Community Guide to Wildfire Smoke and Health

HEALTH EFFECTS AND EXPOSURE REDUCTION RESOURCES
VERSION 2.1

Calgary Region Airshed Zone | 2024

Overview

Over the past few years, residents of the Province of Alberta have experienced increased smoke exposure as a result of severe wildfires. This guide has been created to support communities during smoke and poor air quality events.

The aim of the 'Community Guide to Wildfire Smoke and Health', is to provide consistent Alberta-specific messaging, resources, and information to help municipalities, companies, schools, organizations, and the public to plan for and prepare for wildfire smoke events. The primary focus of the guide are tips and tools for communicating and educating the public about the effects of wildfire smoke on health.

The Community Guide to Wildfire Smoke and Health is intended to be an evolving document. This document and future reversions will be housed on the CRAZ website to ensure that users have access to the most up-to-date information.

The Calgary Region Airshed Zone (CRAZ) was established in 2007 to monitor, collect, and analyze air quality data in Calgary and the surrounding region. CRAZ also provides the region with education on air quality monitoring. The CRAZ region covers 74,000 square kilometers. The zone contains several urban centers, rural municipalities, and three First Nations communities. It is home to 1.8 million people.

In collaboration with:

Thank you to all contributors for the wealth of experience and knowledge that made this document a possibility.

Alberta Environment and Parks
Alberta Health Services
Bow Valley Clean Air Society
Calgary Emergency Management Agency
CD Nova
City of Chestermere
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Millennium EMS Solutions Ltd.
Parks Canada
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Town of Black Diamond
Town of Canmore

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Introduction

In Alberta there has been an increased frequency of wildfires and wildfire smoke. This document will cover topics including:

- the composition of smoke,
- fire and air,
- monitoring,
- how smoke can negatively affect a person's health, and
- how to protect yourself during smoke events.

This document is organized into major topics as it pertains to wildfire smoke. The body of the document has a general description of the topic, but by clicking on the 'Resource" link, much more detailed information is available.

1.0 COMPOSITION OF WILDFIRE SMOKE

Wildfire smoke is typically a mixture of water vapor, gases, fine particles, and trace minerals. These come from burning fuels like trees, vegetation, and other organic components. They sometimes come from, building materials. If a wildfire reaches an urban area, the burning of buildings and other urban materials may affect what the smoke is made up of.

Pollution from fine particles are the main public health concern when exposed to wildfire smoke. Particle pollution is also called particulate matter (PM), and the particulate matter of most concern is PM2.5 which is particulate matter less than 2.5 micrometers in size.. The term PM is used to define a mixture of tiny solids, or liquid droplets that include smoke, soot, dirt, and dust found in the air.

Resource 1: Particulate Matter

1.1 STRUCTURAL FIRE SMOKE[1]

Structural fires can have products with carbon and nitrogen in them. This can produce smoke with various concentrations of hydrogen cyanide. Commercial products made up of materials such as wool, paper, cotton, silk and plastics may produce hydrogen cyanide when they burn.

1.2 BIOMASS SMOKE[2]

Burning biomass emits large amounts of pollutants, just like burning other solid fuels such as coal. Burning organic material emits:

- particulate matter (PM)
- nitrogen oxides (NOx)
- carbon monoxide (CO)
- sulfur dioxide (SO_2)
- lead
- mercury
- other hazardous air pollutants (HAPs)

Resource 2: Air Pollutants

1.3 COLOR OF SMOKE

Smoke is the biproduct of the fuels it is burning. The color of the smoke may indicate the type and density of the fuels involved, all of which gives hints as to what the fire might do next.[3]

[1] Hydrogen Cyanide: The Real Killer Among Fire Gases | Firehouse
[2] https://www.pfpi.net/air-pollution-2
[3] Smoke Color Can Depict Fuel Type - RedZone

For more information: Smoke Color Can Depict Fuel Type - RedZone

1.2 MONITORING WILDFIRE SMOKE

The Calgary Region Airshed Zone follows monitoring objectives for the ambient continuous air quality monitoring networks in compliance with Canada-wide and provincial standards. The ambient continuous air monitoring stations allows for the cumulation of data to produce the Air Quality Health Index number for the area.

Low cost sensor monitoring is another tool used with approval from Environment and Climate Change Canada using the Purple Air Sensor. The Purple Air Sensors collect PM 2.5 data, a main concern for health.

What We Monitor | Calgary Region Airshed Zone (craz.ca)

Resource 4: Air Quality Monitoring

3.0 AQHI

The Air Quality Health Index (AQHI) is measured on a scale of 1 (low) to 10+ (very high) and grouped into four health risk groups. Individuals can use the health messages and the risk levels associated with the AQHI to protect their health. You can do this by limiting short-term exposure to air pollution and adjusting your activity levels during increased levels of air pollution. The AQHI also provides advice on how you can improve the quality of the air you breathe. Government of Alberta provides details About the Air Quality Health Index[4]

"Lower the Number, Lower the Risk"

[4] About the Air Quality Health Index | Alberta.ca

Health Risk	Air Quality Health Index	Health Messages	
		At Risk Population	General Population
Low Risk	1 – 3	**Enjoy** your usual outdoor activities.	**Ideal** air quality for outdoor activities.
Moderate Risk	4 – 6	**Consider** reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	**No need to modify** your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High Risk	7 – 10	**Reduce or reschedule** strenuous activities outdoors. Children and the elderly should also take it easy.	**Consider** reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very High Risk	Above 10	**Avoid** strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	**Reduce or reschedule** strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

About the Air Quality Health Index | Alberta.ca

REGIONAL AND PROVINCIAL AQHI

The Calgary Region Airshed Zone website www.craz.ca is a source for air quality information and local AQHI.

The Government of Alberta AQHI interactive map AQHI - Map (alberta.ca) shares AQHI data across the province, real-time data and forecasted AQHI numbers.

Data contained on this website are automatically polled every hour from Alberta Environment and Parks and Airshed organization monitoring stations. The data is intended for public awareness.[5]

AQHI VS AQI

The Air Quality Index (AQI), is based on one individual pollutant, while the Air Quality Health Index (AQHI) is based on a mixture of several pollutants and compared to the risk on human health.

Difference between Air Quality Health Index and Air Quality Index - Canada.ca

Resource 7: AQHI-Based Response Plan Templates

Templates that can used by any organization to create a staged response plan based on the Air Quality Health Index.

- Response Plan for Poor Air Quality Events Due to Wildfire
- Air Quality and Outdoor Activity Guidance for Children's Programs (including Children's Club and Association, Sport Organizations, Schools, Daycares)
- Examples Of Children's Organizations AQHI Plans
- Employee and Leader Health and Safety Program due to Poor Air Quality

[5] AQHI - Map (alberta.ca)

4.0 HEALTH EFFECTS

As described in the previous section, wildfire smoke is made of complex components. The concentrations of each components vary depending on different factors. Factors include what is burned, the weather, and distance from the fire. In recent years, Albertans have experienced some of the worst air quality due to wildfire smoke.

Most health effects of short-term wildfire smoke are transient for healthy adults and children. This means that they will improve as the air quality improves. Common health effects include the following.[6]

- It's harder to get oxygen into your body when smoky air is breathed.
- Wildfire smoke is irritating and can cause an immune response that may lead to inflammation that affects other parts of your body.

There are a number of common symptoms that can be managed without medical attention. These include eye irritation, runny nose, sore throat, mild cough, phlegm production, wheezy breathing, or headaches.

More severe symptoms may prompt medical attention. These include shortness of breath, severe cough, dizziness, chest pain, or heart palpitations.

Smoky air may make some infections worse, such as pneumonia, COVID-19, and ear infections in children.[7]

People respond differently to wildfire smoke. People with higher health risks may respond more severely. Higher risk population include:

- People with respiratory conditions such as asthma or chronic obstructive pulmonary disease (COPD).
- Older aged adults.
- Unborn children and infants, pregnant women and people caring for infants.
- Young children.

