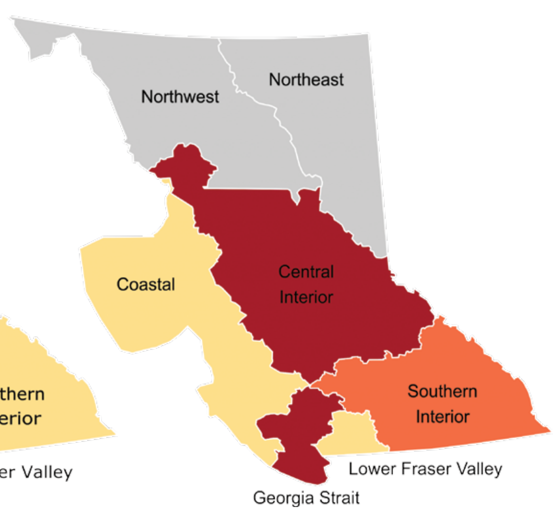



*Figure 6: Air zone management levels for $PM_{2.5}$ based on 2014-2016 data. (Source: http://www.env.gov.bc.ca/soe/indicators/air/fine-pm.html)*

Air Zone Management Levels

- Actions for Achieving Air Zone CAAQS
- Actions for Preventing CAAQS Exceedance
- Actions for Preventing Air Quality Deterioration
- Actions for Keeping Clean Area Clean

For more information see:

https://www.ccme.ca/en/resources/air/aqms.html

Air Zones Management Response: https://www2.gov.bc.ca/assets/gov/environment/air-land-watr/air/reports-oub/air-zones-reports/air_zone_management_response_-_final_09152017.pdf

https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/reports/latest-air-zone-reports

# UPDATES FROM PARTNER AGENCIES

Health Canada / Santé Canada

## Air Quality Health Effects

Estimates of air pollution attributable mortality have been produced for Canada in the past. In its latest update, Health Canada estimates the number of annual mortalities in Canada from all causes that can be attributed to air pollution from human sources in North America to be 14,400 deaths. This estimate is based on both acute and chronic exposure to air pollution, and covers all internal causes of mortality. Health Canada plans to update this estimate on an annual basis.

The Human Health Risk Assessment for Gasoline Exhaust is a comprehensive review and analysis of the potential adverse health effects associated with gasoline fuel use in Canada. Air quality modelling allows the quantification of the contribution that gasoline emissions make to ambient concentrations of $PM_{2.5}$, $NO_2$, $O_3$ and CO and the calculation of health impacts. For calendar year 2015, Canadian on-road and off-road gasoline emissions are associated with 940 premature mortalities from cardiovascular disease, lung cancer and respiratory disease (valued at $6.8 billion). Gasoline emissions are also associated with acute respiratory symptom days, restricted activity days, asthma symptom days, hospital admissions, emergency room visits, child acute bronchitis episodes and adult chronic bronchitis cases across Canada. The total societal cost associated with on-road and off-road gasoline emissions for calendar year 2015 is estimated to be $7.3 billion.

Health Canada has led and contributed to several air quality research projects with 46 publications in scientific journals from the beginning of 2017 to the present. This include: a study of exposure to $PM_{2.5}$ in a transit environment (e.g. Metro, SkyTrain) in Vancouver, Toronto, and Montreal; a study of factors that can affect the association between perinatal exposure to air pollution and childhood asthma; a review of the effectiveness of traffic management strategies in improving air quality; an analysis of air pollution data from the Global Burden of Disease study; and an assessment of the benefits of kitchen exhaust fan use after cooking.

Several population-based studies in Ontario, Canada, investigated over 10 years of long-term population exposure to ambient air pollutants in cohorts of Toronto (over one million people in the cohort), and of almost the entire adult population of Ontario (over 2 million people in the cohort). These studies reported that long-term exposure to air pollutants was associated with increased disease incidence including hypertension, diabetes, COPD, asthma, dementia, Parkinson's disease, and multiple sclerosis.

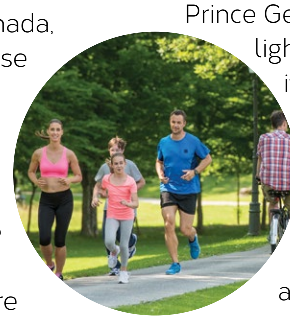
## Residential Wood Burning

Residential wood smoke is a significant contributor to $PM_{2.5}$ pollution in many communities across B.C. In the winter of 2017, Health Canada, UBC, the B.C. Centre for Disease Control, and the B.C. Ministry of Environment and Climate Change Strategy worked in partnership to create and extensively test a new mobile monitoring method in six communities that can measure residential woodsmoke and map spatial patterns across a region. This method is an efficient option to either complement existing $PM_{2.5}$ monitoring by identifying wood smoke hotspots within a community, or to quickly characterize conditions in otherwise unmonitored communities.

The equipment and technology, along with the training materials and app that volunteers can use to analyze and map data collected, will be piloted in two communities. This method will be available for other interested community groups to use next winter. If interested, please contact Michael Brauer at michael.brauer@ubc.ca. Further detailed analysis of the winter 2017 monitoring data is being completed and will be presented later in 2018.

## Air Quality Health Index

In partnership with the Fraser Basin Council, Health Canada completed a study in Prince George during the winters of 2014 and 2015 to assess whether the Air Quality Health Index (AQHI) accurately predicts health risk in smaller cities. Participants completed daily outdoor exercise and various cardiovascular and respiratory health indicators were measured. Results indicated that an increase in the AQHI was associated with adverse changes in cardiovascular and respiratory measures. Over the duration of the study, improvements in some measures of health (in the opposite direction to associations with air pollution), including reduced heart rate, suggesting benefits to the heart from outdoor physical activity were observed. Overall, these findings suggest that older adults living in smaller cities like Prince George benefit from daily light outdoor physical activity, but may also benefit from reducing outdoor activity when the AQHI is particularly high, in order to reduce short term adverse effects on the heart and lungs.



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## Air Quality and Climate Change Planning

Metro Vancouver is engaging with the public, municipal staff and other stakeholders on its proposed Climate 2050 Strategy, which will provide guidance for action across the Metro Vancouver region to reduce greenhouse gas emissions and prepare for the unavoidable effects of global warming. Metro Vancouver will also be working this year toward a new Air Quality Management Plan, including outreach and engagement with stakeholders.

## Regional Air Quality Objectives

In November 2017, Metro Vancouver updated its air quality objectives for $SO_2$, following adoption of new Canadian Ambient Air Quality Standards (CAAQS) for $SO_2$. The new objectives will provide greater human health and environmental protection, and enable air quality management activities for short-term exceedances. In 2018, Metro Vancouver will review its air quality objective for $NO_2$, following federal adoption of new CAAQS for $NO_2$ for 2020 and 2025.

## Air Quality Monitoring near Burrard Inlet

In early 2018, Metro Vancouver began mobile air quality testing near the north shore of Burrard Inlet, to better understand levels of air pollutants, such as $SO_2$, in that area. Metro Vancouver's mobile air monitoring unit (MAMU), which continuously monitors several air pollutants and weather data, will be located on Tsleil-Waututh Reserve Lands about three kilometres east of the Ironworkers Memorial Bridge, for at least six months, and potentially up to a year.

## Climate Actions for Vehicles, Buildings and Business

Metro Vancouver has been working on initiatives to increase the uptake of electric vehicles in the region since 2012 in support of regional greenhouse gas and air emissions reductions goals. Programs such as Emotive: The Electric Vehicle Experience (www.emotivebc.ca), EVCondo.ca, and EV Workplace.ca engage with residents, businesses and strata corporations to lower the barriers to owning and charging an EV.

The Strata Energy Advisor program was launched by Metro Vancouver in May to help strata corporations address climate change. The pilot program will allow strata councils, property managers and strata members to sign up for free energy assessments and get expert advice from a strata energy advisor on building energy efficiency and greenhouse gas reduction. Visit www.strataenergyadvisor.ca.

Metro Vancouver is working with partners to pilot Canada's first National Industrial Symbiosis Program (NISP). Industrial symbioses can transform wastes from one business into higher-value inputs for another business, such as using shredded tires as a building material for a new road. The program focusses on partnership opportunities to maximize efficient use of logistics, space, or even research and development resources, to deliver a variety of environmental benefits. Workshops will be held in the Lower Mainland this year to identify opportunities, and businesses of all sizes and from all sectors are encouraged to attend. Visit www.sustainablebuildingcentre.com/events.

## Regulatory Updates

Metro Vancouver is seeking ways to reduce emissions of odorous air contaminants across the region, following increasing public complaints about unpleasant odours from a variety of sources, including composting and food processing facilities. Odorous air contaminants have the potential to cause effects ranging from nuisance in residential neighbourhoods to health concerns at elevated levels. A public engagement process concluded in April, and a summary of feedback and recommended next steps is being prepared.

To reduce exposure to wood smoke, Metro Vancouver has been seeking input on a proposed phased approach to regulate emissions from residential fireplaces and woodstoves, which are responsible for more than a quarter of regional $PM_{2.5}$ emissions – more than any other source. Feedback received will be considered during development of proposed regulatory requirements.