[6] (Wildfire smoke 101: Wildfire smoke and your health, 2021-08)

[7] (http://bccdc.ca/wildfiresmoke, 2021)

Reference 5: Air Quality – Alberta Health Services

Indigenous Services Canada resource for First Nations. It is the Indigenous Services Canada - Health Emergency Management - Alberta Region One Health page (sorry – long title!): https://www.onehealth.ca/ab/Home/Health-Emergency-Management

4.1 MASKS

Wearing a properly fitted respirator (mask) can reduce exposure to harmful pollutants. Masks with N95 or similar ratings reduce particulate matter concentrations. A proper fit ensures all inhaled air passes through the mask material. It is important to note that N95 masks are not effective at removing wildfire gases which may cause irritations.

BCCDC_WildFire_FactSheet_FaceMasks.pdf

4.2 MENTAL HEALTH RESOURCES

Lengthy exposure to changing air quality may contribute to increased stress and concern for health. Alberta Health Services offers many resources to help in your community.

Resource 6: Mental Health Links and Resources

5.0 Communication

5.1 NOTIFICATIONS

In Alberta, notifications for air quality events which result in poor air quality are issued by Environment and Climate Change Canada or by Alberta Health Services. The following document provides information on the types of air quality events and how these events are assessed and communicated.

Alberta Air Quality Notification Protocol: What you need to know

Special Air Quality Statements issued by Environment and Climate Change Canada are available through:

- The Canada Public Weather Alerts website,
- EC Alert Me, a service users can subscribe to that sends air quality and weather email alerts, and
- The WeatherCAN App, which provides weather alert notifications in locations selected by the user.

Alberta Health Services may issue an air quality advisory when the air quality event only causes an impact on the local communities. You can access Active Alberta Health Services Air Quality Advisories from Active Health Advisories. Alberta Health Services only send notifications for specific location updates.

The Calgary Emergency Management Agency (CEMA) has an online emergency preparedness page to help protect people, property and pets.
https://www.calgary.ca/emergencies/preparedness.html

5.2 AIR QUALITY FORECASTS

Resource 8: BlueSky Canada[8]

BlueSky Canada is a wildfire smoke forecasting system. It aims to help Canadians adapt to increased wildfires on the landscape due to climate change.

Smoky Skies Advisories – British Columbia (BCCDC, 2014)

A public advisory is issued when smoke concentrations in an area have, or may, reach levels that are of concern for human health.

Based on satellite information, smoke transport models, visibility photographs, first-hand observations from the area, in addition to concentrations of fine particulate matter recorded at local air quality stations.

BlueSky Canada intends to respond to the rapidly changing nature of wildfire smoke. Smoke concentrations can vary significantly over short distances and periods of time. This may not be well-characterized by the existing air quality monitoring network or responded to in a timely manner by Wildfire Smoke Advisories.

5.3 COMMUNICATING THROUGH SOCIAL MEDIA

Social media, such as Twitter and Facebook, can be useful for communicating. You can share updates about changing conditions during wildfire smoke events. You can also use it to provide quick tips or information to a broad audience. You may wish to both follow social media posts by other (credible) organizations, and to post your own.

Resource 9: Social Media

[8] Home - FireSmoke.ca

6.0 CLEAN AIR SHELTERS

6.1 PROTECT INDOOR AIR QUALITY AT HOME

In the event of a wildfire smoke event, indoor and outdoor air quality is impacted. There are some simple steps that you can take to protect indoor air quality and health.

The most common advisory issued during a smoke episode is to stay indoors. Staying indoors will provide some protection from smoke. Staying inside with the doors and windows closed can reduce the entry of outdoor air into homes, in some cases by a third or more. Tightly closed, air-conditioned homes with the conditioner re-circulating the air offers more protection. The creation of a clean room can aid in protecting indoor air quality.

Resource 10: Create a Clean Air Room

Resource 11: DIY Air Cleaner

Resource 12: HVAC Standards

Resource 13: Portable Air Cleaners

6.2 PUBLIC CLEAN AIR SHELTERS

Clean air shelters are public spaces that residents can go to if affected by wildfire smoke. Examples include school gymnasiums, buildings at public fairgrounds and civic auditoriums. People who take refuge in these shelters may need to stay only one night or for extended periods (days or week). Any indoor area with effective particle filtration and air conditioning will provide respite from smoke.

Resource 14: Cleaner Air Spaces or shelter-in-place[9]

6.3 CLEAN AIR SPACES

Resource 15: Clean Air Spaces
Inside Vehicles
Offices and Similar Indoor Workplaces
Steps for Building Managers to Protect Office Workers

7.0 FUNDING

Possible funding opportunities that change monthly/yearly.

Resource 16: Funding

[9] (Health Canada. 2020. Guidance for Cleaner Air Spaces during Wildfire Smoke Events)

8.0 RESOURCES

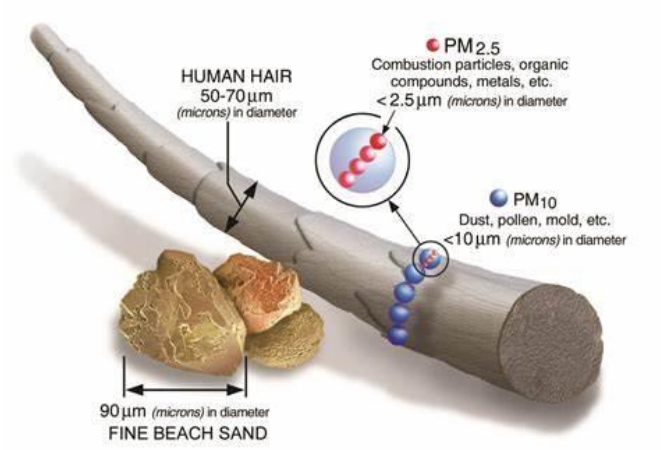
Resource 1: Particulate Matter

The quality of the air is dependent on the rate at which pollutants are emitted into the atmosphere and the ability of the atmosphere to disperse these pollutants. The movement and dispersion of air pollutants is controlled by wind, temperature, turbulence, and the changes in these elements caused by local topography (mountains and valleys).[10]

PARTICULATE MATTER PM (2.5)

Ambient particulate matter consists of a mixture of particles of varying size and chemical composition. Particles that are less than 10 micrometers in diameter (PM_{10}) can be inhaled. The fraction of particles, which are less than 2.5 micrometers in diameter ($PM_{2.5}$) can be trapped in the airways and lungs and is believed to cause adverse health effects. Fine particles ($PM_{2.5}$) also reduce visibility and can contribute to acidification of soils.

$PM_{2.5}$ size particles are formed from gases released to the atmosphere by combustion processes such as from motor vehicles, power plants, gas processing plants, compressor stations, household heating, and forest fires.



United States Environmental Protection Agency shows size comparison for particulate matter

[10] What We Monitor | Calgary Region Airshed Zone (craz.ca)

Resource 2: Air Pollutants

Carbon Monoxide (CO)

Carbon monoxide is a colourless, odourless gas formed from incomplete fossil fuel combustion. CO is toxic to all humans and animals and is the most commonly inhaled poisonous substance.

Oxides of Nitrogen (NOx)

Oxides of nitrogen, mostly in the form of nitrogen oxide (NO) and nitrogen dioxide (NO_2), are produced by the high temperature combustion of fossil fuels. Nitrogen oxide is the predominant species emitted by combustion sources, but it is rapidly changed to nitrogen dioxide in the atmosphere.

Nitrogen dioxide is a reddish-brown gas with a pungent irritating odour. It has been linked to respiratory disease and contributes to acid rain. It plays a major role in atmospheric photochemical reactions and ground level ozone formation and destruction.

Motor vehicles account for over 50% of the total NO_2 generated, however, any combustion source will emit nitrogen dioxide (e.g. power plants, furnaces, space heaters, etc.) Some natural sources include volcanoes, lightning, biological decay, and oceans.

Ground Level Ozone (O_3)

Ozone is formed in the air by the reaction of other air pollutants with sunlight. Ozone is considered a secondary pollutant as it is created through reactions with other airborne substances and can react with other pollutants to form photochemical smog.

Volatile Organic Compounds (VOCs)

Gases that evaporate quickly. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, pharmaceuticals, and refrigerants.[11]

Resource 3: Color of Smoke[12]

Smoke is the byproduct of the fuels it is burning. The color of the smoke indicates to firefighters the type and density of the fuels involved, all of which gives hints as to what the fire might do next.

[11] What are volatile organic compounds (VOCs)? | US EPA
[12] Smoke Color Can Depict Fuel Type - RedZone

White smoke can often mean material is off-gassing moisture and water vapor, meaning the fire is just starting to consume material. White smoke can also indicate light and flashy fuels such as grass or twigs.

Thick, black smoke indicates heavy fuels that are not being fully consumed. At times, black smoke can be an indicator that a manmade material is burning such as tires, vehicles or a structure. As a general rule, the darker the smoke, the more volatile the fire is.

Grey smoke can indicate that the fire is slowing down and running out of materials to burn.

Orange Smoke is when smoke filters up against a bright blue sky, it's no longer blue – in fact, it tends to take an orange hue. This is because now the smoke particles are reflecting light in all directions (there's no absorption on the background) and the scatter pattern is less.

The background blue also overwhelms any blue in the scatter pattern that is created. This leaves our eyes focusing on the yellow and red rays and when you combine these two colors? You get the orange hue that you see in the sky.

The more opaque (harder to see through) a smoke is, the more dangerous it is likely to be.[13]

Resource 4: Air Quality Monitoring

Continuous Community Monitoring

Regional/Airshed/Continuous monitoring uses strategically located permanent monitoring stations to measure the level of air pollution where people live and track trends over time.

CRAZ's continuous monitoring sites include the following three continuous monitoring sites in Calgary including the Calgary Central-Inglewood, Calgary Southeast and Calgary Northwest. The monitoring stations monitor for carbon monoxide (CO), methane (CH_4), total hydrocarbons (THC), non-methane hydrocarbons (NMHC), oxides of nitrogen (NOx), nitrogen dioxide (NO_2), nitric oxide (NO), O_3, $PM_{2.5}$, wind direction and speed, temperature, and relative humidity. In addition, the Calgary Southeast monitoring station also monitors for hydrogen sulphide (H_2S), and sulfur dioxide (SO_2). In 2017, a continuous monitoring site was established in Airdrie, based on the recommendations of STI's March 2015 report. The Airdrie monitoring station monitors for CO, NOx, NO_2, NO, O_3, $PM_{2.5}$, wind direction and speed, temperature, and relative humidity.

Benefits to the community:

[13] Black Smoke: What Does It Mean And What Causes It? (firefighterinsider.com)

- Provide real-time information about air quality impacts on health based on the AQHI;
- Provide transparent, open data for public use and scientific studies;
- Provide data air modelling due to wildfire smoke.

CRAZ Central-Inglewood Continuous Ambient Air Monitoring Station

Portable Air Monitoring Laboratory (PAML)

The PAML's principal role is to produce real-time data on air quality and provide information on potential health risks using the Air Quality Health Index (AQHI) indicator. The PAML is able to measure air quality in the areas that have little or no previous monitoring. Real-time data can be found at www.craz.ca.

Portable Air Monitoring Lab (PAML)

Purple Air Sensors

PurpleAir is a company that combined low-cost PM sensors with a web-based system to provide real-time information on air quality.

The PurpleAir sensors track PM1.0, PM2.5, PM10.0, temperature, humidity, and air pressure and transmit this data to a central database. The sensors have been tested against much more expensive air quality monitors and have been shown to be accurate. The web-based system provides a map-based interface for ease of use and quick feedback on air quality over any area of interest (PurpleAir website / map.purpleair.com).

Many different measurements of air quality are available, including the following:

A University of Northern British Columbia website combines the PurpleAir data with data from government agencies to provide a complete picture of air quality data [Particulate Matter Data / cyclone.unbc.ca/aqmap.](cyclone.unbc.ca/aqmap)

Example PurpleAir Map – Canadian AQI

Purple Air Sensor

Reference 5: Air Quality – Alberta Health Services[14]

Wildfire Smoke and Your Health – Alberta Health Services

When smoke from a wildfire (such as a forest fire or grassland fire) enters a community, it can cause problems for the people who live there. The biggest health risk comes from small particles in the smoke. These particles can get in your eyes, breathing (respiratory) system, and bloodstream. This can cause:

- burning eyes
- a runny nose
- coughing
- trouble breathing or illnesses like bronchitis

If you have a heart or lung problem, these small particles can make it worse.

Who is most at risk for health problems from wildfire smoke?

You might have problems earlier and at lower smoke levels if you:

- have heart or lung disease (such as congestive heart failure, angina, chronic obstructive pulmonary disease, emphysema, asthma)
- are an older adult (especially if you have heart or lung disease)
- are pregnant
- smoke

[14] Environmental Public Health, Alberta Health Services
https://myhealth.alberta.ca/Alberta/Pages/wildfire-smoke-health.aspx

- are a child (Smoke can be more harmful to children because their respiratory systems are still developing, they breathe in more air than adults, and they're more likely to be active outside.)
- do heavy outdoor work or outdoor sports

Smoke can also be harmful to **pets**. Try to keep your pets inside as much as possible and make sure they have lots of water. If your pet has trouble breathing, contact your vet.

If smoke is a problem where I live, what can I do to lower my health risk?

If smoke is a problem in your community, stay inside as much as possible and keep all windows and doors closed. Here's what else you can do to keep your indoor air clean:

- Close fresh air intakes from furnaces, fireplaces, or stoves.
- Turn on your air conditioning if you have it, and set it to recirculate. Keep it running to help filter the air and keep your family cool. (Just remember that some air conditioning systems don't filter the air or improve indoor air quality.)
- If you have room air cleaners with high-efficiency particulate air (HEPA) filters, turn them on. Don't use air cleaners that may produce ozone. For portable air cleaners, follow all the manufacturer's instructions for changing the filter, where to place the device, and the size of room it's meant to be used in.
- Check your furnace filter often. You may need to replace it more often than usual. Upgrade your furnace filters to the highest efficiency your ventilation system can handle. They may help lower the levels of smoke and particles in the air in your home.
- Use humidifiers, which might help remove some of the smoke. The humid air can also help keep your nose and mouth moist.
- Don't use wood stoves, gas stoves, or candles because they make the indoor air quality worse. If you can, prepare foods that you don't have to cook. Cooking (especially frying and broiling) can affect the air quality in your home.
- Don't use spray air fresheners or electric fragrance dispensers because they can affect air quality.
- Don't vacuum because it stirs up particles that are already inside your home.
- Don't let anyone smoke, vape, or use e-cigarettes in your home.

What can I do if it's too warm inside my home?

When you keep doors and windows closed to keep smoke out and you don't have air conditioning, your house might get very warm. If you need to cool down, you could visit a

place that is more air-tight with cooler filtered air. Examples include a shopping mall, library, community centre, or movie theatre.

If you can't leave your home, watch for signs of heat-related illness like heat exhaustion or heatstroke. Turn on the furnace fan or standalone fans to move air around in your home. If the air quality gets better for a short time, you can air out your home by opening doors and windows for a bit.

How can I stay aware of what's going on in my community?

When wildfire smoke is in your community, regularly check for air quality updates on local media (T.V., radio, or online). If you have neighbours, friends, or relatives who live alone, check on them to make sure they're OK.

What if I need to leave my home?

When the air quality is poor and you're in your vehicle, keep the windows closed. Put the air system on recirculate so smoky air doesn't get inside. When driving through an area with low or no smoke, switch the circulation system to let outside air into your vehicle.

If you need to leave your community, only think about leaving if it's safe to travel and you're going somewhere that's likely to have less smoke.

If you're in the wildfire area, be ready to evacuate. Follow **all** public service announcements. Build an emergency kit and have it ready.

Can wearing a mask help protect me from smoke?

Wildfire smoke is a mixture of gases, particles, and water vapour[1]. Particulate matter, particularly fine particulate matter, is the main public health concern with wildfire smoke[1,2]. Like other air quality issues, a multi-layered approach is recommended to reduce the health effects of wildfire smoke[1,2]. Personal protective equipment like respirators (such as N95, KN95 or P100) may be used to reduce exposure to wildfire smoke but are most effective when used as part of a multi-layered approach. Other important layers include staying indoors with doors and windows closed as long as temperatures remain comfortable, cleaning indoor air, and minimizing outdoor activities.