Metro Vancouver amended its bylaw for non-road diesel engines in 2018, to improve reporting requirements for low-use engines. Amendments are also being considered for its automobile refinishing bylaw, to reduce impacts associated with facility emissions and to improve bylaw clarity and enforceability.

For updates on consultation activities, visit www.metrovancouver.org/services/air-quality/consultation.

## Caring for the Air

Metro Vancouver's annual Caring for the Air Report has more air quality stories at www.metrovancouver.org/air.

*(Cont'd on p.14)*

(Cont'd from p.13 - Updates: From Partner Agencies)

Environment and Climate Change Canada | Environnement et Changement climatique Canada

Environment and Climate Change Canada (ECCC) has a mandate to provide Canadians with a clean, safe and sustainable environment. With respect to air quality, this is achieved through its Air Pollution and Weather and Environmental Observations, Forecasts and Warnings programs and mechanisms such as the Air Quality Management System and the Canada-U.S. Air Quality Accord. In British Columbia, ECCC is involved in a number of long and short-term studies.

## National Visibility Monitoring

ECCC continues to run the National Visibility Monitoring Initiative aimed at assessing visibility conditions in border areas of Canada. The initiative includes a monitoring component with multiple sites in the Lower Fraser Valley of B.C, and sites in Kananaskis, Alberta, Egbert, Ontario, and Wolfville, Nova Scotia. Current activities include a comparison of visibility conditions across Canada using data from the National Air Pollution Surveillance (NAPS) speciation network, intercomparison studies between the NAPS and CAPMoN networks and the US IMPROVE visibility monitoring network. Also in the past year, a visibility forecasting framework for the Lower Fraser Valley of B.C. was developed.

## AQ Monitoring at a Marine Boundary Layer Site

A joint ECCC/B.C. Ministry of Environment and Climate Change Strategy/ Metro Vancouver background monitoring site at Ucluelet, on the west coast of Vancouver Island, collected data on background air quality data from 2010 to 2017. Over this time period, scientists carried out various studies at the site including: characterization of marine boundary layer chemistry; characterization of long-range transport of pollutants from Asia; assessing the effect of Marpol Annex VI Marine Emission Control Area regulations on sulphur dioxide and sulphate; investigating the role of marine aerosols as cloud condensation nuclei; investigating the role of halogens in ozone chemistry and on ozone depletion events; and the development of passive air samplers for monitoring mercury concentrations in remote locations. Data from Ucluelet indicate that $SO_2$ levels from ocean-going ship emissions have declined since the implementation of international regulations under the Emission Control Area. New analyses in the past year have focused on characterization of ma-

*Above: The air quality trailer at Ucluelet, B.C.*

rine boundary layer chemistry at this background site over the period of record to provide a baseline against which future measurements at the site (expected to be undertaken in 5 years) can be compared.

## Air Quality Modelling and Wildfire Smoke Forecasting

ECCC is embarking on a photochemical modeling study of the 2017 B.C. wildfire season, in order to improve its ability to forecast $PM_{2.5}$ concentrations for wildfire smoke. The study will use ground- and satellite-based observations to examine how different model configurations and different fire emission models can be used to give Canadians better guidance on wild fire impacts in their communities. In addition, a pilot project is underway to study how the upgrades to ECCC's weather radar network can be used to detect wildfire plumes. The radar upgrades should allow for better discrimination between clouds, rain and smoke particles and could ultimately be used to improve air quality forecasts.

For more information on regional air quality research carried out by Environment Canada, please see the 2014 Georgia-Basin/Puget Sound Airshed Characterization report at: http://www.ec.gc.ca/air/default.asp?lang=En&n=1F36EFBB-1t

A

B

*A view looking southeast over British Columbia's Lower Fraser Valley at Chilliwack (a) on a clear day (29 July 2017 at 3:00 pm PDT) with $PM_{2.5}$ values of 2.2 $\mu g/m^3$ and (b) on a day impacted by smoke from forest fires in the interior of the province (8 August 2017 at 3:00 pm PDT with $PM_{2.5}$ values of 50 $\mu g/m^3$*

## Fraser Valley Regional District (FVRD)

### Air Quality Management Plan

2017 has seen a number of new initiatives undertaken by the FVRD to strengthen their regional air quality program. A new Air Quality Management Plan is expected to be adopted in 2018-2019. One of the objectives under the Plan will be to increase public education and awareness of air quality.

### Air Quality Education Program

The FVRD outreach effort has been largely enhanced through the launch of a well-received school program called "Love Our Air", a portfolio of lessons and custom workshops designed for Grades 5 and 10 Science classrooms. The program focuses on developing students' respect for the environment and understanding how to reduce pollution through their everyday actions. Students learn to identify types of air pollutants, their sources and impacts, as well as possible actions and solutions that they can take as individuals, or with their community. The program will continue in 2018.

### Residential Heating

In addition to financial incentives under the Wood Stove Exchange Program, the FVRD now offers educational Wood Heat Workshops on improving the efficiency of wood heating systems to reduce smoke emissions. These free events allow participants to learn how to prepare their firewood and properly care for their wood burning stoves, as well as the benefits of EPA/CSA-certified appliances. The FVRD will be hosting more workshops later this year.

### Reducing Open Burning

Smoke from outdoor burning has an immediate impact on nearby residents: it affects human health, causes nuisance, and deteriorates overall quality of life. The FVRD has been consistently working on reducing open burning activities in the region.

In 2017, the FVRD investigated alternatives to open burning of wood waste. The study identified recycling, re-use and disposal alternatives to open burning of wood waste from agricultural and rural residential sources; analyzed potential incentives for increased uptake of proposed alternatives; and determined implementation needs, including cost implications. The study was partially funded by a grant from the B.C. Clean Air Research Fund, which is administered by the Fraser Basin Council.

The FVRD also researched how smoke from land clearing burning for development purposes might impact local communities. The results and recommendations from this air dispersion modeling study will help future decision making and planning in our fast-growing region.

More about the FVRD programs and initiatives is available at: http://www.fvrd.ca/EN/main/services/AirQualityandClimate.html.

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BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

### Northeast Air Monitoring Project

This project was a collaborative initiative involving the Ministry, the B.C. Oil and Gas Commission, the B.C. Ministry of Natural Gas Development, the Canadian Association of Petroleum Producers, Spectra Energy and communities in the Peace region to address public demand for air quality information in Northeast B.C. Between 2013 and 2017, the Ministry made air quality measurements in six rural communities, focussing on pollutants that are associated with oil and gas development. The Ministry reported its findings in a 2017 air quality assessment report. Measurements of sulphur dioxide, nitrogen dioxide, ground-level ozone and $PM_{2.5}$ were found to be lower than provincial or national objectives. However, total reduced sulphur (TRS) – primarily an odour issue – exceeded provincial objectives for brief periods of time at monitoring sites in Taylor and Tomslake. For more information on this project see: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/northeast_bc_air_quality_assessment_report.pdf.

### AQHI & Wildfire Smoke

The Air Quality Health Index (AQHI) was developed by Canadian health researchers to communicate the level of health risk posed by air pollution. The underlying health studies tracked air pollution effects on mortality in major Canadian cities. The AQHI has proven to be a useful tool that is now in place across the country. However, experiences in B.C. during the wildfire season and the winter wood smoke season showed that improvements were needed to better reflect the impacts of smoke events on broader health outcomes such as respiratory effects. In 2017, the Ministry worked with BCCDC and Environment and Climate Change

*(Cont'd on p.16)*

*(Cont'd from p.15 - Updates: From Partner Agencies)*

Canada to conduct a B.C. pilot study to make the AQHI more responsive to smoke from wildfires and domestic wood heating. This involved boosting the AQHI (high health risk) when hourly $PM_{2.5}$ levels reached a level associated with respiratory effects. Based on feedback from health and environment agencies and the public, additional research has been conducted to further refine the "AQHI-Plus" model to better reflect the impact of elevated $PM_{2.5}$ levels on respiratory effects. This new formulation will be tested at B.C. monitoring sites during the summer of 2018.

## Provincial Wood Stove Exchange Program

In 2017, the province and BC Lung provided $200,000 in funding to 15 B.C. communities or regional districts to support the change-out of older wood stoves with cleaner-burning options such as heat pumps, gas stoves or new EPA-certified wood stoves. A new call for proposals for funding will be announced in the summer of 2018. For more information see https://www2.gov.bc.ca/gov/content?id=579DDD09E0544FBFA612AF5F6A666BC3.

## New National Air Quality Standard for $NO_2$

In November 2017, B.C. and other Canadian jurisdictions joined together to endorse new Canadian Ambient Air Quality Standards (CAAQS) for $NO_2$ for 2020 and 2025 achievement. Within the past six years, new CAAQS have been adopted for $PM_{2.5}$, ground-level ozone and $SO_2$. For more information on the CAAQS, see: https://www.ccme.ca/en/resources/air/aqms.html.