Respirators are effective for filtering fine particulate matter (as small as 0.3um), but do not protect the user from gases in wildfire smoke. Proper fit and use are critical for respirators (such as N95, KN95 or P100) to provide the level of protection expected. Users should follow the manufacturer's instructions for use, including performing a "seal check" to determine proper fit. People at increased risk of adverse effects from wildfire smoke, such as those with heart or lung problems or older adults, should consult with their health care professionals before using a respirator, as using a respirator can make breathing more difficult.

When a well-fitting respirator is not available, a high-quality medical mask (such as an ASTM-certified mask) may provide some limited protection against wildfire smoke. However, the overall benefits are uncertain as the harmful particles are so small that they can go around or through these masks.

Can I still be active when there's wildfire smoke in the air?

Pay attention to the local air quality health index (AQHI). Adjust your activities according to the AQHI messages. Move outdoor activities indoors and keep your indoor air as clean as possible. Reschedule or cancel outdoor events (such as sports or competitions) if smoke levels are too high.

When you're outside, don't do any heavy activity or exercise. Heavy activity and exercise can make you breathe 10 to 20 times more than you do while you're resting. Stop or slow down if what you're doing makes you cough or feel tired.

Drink lots of water to stay hydrated. This will keep your nose and mouth moist, which makes it easier to breathe. This is important when you're inside and outside.

When there is a lot of haze in the air, don't let your children play outside for a long time.

Do I follow the same health and safety measures for other types of fires (such as building, factory, and landfill fires)?

In most cases, health and safety measures for other types of fires are the same as for wildfires. But you may need to take different measures if other types of fires cause more chemicals in the smoke. For example, you may be told to shelter-in-place (stay indoors and don't leave unless you're told to). Check your local media and follow all public service announcements.

What if I start to feel unwell?

When there's wildfire smoke where you live, pay close attention to your health, especially if you have heart or lung problems. Take all your regular medicines. It's a good idea to have a week's supply of medicine with you. Do everything your healthcare provider told you to do, and contact your healthcare provider if you have any health concerns, even if you don't have heart or lung problems.

If you have chest tightness, chest pain, shortness of breath, or another health emergency, **call 911** or go to the nearest emergency department right away.

For 24/7 nurse advice and general health information, call Health Link at 811.

References

1. Environment and Climate Change Canada. “Protecting your health from wildfire smoke.” May 12, 2023. https://www.canada.ca/en/environment-climate-

change/services/air-quality-health-index/wildfire-smoke/wildfire-smoke-health.html.

2. California Air Resources Board, California Office of Environmental Health Hazard Assessment, U.S. Centers for Disease Control and Prevention, U.S. Forest Service, U.S. Environmental Protection Agency. "Wildfire Smoke: A Guide For Public Health Officials". 2019. https://www.airnow.gov/sites/default/files/2021-09/wildfire-smoke-guide_0.pdf.

Resource 6: Mental Health Links and Resources[15]

Mental Health Tip Cards

Preparing

Preparing Emotionally for Disasters or Emergencies

Disaster Preparedness and your Mental Health

Responding

Responding to a Disaster or Emergency

Helping Your Child or Teen Respond to a Disaster or Emergency

Disaster Response for Mental Health Care Providers

Recovery

Recovery after a Disaster or Emergency

Helping You Recover and Stay Well After a Disaster or Emergency

Helping Children/Teens Recover from Disaster

(Addiction and Mental Health)

Hope For Wellness Hot Line – immediate help for all Indigenous peoples across Canada.

Hope For Wellness Hot Line

[15] www.albertahealthservices.ca/amh

Resource 7: AQHI-Based Response Plan Templates

AQHI-BASED RESPONSE PLAN TEMPLATES

This template may be used by any organization to create a staged response plan based on the Air Quality Health Index. The standardized AQHI health messages appear for the at-risk and general populations. For children's programs, such as schools, daycares, sports organizations, children's clubs and associations, consider using the Children's Program Response Plan as guidance.

Fill in the final column of the AQHI-Based Response Plan Template with your organization- or site-specific response. In your plan, you may wish to consider elements such as communications, facility plans (e.g. ventilation systems), program changes (e.g. modifications to any outdoor programming), and employee/volunteer/program participant safety.

For facilities that are routinely occupied by at-risk populations, consider working with your facility management group to determine whether it is appropriate to install different filters on the Heating, Ventilation and Air Conditioning (HVAC) system during wildfire smoke events. In addition, facility measures could include changing the air intake and circulation rates and ensuring that doors and windows are closed.

*At risk populations may include people with existing respiratory or cardiovascular conditions, young children, the elderly, and those active outdoors.

Response Plan for Poor Air Quality due to Wildfire Smoke

Response Plan for Poor Air Quality due to Wildfire Smoke				
AQHI	**AQHI Messages**		**Wildfire Smoke Response Guidelines**	**Site Specific Actions**
	At-Risk* Population	**General Population**		
Low Risk	No health effects expected **Enjoy** your usual outdoor activities.	No health effects expected **Ideal** air quality for outdoor activities.	If smoke event forecast, implement communication plan and identify site specific actions. For children attending outdoor programs, please see the attached "outdoor activities guidelines". Employer distribute "Tip Sheet".	
Moderate Risk **4-6**	Possible aggravation of heart or lung disease.	No health effects expected	Airshed distribute media release package including the backgrounder. Monitor local media.	

	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	**No need to modify** your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.	Check the AQHI and Alberta Health Services (AHS) Health Advisories. Check Environment Canada's Weather Alerts: Public Weather Alerts for Canada - Environment Canada Consider distributing information to stakeholders about how to reduce smoke exposure.	
High Risk **7-10**	Increasing likelihood of respiratory or cardiac symptoms in sensitive individuals.	Eye, nose and throat irritation in some individuals.	Monitor local media. Check the AQHI and Alberta Health Services (AHS Health Advisories. Distribute information to stakeholder about how to reduce smoke exposure, using messages from AHS and/or Environment and Climate Change Canada (Special Air Quality Statement). If smoke event projected to be prolonged, evaluate and notify possible sites for indoor locations with clean air, as appropriate. Consider activating facility plans to maintain indoor air quality.	
	Reduce or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	**Consider** reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.		
	People with Asthma or Respiratory issues should follow management plan			
Very High Risk **10+**	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.	Increased respiratory effects	Monitor local media. Check the AQHI and Alberta Health Services. Identify indoor locations with clean air to act as shelters for relevant stakeholders (e.g. Employees, program participants). Cancel outdoor events involving activity. Consider cancelling outdoor events that do not involve activity. If AQHI is projected to remain high for a prolonged time, consider evacuation of at-risk populations to indoor locations with clean air	
	Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	**Reduce or reschedule** strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.		

(Adapted from Health Canada's AQHI and USEPA wildfire Smoke, A Guide for Public Health Officials – Revised May 2016)

CHILDREN'S PROGRAM RESPONSE PLAN

This plan may be used by schools, daycares, sports organizations, children's clubs and associations to create a staged response plan based on the Air Quality Health Index. More specific messaging is provided than in the general AQHI-Based Response Plan Template.

In your plan, you may wish to consider elements such as communications (e.g. parent notifications), facility plans (e.g. ventilation systems), program changes (e.g. modifications to any outdoor programming), and employee/volunteer/program participant safety.

Environment and Climate Change Canada has an educational video for kids about how to use the AQHI to decide which days are best to play outside.

Air Quality Health Index for Kids:

Health Canada - What are you Breathing?

AIR QUALITY AND OUTDOOR ACTIVITY GUIDANCE FOR CHILDREN'S PROGRAMS (INCLUDING CHILDREN'S CLUB AND ASSOCIATION, SPORT ORGANIZATIONS, SCHOOLS, DAYCARES)

The table below shows when and how to modify outdoor physical activity based on the Air Quality Health Index. This guidance can help protect the health of all children, including teenagers, who are more sensitive than adults to air pollution. Check the air quality daily at www.environment.alberta.ca/apps/aqhi/aqhi.aspx, or www.craz.ca.