# VISIT/CONTACT

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www.bc.lung.ca
2675 Oak Street
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(604) 731-5864 or toll-free at
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ENVIRONMENT AND
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401 Burrard Street
Vancouver, B.C. V6C 3S5
(604) 664-9100

HEALTH CANADA ENVIRONMENTAL
HEALTH PROGRAM - B.C. REGION
www.hc-sc.gc.ca/ewh-semt/air/index-eng.php
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420-757 Hastings St W
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DISEASE CONTROL
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AND CLIMATE CHANGE STRATEGY
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525 Superior Street
Victoria, B.C. V8W 9M1
(250) 387-9537

Ministry of Environment
Regional Offices
www.env.gov.bc.ca/main/regions.html

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http://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/health
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**We welcome your feedback via this link:** https://form.jotform.com/lungassociation/2018SOTAreport
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Michael Brauer – UBC
Sarah Henderson – BCCDC
Derek Jennejohn – Metro Vancouver
Marina Richter - FVRD
Meghan Roushorne – Health Canada
Natalie Suzuki – B.C. Ministry of Environment and Climate Change Strategy
Christopher Carlsten - UBC

# technical appendix

## 2018 BC Lung State of the Air Report -- Technical Appendix (based on 2017 data)

**Data Source:**

B.C. Ministry of Environment and Climate Change Strategy and Metro Vancouver

**Units:**

All data presented in ppb except $PM_{2.5}$, which is presented in micrograms per cubic metre ($\mu g/m^3$)

**Monitoring sites:**

Monitoring is often conducted to address various objectives that may include measuring concentrations representative of: community exposure, industrial impacts, background concentrations, etc.

For the State of the Air Report, monitoring sites immediately adjacent to industrial facilities were not generally included unless these sites were also near areas of high population density.

**Data completeness:**

Data completeness criteria have been relaxed relative to previous reports to enable reporting of data from more stations.

In this report, a valid day has data for at least 18 hours (75%).

A valid year has data for at least 60% of days in each quarter and 75% of of hours over an entire year, with the following exceptions.

For peak (4th highest) 8-hour ozone levels, a valid 8-hour period has data for at least 6 hours, a valid day has data for at least 18 hours, and a valid year has at least 75% of days in the second and third quarters (April 1 to September 30).

For peak (1-hour) $SO_2$ and $NO_2$ levels, a valid daily maximum includes those days where less than 18 hours are available in a day but the maximum concentration exceeds the objective level.

Annual mean $PM_{2.5}$ levels are based on the annual mean of daily $PM_{2.5}$ concentrations.

Where data completeness requirements are not met, only number of hours per year, maximum value and number of exceedances are shown.

In some limited cases (e.g. Prince Rupert and Prince George), data monitored sequentially from two different sites have been combined to allow for reporting of a complete year of data.

**Collocated monitors:**

Where more than one $PM_{2.5}$ monitor is operating at a single site, data are shown for the monitor currently considered the primary reporting monitor and/or the monitor reporting a complete year of data.

A common example is the collocation of new Federal Equivalent Method (FEM) instruments alongside the Tapered Element Oscillating Microbalance (TEOM) instruments. This is done primarily for testing purposes, to ensure satisfactory FEM performance prior to establishing the FEM instrument as the primary reporting monitor and decommissioning the older TEOM instrument.

**Disclaimer:**

While the information in these data summaries are believed to be accurate, the data summaries are provided as is without any warranty, and may be subject to change as changes to the underlying database occur.

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3. The information provided in these data is intended for educational and informational purposes only. These data are not intended to endorse or recommend any particular product, material or service provider nor is it intended as a substitute for engineering, legal or other professional advice. Such advice should be sought from qualified professionals.

## Summary of 2017 $NO_2$ Data

| Station | Year | No. Valid Hrs | No. Valid Days | Annual Avg. | Percentiles (1h) | | | | | 1h Max | Annual 98th Percentile of D1HM* | No. Days | | | % Valid Days Per Quarter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 25th | 50th | 75th | 98th | 99th | | | >100 ppb | >60 ppb | >42 ppb | Q1 | Q2 | Q3 | Q4 |
| Abbotsford-Airport | 2017 | 7959 | 332 | 7.7 | 3 | 6 | 11 | 23 | 25 | 33 | 29 | 0 | 0 | 0 | 81 | 96 | 98 | 89 |
| Abbotsford-Mill Lake | 2017 | 8503 | 360 | 9.1 | 4 | 7 | 13 | 26 | 28 | 43 | 36 | 0 | 0 | 1 | 100 | 98 | 97 | 100 |
| Agassiz | 2017 | 8599 | 364 | 7.7 | 3 | 6 | 11 | 22 | 24 | 40 | 30 | 0 | 0 | 0 | 100 | 100 | 100 | 99 |
| Blueberry River | 2017 | 7556 | 323 | . | . | . | . | . | . | 18 | . | 0 | 0 | 0 | 98 | 98 | 100 | 59 |
| Burnaby-Kensington | 2017 | 8616 | 363 | 12.2 | 6 | 10 | 16 | 35 | 38 | 57 | 46 | 0 | 0 | 16 | 99 | 99 | 100 | 100 |
| Burnaby-Mtn | 2017 | 8613 | 363 | 7.4 | 4 | 6 | 10 | 24 | 28 | 45 | 38 | 0 | 0 | 1 | 98 | 100 | 100 | 100 |
| Burnaby South | 2017 | 8595 | 361 | 13.5 | 7 | 12 | 18 | 34 | 37 | 53 | 44 | 0 | 0 | 9 | 96 | 100 | 100 | 100 |
| Castlegar | 2017 | 8250 | 353 | 6.4 | 3 | 5 | 9 | 21 | 23 | 34 | 29 | 0 | 0 | 0 | 98 | 96 | 98 | 96 |
| Chilliwack | 2017 | 8525 | 357 | 8.3 | 4 | 7 | 11 | 23 | 26 | 40 | 33 | 0 | 0 | 0 | 100 | 97 | 99 | 96 |
| Colwood | 2017 | 8353 | 364 | 4.9 | 1 | 3 | 7 | 19 | 21 | 32 | 26 | 0 | 0 | 0 | 100 | 100 | 100 | 99 |
| Coquitlam | 2017 | 6945 | 294 | 11.2 | 5 | 10 | 16 | 30 | 33 | 41 | 37 | 0 | 0 | 0 | 100 | 88 | 35 | 100 |
| Courtenay | 2017 | 8338 | 363 | 4.6 | 2 | 3 | 6 | 19 | 22 | 40 | 29 | 0 | 0 | 0 | 100 | 100 | 98 | 100 |
| Duncan | 2017 | 8279 | 359 | 4.4 | 2 | 3 | 6 | 16 | 18 | 30 | 23 | 0 | 0 | 0 | 100 | 96 | 100 | 98 |
| Farmington | 2017 | 584 | 25 | . | . | . | . | . | . | 24 | . | 0 | 0 | 0 | 0 | 0 | 0 | 27 |
| Fort St. John | 2017 | 7714 | 331 | 6.2 | 2 | 3 | 8 | 32 | 39 | 76 | 47 | 0 | 1 | 18 | 98 | 98 | 92 | 75 |
| Hope | 2017 | 8524 | 358 | 5.0 | 2 | 4 | 7 | 16 | 18 | 25 | 23 | 0 | 0 | 0 | 100 | 92 | 100 | 100 |
| Kamloops Aberdeen | 2017 | 8386 | 365 | 2.9 | 1 | 1 | 4 | 15 | 19 | 42 | 24 | 0 | 0 | 1 | 100 | 100 | 100 | 100 |
| Kamloops-Fed. Bldg. | 2017 | 8395 | 365 | 11.3 | 5 | 8 | 16 | 35 | 38 | 57 | 44 | 0 | 0 | 10 | 100 | 100 | 100 | 100 |
| Kelowna | 2017 | 8243 | 356 | 7.6 | 3 | 6 | 11 | 26 | 29 | 44 | 35 | 0 | 0 | 1 | 100 | 97 | 97 | 97 |
| Langdale | 2017 | 8291 | 360 | 5.5 | 3 | 5 | 7 | 16 | 19 | 59 | 26 | 0 | 0 | 1 | 97 | 100 | 100 | 98 |
| Langley | 2017 | 8590 | 363 | 6.1 | 3 | 5 | 8 | 20 | 23 | 42 | 29 | 0 | 0 | 1 | 100 | 99 | 100 | 99 |
| Maple Ridge | 2017 | 8629 | 365 | 8.6 | 4 | 7 | 12 | 27 | 31 | 47 | 38 | 0 | 0 | 2 | 100 | 100 | 100 | 100 |
| Mission | 2017 | 8499 | 356 | 6.9 | 3 | 5 | 9 | 23 | 26 | 40 | 32 | 0 | 0 | 0 | 97 | 98 | 100 | 96 |
| Nanaimo | 2017 | 8336 | 363 | 6.7 | 3 | 5 | 9 | 20 | 23 | 38 | 31 | 0 | 0 | 0 | 98 | 100 | 100 | 100 |
| New Westminster | 2017 | 8377 | 353 | 17.3 | 10 | 17 | 23 | 37 | 40 | 76 | 49 | 0 | 1 | 24 | 100 | 88 | 99 | 100 |
| North Delta | 2017 | 8501 | 359 | 14.1 | 7 | 12 | 20 | 38 | 42 | 53 | 50 | 0 | 0 | 23 | 94 | 99 | 100 | 100 |
| N. Vancouver-Mahon Park | 2017 | 8595 | 364 | 12.7 | 6 | 11 | 18 | 34 | 37 | 53 | 43 | 0 | 0 | 12 | 99 | 100 | 100 | 100 |
| N. Vancouver-2nd Narrows | 2017 | 8415 | 354 | 13.3 | 7 | 11 | 17 | 37 | 41 | 75 | 50 | 0 | 3 | 30 | 98 | 90 | 100 | 100 |

## Summary of 2017 $NO_2$ Data (continued)

| Station | Year | No. Valid Hrs | No. Valid Days | Annual Avg. | Percentiles (1h) | | | | | 1h Max | Annual 98th Percentile of D1HM* | No. Days | | | % Valid Days Per Quarter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 25th | 50th | 75th | 98th | 99th | | | >100 ppb | >60 ppb | >42 ppb | Q1 | Q2 | Q3 | Q4 |
| Pitt Meadows | 2017 | 8539 | 360 | 9.5 | 3 | 8 | 14 | 30 | 33 | 48 | 40 | 0 | 0 | 3 | 99 | 96 | 100 | 100 |
| Port Moody | 2017 | 8601 | 363 | 13.5 | 8 | 12 | 18 | 32 | 35 | 49 | 40 | 0 | 0 | 4 | 99 | 99 | 100 | 100 |
| Powell River Cranberry Lake | 2017 | 7338 | 318 | 2.9 | 1 | 2 | 4 | 12 | 14 | 35 | 21 | 0 | 0 | 0 | 100 | 99 | 100 | 50 |
| Prince George-18th Ave MAML | 2017 | 2637 | 114 | . | . | . | . | . | . | 38 | . | 0 | 0 | 0 | 0 | 0 | 25 | 99 |
| Prince George Plaza 400 | 2017 | 3591 | 155 | . | . | . | . | . | . | 59 | . | 0 | 0 | 7 | 21 | 98 | 51 | 0 |
| Prince Rupert-Fairview | 2017 | 3567 | 154 | . | . | . | . | . | . | 19 | . | 0 | 0 | 0 | 0 | 0 | 72 | 96 |
| Prince Rupert-Pineridge | 2017 | 4707 | 204 | . | . | . | . | . | . | 42 | . | 0 | 0 | 0 | 100 | 99 | 26 | 0 |
| Prince Rupert-Pineridge+Fairview | 2017 | 8274 | 358 | 3.1 | 1 | 2 | 4 | 13 | 15 | 42 | 21 | 0 | 0 | 0 | 100 | 99 | 98 | 96 |
| Quesnel | 2017 | 8267 | 355 | 7.5 | 3 | 6 | 11 | 27 | 30 | 39 | 36 | 0 | 0 | 0 | 100 | 90 | 100 | 99 |
| Richmond South | 2017 | 8494 | 359 | 13.0 | 5 | 11 | 19 | 36 | 39 | 48 | 44 | 0 | 0 | 11 | 97 | 97 | 100 | 100 |
| Rolla | 2017 | 7585 | 326 | 1.8 | 0 | 1 | 3 | 9 | 11 | 31 | 18 | 0 | 0 | 0 | 96 | 99 | 98 | 65 |
| Smithers | 2017 | 8274 | 360 | 5.4 | 1 | 3 | 8 | 21 | 23 | 30 | 29 | 0 | 0 | 0 | 98 | 100 | 99 | 98 |
| Squamish | 2017 | 8663 | 362 | 6.1 | 3 | 5 | 8 | 20 | 22 | 34 | 27 | 0 | 0 | 0 | 97 | 100 | 100 | 100 |
| Surrey | 2017 | 7874 | 331 | 9.3 | 4 | 7 | 13 | 28 | 32 | 57 | 40 | 0 | 0 | 3 | 98 | 99 | 66 | 100 |
| Taylor | 2017 | 8168 | 351 | 3.4 | 1 | 2 | 4 | 18 | 22 | 41 | 28 | 0 | 0 | 0 | 93 | 93 | 98 | 100 |
| Taylor Townsite | 2017 | 4311 | 181 | . | . | . | . | . | . | 48 | . | 0 | 0 | 2 | 0 | 22 | 79 | 96 |
| Terrace | 2017 | 8240 | 354 | 2.6 | 1 | 1 | 3 | 15 | 18 | 29 | 22 | 0 | 0 | 0 | 99 | 99 | 93 | 97 |
| Tsawwassen | 2017 | 8592 | 364 | 7.1 | 3 | 5 | 10 | 26 | 30 | 52 | 37 | 0 | 0 | 2 | 100 | 99 | 100 | 100 |
| Richmond-Airport | 2017 | 8605 | 364 | 15.9 | 8 | 14 | 22 | 42 | 45 | 71 | 52 | 0 | 4 | 37 | 99 | 100 | 100 | 100 |
| Vancouver-Dwtn | 2017 | 8389 | 352 | 19.1 | 13 | 19 | 24 | 36 | 38 | 59 | 46 | 0 | 0 | 19 | 97 | 91 | 100 | 98 |
| Vernon | 2017 | 8283 | 358 | 10.4 | 5 | 8 | 14 | 31 | 33 | 46 | 39 | 0 | 0 | 4 | 96 | 100 | 100 | 97 |
| Victoria | 2017 | 8346 | 365 | 8.2 | 3 | 6 | 12 | 28 | 31 | 54 | 43 | 0 | 0 | 8 | 100 | 100 | 100 | 100 |
| Whistler | 2017 | 8666 | 362 | 4.4 | 1 | 3 | 6 | 17 | 21 | 32 | 26 | 0 | 0 | 0 | 97 | 100 | 100 | 100 |
| Williams Lake | 2017 | 7867 | 341 | 5.8 | 1 | 4 | 8 | 24 | 27 | 38 | 34 | 0 | 0 | 0 | 100 | 100 | 100 | 74 |

*Percentiles of daily 1-hour maximum (D1HM) based on "Guidance on Application of Provincial Air Quality Objectives for $NO_2$" at:
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/no2_aqo-implementation_guide.pdf

## Summary of 2017 $O_3$ Data

| Site | Year | No. Valid Hrs | Annual Avg. | Percentiles (1h) | | | | | 1h Max | Daily 8h Max | | No. Days >63 ppb | Percentage of Valid Days Per Quarter | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25th | 50th | 75th | 98th | 99th | | Annual Max | Annual 4th Highest | | Q1 | Q2 | Q3 | Q4 | Q2+Q3 |
| Abbotsford-Airport | 2017 | 8382 | 22.3 | 11 | 23 | 33 | 48 | 55 | 81 | 67 | 64 | 4 | 92 | 95 | 99 | 92 | 97 |
| Abbotsford-Mill Lake | 2017 | 8488 | 20.7 | 10 | 20 | 30 | 48 | 56 | 84 | 68 | 66 | 5 | 97 | 99 | 96 | 98 | 97 |
| Agassiz | 2017 | 8431 | 20.9 | 10 | 21 | 30 | 51 | 59 | 91 | 73 | 66 | 4 | 100 | 89 | 99 | 97 | 94 |
| Blueberry River | 2017 | 7536 | 29.3 | 22 | 30 | 37 | 50 | 52 | 61 | 58 | 53 | 0 | 97 | 97 | 97 | 61 | 97 |
| Burnaby-Kensington | 2017 | 8635 | 18.5 | 9 | 18 | 27 | 41 | 44 | 83 | 67 | 52 | 1 | 99 | 99 | 99 | 100 | 99 |
| Burnaby-Mtn | 2017 | 8641 | 28.7 | 22 | 29 | 35 | 47 | 52 | 86 | 71 | 66 | 4 | 99 | 100 | 99 | 100 | 99 |
| Burnaby South | 2017 | 8584 | 18.5 | 10 | 19 | 27 | 40 | 43 | 68 | 56 | 46 | 0 | 96 | 99 | 100 | 99 | 99 |
| Castlegar | 2017 | 8253 | 20.6 | 11 | 19 | 29 | 48 | 51 | 64 | 56 | 51 | 0 | 99 | 95 | 96 | 95 | 95 |
| Chilliwack | 2017 | 8487 | 20.7 | 10 | 21 | 30 | 51 | 58 | 88 | 70 | 66 | 6 | 94 | 98 | 99 | 96 | 98 |
| Colwood | 2017 | 8330 | 23.4 | 13 | 24 | 34 | 45 | 47 | 64 | 54 | 50 | 0 | 99 | 99 | 98 | 100 | 98 |
| Coquitlam | 2017 | 6969 | 17.0 | 6 | 16 | 27 | 42 | 46 | 81 | 63 | 50 | 0 | 100 | 87 | 35 | 98 | 61 |
| Courtenay | 2017 | 8038 | 19.7 | 9 | 21 | 29 | 42 | 44 | 78 | 60 | 48 | 0 | 99 | 99 | 98 | 86 | 98 |
| Duncan | 2017 | 8271 | 19.2 | 7 | 19 | 30 | 45 | 49 | 78 | 64 | 54 | 1 | 99 | 95 | 99 | 97 | 97 |
| Farmington Community Hall | 2017 | 582 | . | . | . | . | . | . | 47 | 45 | . | 0 | 0 | 0 | 0 | 27 | 0 |
| Fort St. John | 2017 | 8207 | 25.7 | 19 | 26 | 33 | 46 | 48 | 56 | 53 | 50 | 0 | 97 | 98 | 92 | 98 | 95 |
| Hope | 2017 | 8421 | 21.1 | 9 | 21 | 31 | 52 | 60 | 94 | 79 | 72 | 7 | 96 | 91 | 100 | 100 | 96 |
| Kamloops-Fed. Bldg. | 2017 | 8392 | 21.6 | 11 | 22 | 32 | 48 | 51 | 82 | 63 | 55 | 1 | 100 | 100 | 98 | 100 | 99 |
| Kelowna | 2017 | 8268 | 24.9 | 16 | 25 | 34 | 49 | 54 | 75 | 66 | 58 | 1 | 100 | 97 | 96 | 97 | 96 |
| Langley | 2017 | 8526 | 22.1 | 13 | 23 | 32 | 45 | 50 | 79 | 67 | 61 | 3 | 100 | 99 | 99 | 98 | 99 |
| Maple Ridge | 2017 | 8326 | 21.0 | 10 | 21 | 31 | 48 | 56 | 91 | 72 | 68 | 6 | 84 | 99 | 100 | 99 | 99 |
| Mission | 2017 | 8571 | 23.5 | 15 | 24 | 32 | 52 | 60 | 94 | 80 | 70 | 6 | 99 | 99 | 100 | 97 | 99 |
| Nanaimo | 2017 | 8358 | 22.4 | 16 | 23 | 29 | 40 | 42 | 65 | 57 | 46 | 0 | 100 | 100 | 99 | 99 | 99 |
| New Westminster | 2017 | 8380 | 13.9 | 2 | 11 | 23 | 42 | 44 | 74 | 60 | 51 | 0 | 97 | 89 | 98 | 100 | 93 |
| North Delta | 2017 | 8535 | 18.5 | 9 | 18 | 28 | 41 | 44 | 69 | 60 | 46 | 0 | 93 | 100 | 99 | 100 | 99 |
| N. Vancouver-Mahon Park | 2017 | 8613 | 17.7 | 8 | 18 | 26 | 42 | 45 | 75 | 63 | 48 | 0 | 97 | 99 | 100 | 100 | 99 |
| North Vancouver Second Narrows | 2017 | 8349 | 15.9 | 7 | 15 | 24 | 38 | 41 | 76 | 61 | 42 | 0 | 97 | 89 | 95 | 99 | 92 |
| Pitt Meadows | 2017 | 8325 | 18.9 | 6 | 19 | 30 | 45 | 50 | 81 | 66 | 61 | 1 | 94 | 93 | 98 | 91 | 96 |
| Port Moody | 2017 | 8588 | 14.6 | 3 | 13 | 24 | 40 | 44 | 79 | 62 | 53 | 0 | 97 | 99 | 99 | 100 | 99 |