Air Quality Health Index

Air Quality Health Index		Outdoor Activity Guidance
	Low Risk 1-3	Great day to be outside!
	Moderate Risk 4-6	Good day to be active outside! Children who are sensitive to air pollution could have symptoms. *
	High Risk 7-10	It's OK to be active outside, especially for short physical activities. For longer activities such as athletic practice, take more breaks and do less intense activities. Watch for symptoms and take action as needed.* Children with asthma should follow their asthma action plans and keep their quick-relief medicine handy.
	Very High Risk 10+	For all outdoor activities, take more breaks and do less intense activities. Consider moving longer or more intense activities indoors or rescheduling them to another day or time. Watch for symptoms and take action as needed.* Children with asthma should follow their asthma action plans and keep their quick-relief medicine handy.

*Watch for Symptoms: Air pollution can make asthma symptoms worse and trigger attacks. Symptoms of asthma include coughing, wheezing, difficulty breathing, and chest tightness. Even students who do not have asthma could experience these symptoms. If symptoms occur: The student might need to take a break, do a less intense activity, stop all activity, go indoors, or use quick-relief medicine as prescribes. If symptoms don't improve, get medical help.

QUESTIONS AND ANSWERS:

How long can students stay outside when the air quality is unhealthy?

There is no exact amount of time. The worse the air quality, the more important it is to take breaks, do less intense activities, and watch for symptoms. Remember that students with asthma will be more sensitive to unhealthy air.

Why should students take breaks and do less intense activities when air quality is unhealthy?

Students breathe harder when they are active for a longer period of time or when they do more intense activities. More pollution enters the lungs when a person is breathing harder. It helps to:

- reduce the amount of time students are breathing hard (e.g., take breaks; rotate players frequently)
- reduce the intensity of activities so students are not breathing so hard (e.g., walk instead of run)

If students stay inside because of unhealthy outdoor air quality caused by wildfire smoke, can they still be active? It depends on which pollutant is causing the problem:

- Ozone pollution: If windows are closed, the amount of ozone should be much lower indoors, so it is OK to keep students moving.
- Particle pollution: If the building has a forced air heating or cooling system that filters out particles then the amount of particle pollution should be lower indoors, and it is OK to keep students moving. It is important that the particle filtration system is installed properly and well maintained.

What physical activities can students do inside? Encourage indoor activities that keep all students moving. Plan activities that include aerobic exercise as well as muscle and bone strengthening components (e.g., jumping, skipping, sit-ups, pushups). If a gymnasium or open space is accessible, promote activities that use equipment, such as cones, hula hoops, and sports balls. If restricted to the classroom, encourage students to come up with fun ways to get everyone moving (e.g., act out action words from a story). Teachers and recess supervisors can work with PE teachers to identify additional indoor activities.

What is an asthma action plan?

An asthma action plan is a written plan developed with a student's doctor for daily management of asthma. It includes medication plans, control of triggers, and how to recognize and manage worsening asthma symptoms. See www.cdc.gov/asthma/actionplan.html for a link to sample asthma action plans. When asthma is well managed and well controlled, students should be able to participate fully in all activities. For a booklet on "Asthma and Physical Activity in the School," see https://www.nhlbi.nih.gov/resources/asthma-and-physical-activity-school.

EXAMPLES OF CHILDREN'S ORGANIZATIONS AQHI PLANS

AIR AWARE: Air Quality Monitoring Guidelines Calgary Minor Soccer[16]

IMPORTANT NOTE: The Match Official reserves the right to cancel the game if they consider the conditions dangerous.

Games: If the affiliated member has not cancelled games in advance, all teams and match officials should arrive ready to play. If the AQHI is at "7" at the next calculation, the match official should consider delaying or cancelling the game. If the game is cancelled, it must be written on the game sheet with the reason for abandonment stating the Index Calculation, time & date and AQHI station used.

Practices: If the AQHI is "3" or below, continue training as normal

If the AQHI is "4-6", adjust practice by doing the following: - Reducing intensity - Reducing the duration - Provide resting periods

If the AQHI is "7" or above, practices should be rescheduled!

Air Quality Policy – Calgary Minor Softball[17]

The Government of Canada, Calgary – Air Quality Health Index will be used as the guide for Calgary Minor Softball Association.
(https://weather.gc.ca/airquality/pages/provincial_summary/ab_e.html)

Games should be delayed or rescheduled if the air quality health index is at a 7 or above. If games are not cancelled by Calgary Minor Softball Association in advance, both teams and umpires (if one has been assigned) are expected to go to the diamond prepared to play. At this time Calgary Minor Softball Association umpires and parent umpires will have the authority to cancel games at any time if they feel that air quality has deteriorated to unsafe levels.

Practices should be rescheduled if the air quality health index is at a 7 or above.
If the air quality health index exceeds a 4, practices should be modified – this can be done by reducing the intensity and duration, as well as allowing for rest periods.

Those with compromised respiratory systems can decide where their personal cut-off is.

[16] Calgary Minor Soccer Association : Powered by GOALLINE
[17] Calgary Minor Softball Association : Powered by GOALLINE

Employee and Leader Information

As part of your organization's Occupational Health and Safety program, you may wish to provide information to employees and to supervisors.

Alberta Labor has a tip sheet for workers and employers called "Working When There is Wildland Fire Smoke" that provides information and messages that you may use[18].

The City of Calgary has developed tip sheets for employees and for supervisors that are provided here as examples.

[18] Alberta Labour. (2017). Working When There is Wildland Fire Smoke. Retrieved from: https://open.alberta.ca/dataset/14df5db4-ec33-419e-b1cb-989ba1d58cfa/resource/ab6e8788-8dfa-437f-9276-c822c8b2472b/download/GH020-Wildland-Fire-Smoke.pdf

For employees:

Poor air quality due to wildfire smoke

Smoke from wildfires can damage your eyes, irritate your respiratory system, and worsen chronic heart and lung diseases. Wildfire smoke contains components such as particulate matter, carbon monoxide and other harmful substances. Employees performing outdoor strenuous tasks are most exposed to these risks. Although the levels of substances in outdoor air are typically well below the occupational exposure limits found in the Alberta OHS Code, these exposures can still pose health issues for some employees. Take extra steps to keep yourself and your co-workers safe. Talk to your supervisor about how you can integrate these tips into your workday.

SAFETY TIPS FOR POOR AIR QUALITY: Discuss with your supervisor and keep this for quick reference

Tip 1: Plan your work if you can

- Talk to your supervisor about relocating or rescheduling outdoor work.
- Reduce levels of physical activity to decrease inhalation of pollutants.
- Consider working from home or Teams meetings instead of travelling, if possible.
- Talk to your supervisor about any personal factors that might put you at risk, such as a medical condition. Your supervisor can help you plan safe work options.

Tip 2: Keep doors and windows closed

- In the office, close doors and windows to keep indoor air cleaner.
- In your vehicle, close doors and windows, and set the air system to re-circulate.

Tip 3: If you work outdoors, take breaks

- Take mini breaks when doing heavier work.
- Take rest breaks in a filtered air environment.
- Drink plenty of water and stay cool.

Visit myCity/Safety or talk to your supervisor.

For employees:
Poor air quality due to wildfire smoke

Tip 4: Monitor yourself and co-workers for symptoms

- Know who is first aid trained in case of an emergency.
- You may be an At Risk employee if you are a senior, pregnant, a smoker, or have an existing illness or chronic health conditions, such a cancer, diabetes and lung or heart conditions. Follow the recommendations of your physician if a worsening of symptoms occurs and keep required medications on hand.
- If you have chest tightness, severe cough, wheezing, dizziness, heart palpitations, chest pain, or shortness of breath, talk to a health professional or seek urgent medical attention. If you think you could be having a medical emergency, dial 911. Report symptoms or concerns to your supervisor.
- Heat can worsen air quality conditions, and their effects. Check whether there is also a heat advisory in place, and make note of extra steps to stay safe in the heat.
- Report safety concerns through SDMS online at myCity/Safety.

Air Quality Health Index Health Messages

AQHI is presented on a scale of 1 to 10+ with four health risk categories (low, moderate, high, and very high):

- 1 to 3 = **low** health risk
- 4 to 6 = **moderate** health risk
- 7 to 10 = **high** health risk
- 10+ = **very** high health risk

AQHI is calculated using concentrations of ozone (O_3), nitrogen dioxide (NO_2), and particulate matter (PM2.5). The main concern from wildfire smoke is PM2.5.