## Summary of 2017 $O_3$ Data (continued)

| Site | Year | No. Valid Hrs | Annual Avg. | Percentiles (1h) | | | | | 1h Max | Daily 8h Max | | No. Days >63 ppb | Percentage of Valid Days Per Quarter | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25th | 50th | 75th | 98th | 99th | | Annual Max | Annual 4th Highest | | Q1 | Q2 | Q3 | Q4 | Q2+Q3 |
| Prince George 18th Avenue MAML | 2017 | 2646 | . | . | . | . | . | . | 39 | 37 | . | 0 | 0 | 0 | 25 | 99 | 13 |
| Prince George-Plaza 400 | 2017 | 5312 | . | . | . | . | . | . | 53 | 52 | 50 | 0 | 97 | 98 | 54 | 0 | 76 |
| Prince George | 2017 | 7958 | 21.4 | 9 | 22 | 33 | 46 | 47 | 53 | 52 | 50 | 0 | 97 | 98 | 79 | 99 | 89 |
| Quesnel | 2017 | 8383 | 19.4 | 7 | 18 | 30 | 47 | 49 | 70 | 55 | 50 | 0 | 100 | 97 | 100 | 99 | 98 |
| Richmond South | 2017 | 8520 | 17.6 | 5 | 17 | 28 | 43 | 45 | 74 | 65 | 49 | 1 | 99 | 97 | 99 | 97 | 98 |
| Rolla | 2017 | 7601 | 31.2 | 25 | 31 | 38 | 48 | 51 | 60 | 56 | 53 | 0 | 97 | 97 | 92 | 64 | 95 |
| Smithers | 2017 | 8232 | 17.4 | 5 | 16 | 28 | 44 | 46 | 55 | 52 | 50 | 0 | 99 | 91 | 98 | 99 | 95 |
| Squamish | 2017 | 8557 | 19.3 | 9 | 19 | 29 | 42 | 45 | 79 | 64 | 52 | 2 | 99 | 99 | 91 | 97 | 95 |
| Surrey | 2017 | 7831 | 21.4 | 12 | 22 | 30 | 45 | 48 | 77 | 68 | 53 | 1 | 98 | 97 | 61 | 100 | 79 |
| Taylor-Golf Course | 2017 | 8271 | 26.0 | 19 | 27 | 34 | 46 | 48 | 61 | 56 | 51 | 0 | 92 | 98 | 97 | 98 | 97 |
| Taylor Townsite | 2017 | 3871 | . | . | . | . | . | . | 54 | 47 | . | 0 | 0 | 7 | 76 | 97 | 42 |
| Terrace | 2017 | 8267 | 20.4 | 11 | 21 | 30 | 42 | 43 | 48 | 45 | 44 | 0 | 99 | 97 | 93 | 96 | 95 |
| Tsawwassen | 2017 | 8512 | 24.0 | 17 | 25 | 32 | 44 | 47 | 70 | 59 | 52 | 0 | 99 | 96 | 97 | 98 | 96 |
| Richmond-Airport | 2017 | 8616 | 16.8 | 6 | 17 | 26 | 39 | 41 | 75 | 63 | 43 | 0 | 98 | 100 | 100 | 99 | 100 |
| Vancouver-Dwtn | 2017 | 8414 | 8.6 | 2 | 7 | 13 | 28 | 31 | 64 | 47 | 36 | 0 | 99 | 85 | 98 | 96 | 91 |
| Vernon | 2017 | 8283 | 19.6 | 8 | 18 | 30 | 45 | 49 | 66 | 56 | 53 | 0 | 96 | 100 | 100 | 97 | 100 |
| Victoria | 2017 | 8357 | 21.9 | 13 | 22 | 31 | 43 | 45 | 60 | 48 | 46 | 0 | 99 | 99 | 99 | 99 | 99 |
| Whistler | 2017 | 8706 | 21.8 | 10 | 22 | 33 | 47 | 50 | 68 | 62 | 58 | 0 | 97 | 100 | 100 | 99 | 100 |
| Williams Lake | 2017 | 8058 | 21.0 | 11 | 21 | 31 | 44 | 46 | 64 | 54 | 49 | 0 | 99 | 100 | 99 | 83 | 99 |