Health risk	Air Quality Health Index	Health Messages
Low risk	**1 - 3**	• Ideal air quality for outdoor work activities. Work should proceed as usual.
Moderate risk	**4 - 6**	• Consider rescheduling outdoor work activities for At Risk employees.
High risk	**7 - 10**	• At Risk employees and employees performing strenuous work should consult with their supervisor to reduce or reschedule outdoor work activities where possible. • Employees should consider wearing an N95 mask when they are: o Working outside for more than 15 minutes within a one-hour period. o Are performing strenuous work.

Visit myCity/Safety or talk to your supervisor.

For employees:
Poor air quality due to wildfire smoke

		○ Have underlying conditions. Employees wearing an N95 respirator must complete an X526 Health Surveillance for Respiratory Users and should be fit tested prior to respirator use. Contact your safety advisor if you need a fit test.
Very high risk	**10+**	• Non-essential outdoor work activities should be rescheduled. • If employees are working outside for more than 15 minutes within a one-hour period, they should consider wearing an N95 respirator. • Employees wearing an N95 respirator must complete an X526 Health Surveillance for Respiratory Users and should be fit tested prior to respirator use. Contact your safety advisor if you need a fit test.

Stay informed

- Check myCity for updates.
- Monitor the Air Quality Health Index at Environment Canada.

Tips to Take Home

- Avoid using your backyard fire pit or having a smoky barbeque.
- Consider switching to indoor activities, or visiting a recreation centre, library or shopping mall with cooler, filtered air.
- If you have neighbours, friends or relatives who live alone, check on them to make sure they are okay.

Visit myCity/Safety or talk to your supervisor.

For leaders:
Poor air quality due to wildfire smoke

Smoke from wildfires can hurt your eyes, irritate your respiratory system, and worsen chronic heart and lung diseases. Take extra steps to keep yourself, your employees, and your co-workers safe. Talk to your employees about how you can integrate these tips into everyone's workday.

SAFTEY TIPS TO SHARE WITH EMPLOYEES: See employee handout on myCity/Safety/Extreme Weather

Tip 1: Plan your employees' work:

- Talk to your manager about relocating or rescheduling outdoor work
- Reduce levels of physical activity, to decrease inhalation of pollutants
- Consider teleworking or Skype meetings instead of travelling, if possible
- If the event will contribute to business disruption, contact your Business Continuity Management Plan
- Help employees plan safe work options

Tip 2: Keep doors and windows closed

- In the office, close doors, windows and air vents to keep indoor air cleaner
- In your vehicle, close windows and set the air system on re-circulate

Tip 3: If your employees work outdoors, ensure they:

- Take mini breaks when doing heavier work
- Rest indoors in clean air
- Drink plenty of water and stay cool

Tip 4: Monitor yourself and employees for symptoms:

- Know who your first aiders are in case of an emergency
- If you have diabetes, a respiratory (lung) or cardiovascular (heart) condition, take the precautions routinely recommended by your physician if a worsening of symptoms occurs
- If you have chest tightness, chest pain, or shortness of breath, call 9-1-1
- Heat can worsen air quality conditions, and their effects. Check whether there is also a heat advisory in place, and make note of extra steps to stay safe in the heat
- Encourage employees to report safety concerns online at myCity/Safety or use the Safety Reporting Notepad

ISC: Unrestricted

Safety, we're all responsible.
Visit myCity/Safety or talk to your supervisor.

For leaders:
Poor air quality due to wildfire smoke

Air Quality Health Index (AQHI) Health Messages

Health Risk	Air Quality Health Index	Health Messages	
		At Risk Population*	General Population
Low Risk	1-3	**Enjoy** your usual outdoor activities.	**Ideal** air quality for outdoor activities.
Moderate Risk	4-6	**Consider reducing** or rescheduling strenuous activities outdoors if you are experiencing symptoms.	**No need to modify** your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High Risk	7-10	**Reduce** or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	**Consider reducing** or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very High Risk	Above 10	**Avoid** strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	**Reduce** or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

* At Risk Population includes:

1. Children, pregnant women and the elderly
2. Anyone with diabetes, lung or heart conditions
3. Anyone involved in strenuous outdoor work or sports

Stay informed

- Check myCity for updates
- Monitor the Air Quality Health Index at www.airquality.alberta.ca, www.airhealth.ca or download the app at https://open.alberta.ca/interact/aqhi-canada.

ACTIONS AND TIPS TO HELP YOU IN YOUR ROLE AS SUPERVISOR: Answering employees' safety questions

There are actions you can take to keep employees safe when they're working in poor air quality

- Eliminate or control workplace hazards, such as relocating or rescheduling outdoor work and keeping indoor air clean by closing doors, windows and vents
    - Work with your safety advisor to choose the best solution
    - Involve your employees in the hazard assessment process, including identifying appropriate controls
    - Pay special attention to work where respiratory controls are already in place, or that has compounding effects on air quality, such as work that generates vapour, exhaust, or dust
- Consider the compounding effects of hazards on employees. Poor air quality due to wildfire smoke often occurs during periods of hot weather

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Safety, we're all responsible.
Visit myCity/Safety or talk to your supervisor.

For leaders:
Poor air quality due to wildfire smoke

- Poor air quality doesn't just affect those who work outdoors. Employees in offices can help to keep indoor air clean by closing doors, windows and vents. Also, support employees to telework or use Skype meetings to avoid travelling
- Check first aid supplies during work site inspections and ensure enough employees are trained to give first aid at each work site
- Train staff to recognize common symptoms of exposure to smoky air, including:
  - Watery or dry eyes
  - Persistent cough, phlegm, wheeze, scratchy throat or irritated sinuses
  - Headaches
  - Shortness of breath, asthma attacks or lung irritation
  - Irregular heartbeat, chest pain or fatigue
- Encourage staff to take mini breaks to rest indoors or in their vehicles. This is not "slacking off" – it's a matter of staying healthy and safe
- Consider the physical factors of each employee. Some factors put a person at greater risk for health effects, including age, fitness level, medical conditions, pregnancy, and smoking

Resource: Alberta Labour "Working when there is Wildland Fire Smoke" information sheet

Applicable legislation: OHS Code, Part 2 (hazard identification, assessment and control), Part 7 (emergency preparedness and response), Part 11 (first aid) and Schedule 2 (first aid).

Tips to Take Home

- Avoid using your backyard fire pit or having a smoky barbeque
- Avoid using gas lawn mowers, since their emissions contribute to poor air quality
- Consider taking transit instead of driving
- If you have neighbours, friends or relatives who live alone, check on them to make sure they are okay
- Consider switching to indoor activities, or visiting a recreation centre, library or shopping mall with cooler, filtered air

Reinforce with employees:

- ☐ You are important to the team, both as an individual and as an employee. I want you to work safely
- ☐ I can help you access the safety information you need. Talk to me if you have a question or a suggestion for making your work safer
- ☐ You can also talk to our safety advisor (provide name) or visit myCity/Safety for safety information

Tips on how to prepare, lead and follow up on safety discussions:

Prepare ahead

- ☐ Involve your employees in the hazard assessment process, including identifying appropriate controls
- ☐ Look for site hazards related to the topic you are discussing
- ☐ Familiarize yourself with recent safety reports, BU processes, guidelines and legislation related to the topic

Get your team actively involved

- ☐ Choose a real-life example to talk about in the safety discussion
- ☐ Invite your team to ask questions and make suggestions related to the topic. Respond to questions you can answer. Commit to finding answers you don't know
- ☐ Involve your team in preparing for or leading future safety talks

Follow up

- ☐ Look into suggestions and concerns your team brought up
- ☐ Report back on what will be done and the rationale behind decisions made

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Safety, we're all responsible.
Visit myCity/Safety or talk to your supervisor.