## Summary of 2017 $PM_{2.5}$ Data

| Site | Year | No. Valid Hrs | Annual Avg. of 1h Values | Percentiles (1h) | | | | | Max 1h Value | No. Valid Days | 24h Average | | | No. Days | | Percentage of Valid Days Per Quarter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25th | 50th | 75th | 98th | 99th | | | Annual Average | Annual 98th Percentile* | Annual Max | >25 µg/m3 | >28 µg/m3 | Q1 | Q2 | Q3 | Q4 |
| Abbotsford-Airport | 2017 | 7561 | 6.2 | 2 | 4 | 7 | 36 | 45 | 123 | 313 | 6.3 | 33 | 66 | 10 | 9 | 73 | 98 | 100 | 72 |
| Abbotsford-Mill Lake | 2017 | 8507 | 6.7 | 3 | 5 | 8 | 38 | 47 | 140 | 353 | 6.7 | 37 | 58 | 11 | 11 | 100 | 99 | 88 | 100 |
| Agassiz | 2017 | 8666 | 7.1 | 2 | 4 | 7 | 53 | 68 | 164 | 359 | 7.0 | 56 | 99 | 14 | 13 | 98 | 98 | 98 | 100 |
| Burnaby-Kensington | 2017 | 8603 | 6.4 | 2 | 4 | 6 | 46 | 57 | 124 | 357 | 6.4 | 46 | 68 | 13 | 13 | 98 | 100 | 98 | 96 |
| Burnaby South | 2017 | 8369 | 6.0 | 2 | 4 | 7 | 33 | 46 | 110 | 347 | 6.0 | 32 | 54 | 12 | 11 | 99 | 90 | 92 | 99 |
| Burns Lake | 2017 | 8323 | 7.3 | 2 | 4 | 9 | 34 | 43 | 101 | 341 | 7.2 | 26 | 35 | 7 | 4 | 100 | 99 | 96 | 79 |
| Castlegar | 2017 | 6588 | . | . | . | . | . | . | 149 | 272 | . | 50 | 98 | 23 | 21 | 100 | 96 | 99 | 4 |
| Chilliwack | 2017 | 8647 | 6.9 | 2 | 4 | 7 | 51 | 61 | 160 | 358 | 6.9 | 49 | 88 | 15 | 15 | 99 | 99 | 100 | 95 |
| Colwood | 2017 | 8700 | 6.5 | 2 | 5 | 8 | 30 | 36 | 89 | 365 | 6.5 | 24 | 47 | 7 | 6 | 100 | 100 | 100 | 100 |
| Courtenay | 2017 | 8658 | 10.2 | 2 | 5 | 12 | 52 | 59 | 111 | 362 | 10.2 | 34 | 74 | 34 | 23 | 98 | 100 | 99 | 100 |
| Crofton Georgia Hts | 2017 | 8350 | 6.5 | 2 | 4 | 7 | 37 | 47 | 81 | 348 | 6.4 | 37 | 49 | 13 | 11 | 99 | 100 | 93 | 89 |
| Crofton-Substation | 2017 | 8335 | 6.4 | 2 | 5 | 8 | 34 | 44 | 79 | 355 | 6.4 | 33 | 49 | 11 | 10 | 96 | 100 | 95 | 99 |
| Duncan-Cairnsmore | 2017 | 8455 | 8.8 | 2 | 5 | 11 | 39 | 44 | 70 | 352 | 8.8 | 32 | 39 | 26 | 14 | 99 | 97 | 90 | 100 |
| Duncan-Deykin | 2017 | 8373 | 7.8 | 3 | 5 | 9 | 35 | 44 | 110 | 349 | 7.8 | 38 | 48 | 13 | 12 | 98 | 95 | 95 | 96 |
| Campbell River | 2017 | 8334 | 7.9 | 3 | 6 | 9 | 35 | 43 | 103 | 347 | 7.9 | 25 | 60 | 7 | 4 | 100 | 88 | 100 | 92 |
| Fort St John 85th Avenue | 2017 | 7384 | . | . | . | . | . | . | 155 | 305 | . | . | 39 | 4 | 2 | 80 | 59 | 97 | 98 |
| Fort St. John-Key Learning Centre | 2017 | 7807 | 5.9 | 2 | 4 | 7 | 24 | 31 | 296 | 322 | 5.9 | 18 | 49 | 4 | 3 | 98 | 67 | 100 | 88 |
| Fort St. John-Old Fort | 2017 | 8034 | 4.4 | 1 | 3 | 5 | 21 | 27 | 86 | 336 | 4.5 | 16 | 32 | 3 | 2 | 81 | 95 | 92 | 100 |
| Gibsons Municipal Hall | 2017 | 4183 | . | . | . | . | . | . | 94 | 171 | . | 50 | 61 | 12 | 12 | . | 1 | 97 | 88 |
| Golden | 2017 | 8648 | 11.8 | 3 | 6 | 13 | 71 | 94 | 209 | 361 | 11.8 | 63 | 118 | 31 | 28 | 100 | 96 | 100 | 100 |
| Grand Forks | 2017 | 8068 | 11.8 | 4 | 7 | 15 | 52 | 58 | 226 | 335 | 11.7 | 45 | 104 | 33 | 26 | 74 | 100 | 92 | 100 |
| Harmac | 2017 | 8489 | 8.1 | 2 | 5 | 10 | 42 | 51 | 99 | 361 | 8.0 | 34 | 50 | 17 | 13 | 100 | 100 | 100 | 96 |
| Hope | 2017 | 8579 | 7.5 | 2 | 4 | 7 | 61 | 87 | 158 | 353 | 7.5 | 63 | 97 | 16 | 16 | 100 | 88 | 99 | 100 |
| Horseshoe Bay | 2017 | 8530 | 5.1 | 2 | 3 | 5 | 40 | 50 | 123 | 352 | 5.1 | 40 | 70 | 12 | 12 | 93 | 99 | 98 | 96 |
| Houston | 2017 | 8714 | 9.3 | 2 | 4 | 10 | 55 | 69 | 133 | 363 | 9.3 | 30 | 63 | 20 | 12 | 100 | 98 | 100 | 100 |
| Kamloops-Aberdeen | 2017 | 8742 | 13.0 | 1 | 3 | 6 | 159 | 219 | 383 | 365 | 13.0 | 158 | 211 | 31 | 31 | 100 | 100 | 100 | 100 |

## Summary of 2017 $PM_{2.5}$ Data (continued)

| Site | Year | No. Valid Hrs | Annual Avg. of 1h Values | Percentiles (1h) | | | | | Max 1h Value | No. Valid Days | 24h Average | | | No. Days | | Percentage of Valid Days Per Quarter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25th | 50th | 75th | 98th | 99th | | | Annual Average | Annual 98th Percentile* | Annual Max | >25 µg/m3 | >28 µg/m3 | Q1 | Q2 | Q3 | Q4 |
| Kamloops-Fed. Bldg. | 2017 | 8601 | 15.3 | 3 | 6 | 11 | 135 | 180 | 862 | 361 | 15.3 | 130 | 274 | 34 | 33 | 100 | 100 | 100 | 96 |
| Kelowna | 2017 | 3583 | . | . | . | . | . | . | 42 | 149 | . | . | 20 | 0 | 0 | 98 | 67 | 0 | 0 |
| Kitimat-Haisla** | 2017 | 8689 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Kitimat-Haul Rd | 2017 | 8583 | 3.6 | 1 | 3 | 5 | 15 | 18 | 84 | 364 | 3.6 | 12 | 18 | 0 | 0 | 100 | 100 | 99 | 100 |
| Kitimat-Riverlodge | 2017 | 8716 | 4.3 | 2 | 4 | 6 | 14 | 16 | 47 | 365 | 4.3 | 11 | 14 | 0 | 0 | 100 | 100 | 100 | 100 |
| Kitimat-Whitesail** | 2017 | 8695 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Langdale | 2017 | 8344 | 9.3 | 4 | 7 | 10 | 55 | 67 | 202 | 345 | 9.3 | 57 | 71 | 12 | 12 | 93 | 86 | 100 | 99 |
| Langley | 2017 | 8673 | 6.5 | 2 | 4 | 7 | 37 | 46 | 262 | 361 | 6.5 | 33 | 49 | 11 | 10 | 100 | 99 | 100 | 97 |
| Lavington | 2017 | 8536 | 11.5 | 3 | 7 | 13 | 71 | 82 | 156 | 358 | 11.5 | 67 | 85 | 32 | 29 | 100 | 93 | 100 | 99 |
| Mission | 2017 | 7518 | . | . | . | . | . | . | 112 | 312 | . | 47 | 70 | 13 | 13 | 57 | 88 | 100 | 97 |
| Nanaimo | 2017 | 8439 | 5.9 | 2 | 4 | 7 | 36 | 48 | 100 | 354 | 5.9 | 38 | 53 | 11 | 11 | 94 | 100 | 100 | 93 |
| Nelson | 2017 | 1729 | . | . | . | . | . | . | 205 | 70 | . | 148 | 159 | 25 | 24 | 0 | 0 | 75 | 1 |
| New Westminster | 2017 | 8508 | 7.5 | 3 | 5 | 9 | 35 | 49 | 98 | 352 | 7.5 | 35 | 53 | 11 | 11 | 100 | 88 | 99 | 99 |
| North Delta | 2017 | 8588 | 6.8 | 3 | 5 | 8 | 33 | 42 | 72 | 357 | 6.8 | 32 | 45 | 12 | 10 | 94 | 100 | 97 | 100 |
| N. Vancouver-Mahon Park | 2017 | 8630 | 6.3 | 2 | 4 | 6 | 47 | 62 | 121 | 357 | 6.3 | 48 | 66 | 13 | 13 | 100 | 95 | 97 | 100 |
| N. Vancouver-2nd Narrows | 2017 | 8387 | 7.7 | 3 | 5 | 8 | 50 | 59 | 117 | 345 | 7.7 | 51 | 70 | 13 | 13 | 93 | 89 | 98 | 98 |
| Peace Valley | 2017 | 8143 | 3.5 | 1 | 2 | 4 | 18 | 24 | 125 | 335 | 3.5 | 17 | 33 | 2 | 2 | 92 | 88 | 96 | 91 |
| Pitt Meadows | 2017 | 8635 | 6.1 | 2 | 4 | 7 | 38 | 47 | 99 | 360 | 6.1 | 39 | 59 | 12 | 12 | 98 | 98 | 100 | 99 |
| Port Alberni-Elem. School | 2017 | 7490 | 9.9 | 3 | 6 | 12 | 44 | 50 | 85 | 313 | 9.9 | 33 | 44 | 24 | 16 | 100 | 100 | 71 | 73 |
| Port Alberni-Port | 2017 | 1584 | . | . | . | . | . | . | 63 | 65 | . | . | 24 | 0 | 0 | 0 | 0 | 0 | 71 |
| Port Moody | 2017 | 8623 | 7.1 | 3 | 5 | 8 | 48 | 57 | 119 | 357 | 7.0 | 45 | 75 | 12 | 12 | 98 | 98 | 96 | 100 |
| Powell River-James Thomson | 2017 | 7916 | 3.1 | 0 | 1 | 3 | 27 | 41 | 75 | 333 | 3.0 | 28 | 57 | 7 | 7 | 84 | 100 | 87 | 93 |
| Powell River-Wildwood | 2017 | 7902 | 3.6 | 0 | 2 | 3 | 36 | 50 | 110 | 330 | 3.5 | 35 | 67 | 11 | 10 | 64 | 100 | 97 | 100 |
| Prince George 18th Avenue MAML | 2017 | 2741 | . | . | . | . | . | . | 85 | 115 | . | . | 30 | 1 | 1 | 0 | 0 | 25 | 100 |
| Prince George Plaza 400 | 2017 | 5581 | . | . | . | . | . | . | 1433 | 231 | . | 54 | 282 | 15 | 15 | 98 | 99 | 58 | 0 |

## Summary of 2017 $PM_{2.5}$ Data (continued)

| Site | Year | No. Valid Hrs | Annual Avg. of 1h Values | Percentiles (1h) | | | | | Max 1h Value | No. Valid Days | 24h Average | | | No. Days | | Percentage of Valid Days Per Quarter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25th | 50th | 75th | 98th | 99th | | | Annual Average | Annual 98th Percentile* | Annual Max | >25 µg/m3 | >28 µg/m3 | Q1 | Q2 | Q3 | Q4 |
| Prince George-Plaza+18th Ave | 2017 | 8322 | 10.1 | 3 | 5 | 11 | 45 | 74 | 1433 | 346 | 10.1 | 48 | 282 | 16 | 16 | 98 | 99 | 83 | 100 |
| Prince Rupert-Fairview | 2017 | 3801 | . | . | . | . | . | . | 27 | 158 | . | . | 16 | 0 | 0 | 0 | 0 | 72 | 100 |
| Prince Rupert-Pineridge | 2017 | 4874 | . | . | . | . | . | . | 126 | 201 | . | . | 9 | 0 | 0 | 97 | 99 | 26 | 0 |
| Prince Rupert-Pineridge+Fairview | 2017 | 8675 | 3.1 | 0 | 2 | 5 | 12 | 14 | 126 | 359 | 3.1 | 8 | 16 | 0 | 0 | 97 | 99 | 98 | 100 |
| Quesnel | 2017 | 8725 | 14.2 | 4 | 8 | 15 | 88 | 127 | 284 | 363 | 14.2 | 74 | 173 | 34 | 30 | 100 | 98 | 100 | 100 |
| Richmond-Airport | 2017 | 8712 | 6.2 | 3 | 4 | 8 | 26 | 33 | 75 | 364 | 6.2 | 22 | 37 | 6 | 4 | 99 | 100 | 100 | 100 |
| Richmond South | 2017 | 8260 | 6.4 | 3 | 5 | 8 | 26 | 36 | 66 | 338 | 6.3 | 20 | 37 | 4 | 4 | 98 | 90 | 83 | 100 |
| Smithers | 2017 | 8708 | 8.3 | 2 | 4 | 10 | 44 | 53 | 129 | 365 | 8.4 | 35 | 63 | 14 | 11 | 100 | 100 | 100 | 100 |
| Squamish | 2017 | 8302 | 7.2 | 2 | 4 | 7 | 65 | 80 | 159 | 346 | 7.2 | 69 | 98 | 13 | 12 | 96 | 87 | 98 | 99 |
| Surrey | 2017 | 7872 | 5.8 | 3 | 4 | 7 | 21 | 26 | 62 | 325 | 5.8 | 17 | 32 | 3 | 2 | 96 | 96 | 65 | 100 |
| Taylor | 2017 | 5843 | . | . | . | . | . | . | 68 | 241 | . | . | 36 | 3 | 2 | 93 | 26 | 45 | 100 |
| Terrace | 2017 | 7820 | 6.4 | 2 | 4 | 8 | 29 | 34 | 131 | 327 | 6.4 | 19 | 35 | 1 | 1 | 62 | 100 | 96 | 100 |
| Tsawwassen | 2017 | 8415 | 5.0 | 2 | 3 | 6 | 24 | 33 | 98 | 348 | 5.0 | 23 | 34 | 5 | 4 | 99 | 100 | 89 | 93 |
| Valemount | 2017 | 8323 | 17.2 | 2 | 5 | 14 | 141 | 200 | 422 | 342 | 17.4 | 98 | 140 | 63 | 54 | 98 | 77 | 100 | 100 |
| Vanderhoof | 2017 | 8485 | 10.1 | 3 | 6 | 12 | 47 | 59 | 626 | 353 | 10.1 | 47 | 92 | 24 | 20 | 98 | 96 | 97 | 97 |
| Vernon | 2017 | 8304 | 11.4 | 4 | 7 | 12 | 70 | 79 | 162 | 343 | 11.5 | 69 | 82 | 32 | 28 | 92 | 96 | 98 | 90 |
| Victoria | 2017 | 8571 | 7.2 | 2 | 5 | 9 | 32 | 38 | 74 | 357 | 7.2 | 24 | 42 | 6 | 2 | 100 | 100 | 93 | 98 |
| Whistler | 2017 | 7482 | 10.9 | 3 | 6 | 11 | 79 | 110 | 225 | 319 | 10.8 | 87 | 143 | 15 | 13 | 100 | 80 | 75 | 95 |
| Williams Lake | 2017 | 8413 | 19.9 | 3 | 7 | 14 | 159 | 270 | 946 | 350 | 19.9 | 200 | 294 | 48 | 45 | 100 | 100 | 100 | 84 |

*Percentile of 24h average concentrations based on approach outlined in "Guidance Document on Achievement Determination. Canadian Ambient Air Quality Objectives for Fine Particulate Matter and Ozone" at: https://www.ccme.ca/files/Resources/air/aqms/pn_1483_gdad_eng.pdf

**Kitimat-Haisla and Whitesail data are currently under review for monitoring issues

## Summary of 2017 $SO_2$ Data

| Site | Year | No. Valid Hrs | Annual Avg. | Percentile (1h) 25th | 50th | 75th | 98th | 99th | Max | No. Valid Days | Percentile (D1HM)* 97.5th | 98th | 99th | No. of Days >75 ppb | >70 ppb | Percentage of Valid Days Per Quarter Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abbotsford-Airport | 2017 | 8401 | 0.1 | 0 | 0 | 0 | 1 | 1 | 4 | 356 | 2 | 2 | 3 | 0 | 0 | 100 | 97 | 100 | 93 |
| Abbotsford-Mill Lake | 2017 | 8469 | 0.2 | 0 | 0 | 0 | 1 | 1 | 6 | 359 | 3 | 3 | 4 | 0 | 0 | 99 | 99 | 96 | 100 |
| Bessborough | 2017 | 8286 | 0.4 | 0 | 0 | 0 | 2 | 2 | 15 | 358 | 6 | 6 | 9 | 0 | 0 | 98 | 99 | 99 | 97 |
| Blueberry River | 2017 | 6278 | . | . | . | . | . | . | 18 | 269 | . | . | . | 0 | 0 | 37 | 98 | 100 | 60 |
| Burnaby North | 2017 | 8626 | 1.1 | 0 | 1 | 1 | 7 | 9 | 28 | 363 | 16 | 17 | 19 | 0 | 0 | 99 | 99 | 100 | 100 |
| Burnaby South | 2017 | 8543 | 0.3 | 0 | 0 | 0 | 2 | 2 | 9 | 362 | 4 | 4 | 6 | 0 | 0 | 97 | 100 | 100 | 100 |
| Burnaby-Capitol Hill | 2017 | 8606 | 0.9 | 0 | 0 | 1 | 7 | 15 | 123 | 362 | 41 | 43 | 74 | 3 | 4 | 100 | 97 | 100 | 100 |
| Burnaby-Kensington | 2017 | 8605 | 0.3 | 0 | 0 | 0 | 2 | 3 | 13 | 362 | 5 | 5 | 7 | 0 | 0 | 97 | 100 | 100 | 100 |
| Castlegar | 2017 | 8191 | 2.6 | 0 | 0 | 1 | 26 | 32 | 76 | 354 | 44 | 46 | 56 | 1 | 1 | 100 | 98 | 99 | 91 |
| Chilliwack | 2017 | 8520 | 0.1 | 0 | 0 | 0 | 1 | 1 | 4 | 360 | 3 | 3 | 4 | 0 | 0 | 100 | 99 | 100 | 96 |
| Colwood | 2017 | 419 | . | . | . | . | . | . | 2 | 18 | . | . | . | 0 | 0 | 20 | 0 | 0 | 0 |
| Crofton-Georgia Hts | 2017 | 8038 | 2.2 | 0 | 1 | 1 | 18 | 28 | 133 | 350 | 65 | 70 | 78 | 6 | 6 | 99 | 100 | 100 | 85 |
| Farmington | 2017 | 585 | . | . | . | . | . | . | 3 | 25 | . | . | . | 0 | 0 | 0 | 0 | 0 | 27 |
| Fort St John-Key Learning Centre | 2017 | 7867 | 0.3 | 0 | 0 | 0 | 2 | 2 | 13 | 340 | 3 | 4 | 5 | 0 | 0 | 98 | 100 | 75 | 100 |
| Kamloops-Fed. Bldg. | 2017 | 8393 | 0.5 | 0 | 0 | 1 | 2 | 3 | 14 | 365 | 7 | 8 | 10 | 0 | 0 | 100 | 100 | 100 | 100 |
| Kelowna | 2017 | 7870 | 0.3 | 0 | 0 | 0 | 1 | 1 | 7 | 335 | 2 | 2 | 2 | 0 | 0 | 100 | 91 | 80 | 96 |
| Kitimat Riverlodge | 2017 | 8366 | 0.4 | 0 | 0 | 0 | 3 | 6 | 45 | 365 | 17 | 17 | 28 | 0 | 0 | 100 | 100 | 100 | 100 |
| Kitimat-Haisla | 2017 | 8119 | 0.3 | 0 | 0 | 0 | 2 | 4 | 14 | 351 | 6 | 7 | 12 | 0 | 0 | 100 | 100 | 97 | 88 |
| Kitimat-Haul Rd | 2017 | 8377 | 3.8 | 0 | 1 | 3 | 30 | 39 | 95 | 365 | 56 | 58 | 66 | 1 | 1 | 100 | 100 | 100 | 100 |
| Kitimat-Whitesail | 2017 | 8347 | 0.4 | 0 | 0 | 0 | 3 | 5 | 41 | 364 | 13 | 15 | 21 | 0 | 0 | 100 | 100 | 100 | 99 |
| Langdale | 2017 | 8342 | 0.7 | 0 | 1 | 1 | 4 | 5 | 29 | 362 | 8 | 8 | 10 | 0 | 0 | 100 | 100 | 100 | 97 |
| Langley | 2017 | 8553 | 0.2 | 0 | 0 | 0 | 1 | 1 | 4 | 360 | 2 | 3 | 4 | 0 | 0 | 100 | 97 | 100 | 98 |
| N. Vancouver-2nd Narrows | 2017 | 8376 | 0.5 | 0 | 0 | 1 | 2 | 3 | 12 | 353 | 7 | 7 | 8 | 0 | 0 | 97 | 90 | 100 | 100 |
| N. Vancouver-Mahon Park | 2017 | 8207 | 0.4 | 0 | 0 | 0 | 2 | 2 | 5 | 346 | 4 | 4 | 4 | 0 | 0 | 99 | 100 | 83 | 98 |
| Pitt Meadows | 2017 | 8350 | 0.4 | 0 | 0 | 1 | 2 | 3 | 11 | 352 | 4 | 4 | 4 | 0 | 0 | 99 | 97 | 100 | 90 |
| Port Alberni | 2017 | 1620 | . | . | . | . | . | . | 3 | 70 | . | . | . | 0 | 0 | 78 | 0 | 0 | 0 |
| Port Moody | 2017 | 8540 | 0.4 | 0 | 0 | 0 | 3 | 4 | 11 | 363 | 5 | 5 | 5 | 0 | 0 | 100 | 100 | 100 | 98 |
| Prince George-18th Ave MAML | 2017 | 1906 | . | . | . | . | . | . | 34 | 79 | . | . | . | 0 | 0 | 0 | 0 | 0 | 86 |