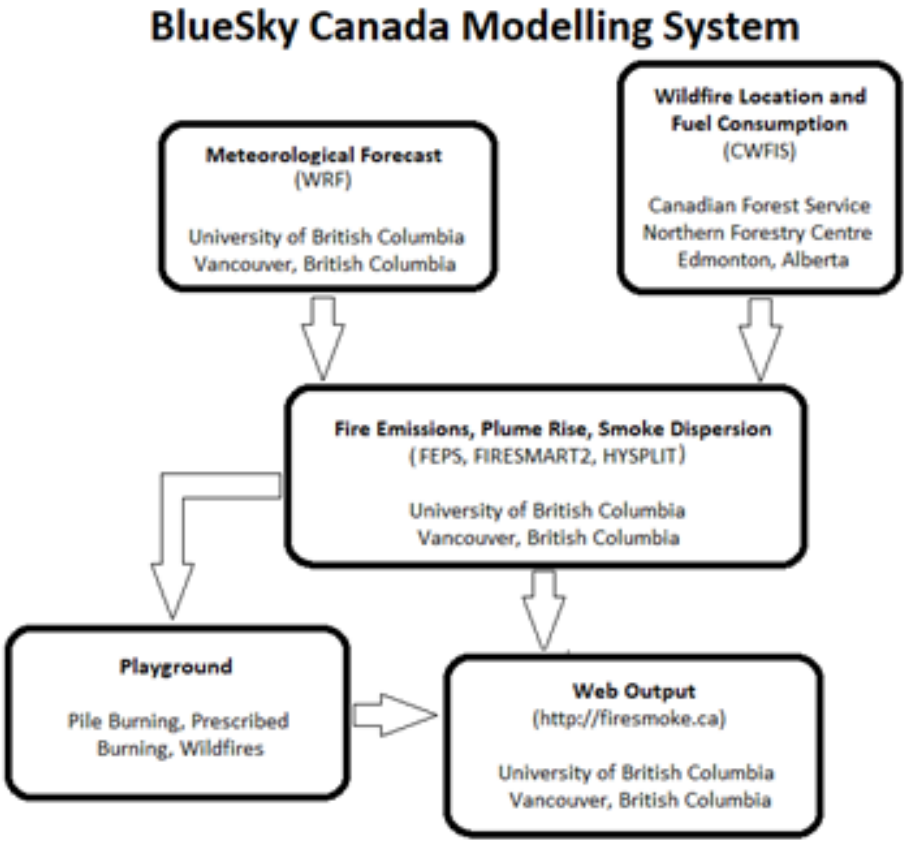
Resource 8: BlueSky Canada[19]

First envisioned at the National Workshop on Smoke Forecasting held in Edmonton in 2007.

This system provides:

- Information to environmental agencies to share with the public and media regarding the expected duration and intensity of a wildfire smoke event.
- Health authorities and emergency responders' information about potential exposure to smoke in order to inform evacuation decisions, and the need to issue health alerts and appropriate messaging.
- Health researchers with information about smoke exposure to in populated areas or to populations at risk where there was no available monitoring data.
- A platform for furthering research on modelling wildfire smoke.

BlueSky Canada was adopted from the US Forest Service's Blue Sky modular system (Larkin et al., 2008) allowing for the adoption of Canadian fire growth models.



Simple overview of BlueSky Canada wildfire smoke forecasting system.

[19] Home - FireSmoke.ca

BlueSky Canada is a wildfire smoke forecasting system to help Canadians adapt to increased wildfires on the landscape due to climate change. It is a collaborative effort amongst various provincial governments, the federal government and academia.

BlueSky Canada and You

Provide information to the public, health officials and first responder

BlueSky Canada is intended to forecast ground level concentrations of PM2.5 (smoke) to the general public, health officials and first responders. BlueSky tries to provide this information in a timely manner using the best available information.

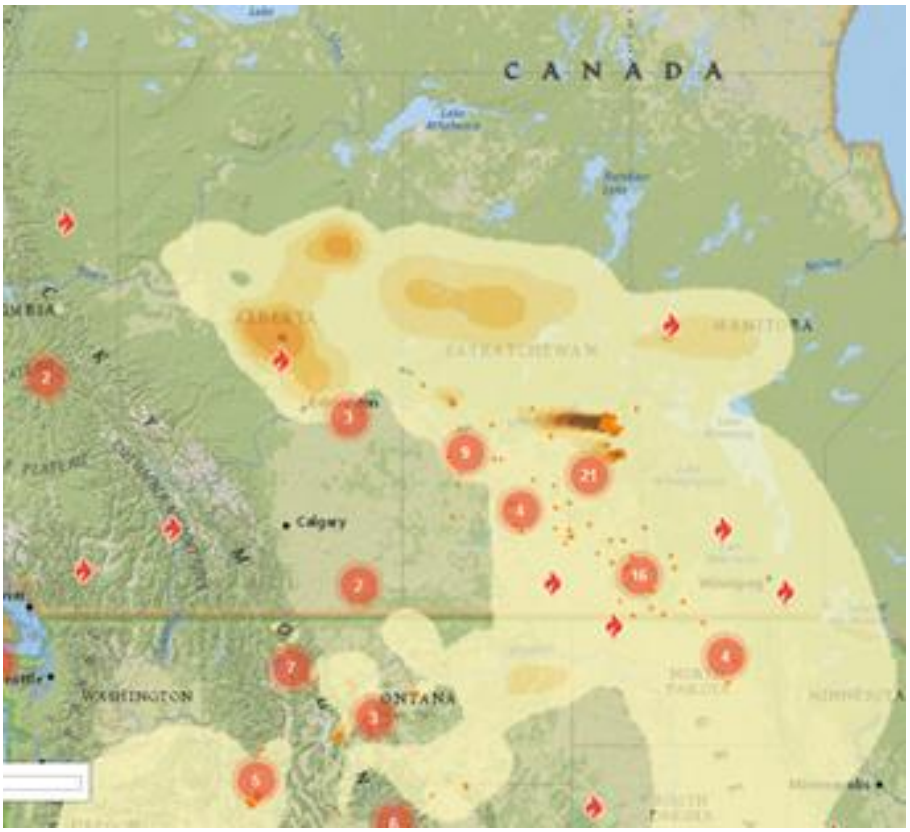
BlueSky Canada is a complex air quality model system

BlueSky Canada is a collection of models (fire growth model, dispersion model, weather model, etc.) that requires considerable skill to assemble, run and maintain.

"The forecasts are based on the best science and technology we have today…We feel the accuracy is pretty good in terms of general patterns."

- Warren McCormack, BC Ministry of Environment and Climate Change Strategy.

(Kelowna Daily Courier, August 29, 2017)



BlueSky Canada forecast October 5, 2021, 2:00 PM MS

Limitations of BlueSky Canada

BlueSky Canada strives to produce the most accurate PM2.5 forecasts on the basis of the best available information. However, given the inherent uncertainty in fire start times, fire growth models, and weather forecasts, BlueSky Canada is still considered an experimental tool that users may use at their own risk.

Platform for further development

BlueSky Canada continually strives to improve model performance. Model evaluation is undertaken on a regular basis with improvements being incorporated as needed.

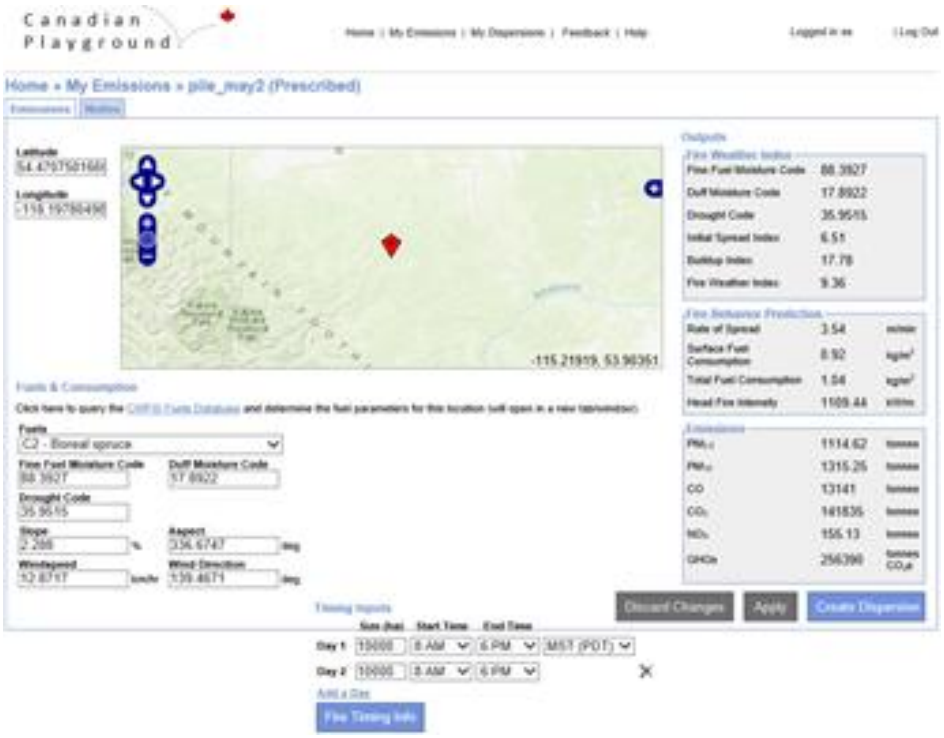
BlueSky Canada Services

- Four times daily national forecasts (including the northern contiguous United States and Eastern Alaska) of ground level PM2.5 (smoke) concentrations for the next 48 hours.
- Downloadable forecasts in netCDF and kmz (Google Earth) formats.
- Archived forecasts for at least the last two years. Additional archived data may be made available upon request.
- All data is publicly available at no cost.