## Summary of 2017 $SO_2$ Data (continued)

| Site | Year | No. Valid Hrs | Annual Avg. | Percentile (1h) | | | | | Max | No. Valid Days | Percentile (D1HM)* | | | No. of Days | | Percentage of Valid Days Per Quarter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25th | 50th | 75th | 98th | 99th | | | 97.5th | 98th | 99th | >75 ppb | >70 ppb | Q1 | Q2 | Q3 | Q4 |
| Prince George-CBC Transmitter | 2017 | 8184 | 3.6 | 0 | 0 | 2 | 31 | 42 | 221 | 352 | 104 | 105 | 116 | 18 | 20 | 93 | 96 | 97 | 100 |
| Prince George-Jail | 2017 | 8316 | 3.3 | 0 | 0 | 2 | 30 | 36 | 135 | 361 | 55 | 57 | 76 | 4 | 4 | 100 | 99 | 97 | 100 |
| Prince George-Plaza 400 | 2017 | 5275 | . | . | . | . | . | . | 90 | 227 | . | . | . | 1 | 2 | 98 | 97 | 55 | 0 |
| Prince George-Plaza + 18th Ave | 2017 | 7181 | . | . | . | . | . | . | 90 | 306 | . | . | . | 1 | 2 | 98 | 97 | 55 | 86 |
| Prince Rupert-Fairview Container | 2017 | 3644 | . | . | . | . | . | . | 1 | 158 | . | . | . | 0 | 0 | 0 | 0 | 72 | 100 |
| Prince Rupert-Pineridge Elem. | 2017 | 4684 | . | . | . | . | . | . | 1 | 202 | . | . | . | 0 | 0 | 98 | 99 | 26 | 0 |
| Prince Rupert-Pineridge+Fairview | 2017 | 8328 | 0.1 | 0 | 0 | 0 | 0 | 0 | 1 | 360 | 1 | 1 | 1 | 0 | 0 | 98 | 99 | 98 | 100 |
| Quesnel | 2017 | 8323 | 0.2 | 0 | 0 | 0 | 1 | 2 | 10 | 361 | 5 | 6 | 7 | 0 | 0 | 100 | 96 | 100 | 100 |
| Richmond South | 2017 | 8242 | 0.3 | 0 | 0 | 0 | 2 | 2 | 9 | 348 | 5 | 5 | 5 | 0 | 0 | 84 | 97 | 100 | 100 |
| Richmond-Airport | 2017 | 8589 | 0.4 | 0 | 0 | 1 | 2 | 2 | 8 | 364 | 4 | 4 | 5 | 0 | 0 | 100 | 100 | 100 | 99 |
| Rolla | 2017 | 6253 | . | . | . | . | . | . | 41 | 271 | . | . | . | 0 | 0 | 93 | 99 | 55 | 50 |
| Squamish | 2017 | 8485 | 0.6 | 0 | 0 | 1 | 2 | 3 | 18 | 360 | 6 | 7 | 11 | 0 | 0 | 100 | 98 | 100 | 97 |
| Taylor-Golf Course | 2017 | 8253 | 0.5 | 0 | 0 | 0 | 3 | 6 | 82 | 354 | 15 | 17 | 28 | 1 | 1 | 96 | 99 | 93 | 100 |
| Taylor-S. Hill | 2017 | 8223 | 0.3 | 0 | 0 | 0 | 2 | 4 | 40 | 357 | 14 | 15 | 18 | 0 | 0 | 92 | 100 | 100 | 99 |
| Taylor-Townsite | 2017 | 8261 | 0.7 | 0 | 0 | 0 | 7 | 12 | 56 | 360 | 26 | 27 | 39 | 0 | 0 | 99 | 98 | 99 | 99 |
| Terrace | 2017 | 8258 | 0.5 | 0 | 0 | 1 | 3 | 3 | 8 | 359 | 5 | 5 | 6 | 0 | 0 | 100 | 98 | 96 | 100 |
| Trail-Birchbank | 2017 | 8162 | 8.9 | 0 | 1 | 9 | 62 | 79 | 354 | 348 | 137 | 154 | 194 | 50 | 56 | 100 | 89 | 95 | 98 |
| Trail-Butler Park | 2017 | 8198 | 11.4 | 1 | 3 | 9 | 95 | 130 | 395 | 357 | 243 | 261 | 303 | 117 | 124 | 100 | 92 | 95 | 98 |
| Trail-Columbia Gdns | 2017 | 8207 | 5.4 | 0 | 1 | 6 | 37 | 48 | 124 | 356 | 75 | 75 | 90 | 7 | 11 | 91 | 99 | 100 | 100 |
| Trail-Warfield | 2017 | 8189 | 10.1 | 0 | 1 | 6 | 96 | 136 | 386 | 354 | 249 | 255 | 332 | 106 | 117 | 100 | 92 | 95 | 98 |
| Tsawwassen | 2017 | 8524 | 0.4 | 0 | 0 | 1 | 1 | 2 | 15 | 365 | 3 | 4 | 7 | 0 | 0 | 100 | 100 | 100 | 100 |
| Vancouver-Dwtn | 2017 | 8060 | 0.5 | 0 | 0 | 1 | 2 | 3 | 9 | 339 | 6 | 7 | 7 | 0 | 0 | 89 | 91 | 100 | 91 |
| Victoria-James Bay | 2017 | 8695 | 0.1 | 0 | 0 | 0 | 1 | 1 | 5 | 362 | 2 | 2 | 3 | 0 | 0 | 100 | 98 | 100 | 99 |
| Victoria-Topaz | 2017 | 8356 | 0.4 | 0 | 0 | 1 | 2 | 3 | 10 | 364 | 4 | 5 | 6 | 0 | 0 | 99 | 100 | 100 | 100 |
| Williams Lake | 2017 | 7854 | 0.3 | 0 | 0 | 0 | 1 | 1 | 3 | 341 | 2 | 2 | 2 | 0 | 0 | 99 | 100 | 100 | 75 |

*Percentiles of daily 1-hour maximum (D1HM) based on "Guidance on Application of Provincial Air Quality Objectives for $SO_2$" at:
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/so2_aqo-implementation_guide.pdf