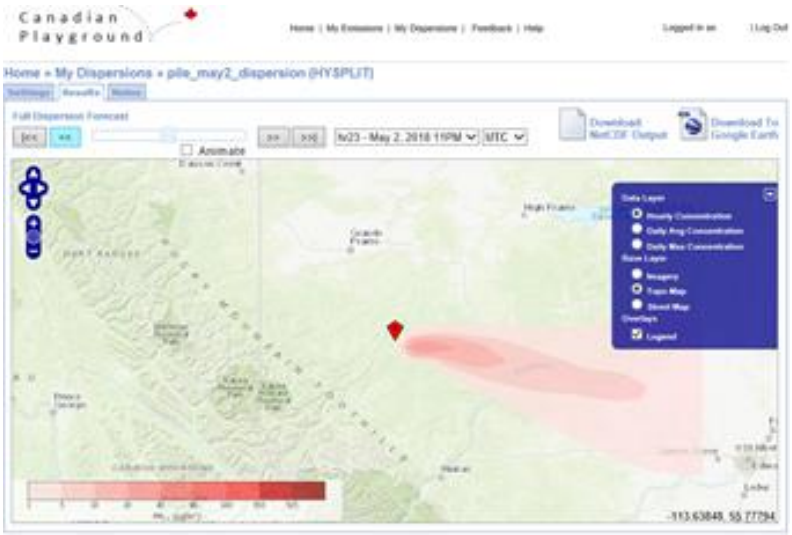
BlueSky Canada Services - Playground

Playground is a companion module within BlueSky Canada that is easy to use and allows you to forecast local smoke events. In particular, Playground:

- Makes use of premade fuel loading (NRCan)
- Easy to use interface for setting location, size of fire, fuel, etc.
- Publicly available (log in required)
- Very quick – a forecast is typically available in less than 10 minutes
- Modules for:
    - Prescribed fires
    - Pile burns
    - Wildfires



Simple interface for setting up local smoke event



Animated output showing smoke plume

Check out www.firesmoke.ca for the latest wildfire forecasts, fire weather forecasts, wildfire smoke modelling tools with instructional videos, and ongoing research projects and information.

Resource 9: Social Media

Twitter (X)

To keep up to date, consider following these Twitter accounts:

Alberta Health	@GoAHealth
Alberta Health Services (AHS) Communications	@AHS_media
Your relevant AHS Zone e.g. South Zone	 @AHS_SouthZone
Your relevant airshed e.g. Calgary Region Airshed Zone	 @calgaryairshed
Alberta Airsheds Council	@albertaairsheds
Environment Canada	@environmentca
Environment Canada's official source for weather alerts for your area e.g. Calgary	 @ECAlertAB52
Alberta Environment and Parks	@AB_EP
Alberta Government	@YourAlberta
Alberta Wildfire	@AlbertaWildfire
Red Cross Alberta	@RedCrossAB
Local news media	Check website of local media
Municipalities in affected areas	Check website of municipality
For wildfires in the Rocky Mountain National Parks, consider local sources Banff National Park Rocky Mountain Outlook Exshaw Fire Rescue	 @BanffNP @rmoutlook @ExshawFire

Facebook

Consider following these Facebook sites:

Environment and Natural Resources Canada

Parks Canada

Banff National Park, or the location in which the wildfire is occurring

Example Social Media Posts

Posting on social media helps keep members up to date on what is happening during poor air quality and provides valuable information. One tip when writing a post and a URL needs to be shorten, copy and paste URL into the website Bitly.com. By following the recommended sites, it is easy to re-tweet or share and pass on information.

Sample Tweets:

An air quality statement @GoAHealth was issued @Townofcochrane, for more info visit http://bit.ly/2uHE4Np

Seniors, children, those with lung or heart conditions most affected by poor #airquality. Reduce time outside, call 811 if you have symptoms Health Information for Air Quality Events | Alberta Health Services (Tweet posted by @GoAHealth, 2017-07-2017)

Learn about the #AQHI forecasts to understand the impacts #wildfire smoke may have on your health. http://bit.ly/2wJ5NyL

Keep an eye on your AQHI, Air Quality Health Index #yyc @CityofCalgary @City_of_Airdrie Home | Calgary Region Airshed Zone (craz.ca)

Ten tips if your experiencing poor air quality:

#10: Check on the real time data in #yyc @cityofcalgary and learn more about air quality at http://bit.ly/2w3xc1Z

#9: Consider moving longer or more intense activities indoors or rescheduling them to another day or time.

#8: Stay informed. Download the AQHI Canada App Air Quality Health Index – Resources | Alberta.ca

#7: Take breaks indoors in clean air, example: at home or in a mall, library, or recreation center

#6: Reduce levels of physical activity, as necessary, to decrease the inhalation of airborne

#5: If you must drive to another location, keep windows and vents closed. Run car fans on re-circulate mode to avoid drawing in outdoor air.

#4: Close fireplace dampers on wood burning fireplaces. Health Information for Air Quality Events | Alberta Health Services

#3: Avoid running fans, such as "whole-house fans" or "fresh air ventilation systems", that bring more smoky outdoor air inside

#2: If you have an air-conditioner, keep the fresh-air intake closed and the filter clean to prevent outdoor smoke from getting inside.

#1 Switch all floor registers in your house to a closed position. http://bit.ly/2uHE4Np

Sample Facebook Posts:

Just a reminder that it is a great idea to download the AQHI Canada App to your mobile devices. The Air Quality Health Index (AQHI) Canada app informs users of the level of health risk associated with local outdoor air quality. The app provides hourly AQHI readings and daily forecasts for all AQHI communities across Canada. http://bit.ly/2uSkth2

Make sure that you check the AQHI daily! For the AQHI in Calgary and Airdrie visit the CRAZ website www.craz.ca

Here are a few tips from the Alberta Health Services Air Advisory Page on what you can do in a poor air quality event: Health Information for Air Quality Events | Alberta Health Services

If air quality is because of smoke reduce presence of smoke in indoor environments:

- Close and lock all outside windows and doors, including attached garage doors.
- Turn down furnace thermostats and furnace fans to the minimum setting. Do not attempt to extinguish pilot light.
- If you have an air-conditioner, keep the fresh-air intake closed and the filter clean to prevent outdoor smoke from getting inside.
- Avoid running fans, such as "whole-house fans" or "fresh air ventilation systems", that bring more smoky outdoor air inside.
- Switch all floor registers to closed position.
- Close fire place dampers on wood burning fireplaces.
- Do not use wood burning fireplace, wood stoves or other smoke-producing appliances or features, including candles.
- If you must drive to another location, keep windows and vents closed. Run car fans on re-circulate mode to avoid drawing in outdoor air.

- Reduce levels of physical activity, as necessary, to decrease the inhalation of airborne pollutants.
- Do not smoke tobacco – smoking puts added stress on your lungs and those around you.

Residents are reminded not to use backyard fire pits or fire boxes in parks when the air quality risk is high or very high, as it is now. Environment and Natural Resources in Canada Environment and Natural Resources in Canada posted in August, 2017

Young children are among the groups most sensitive to air pollution. Check the Air Quality Health Index before playing outside!
http://ow.ly/mWYf30efJB4

The Air Quality Health Index uses a scale to show the health risk associated with the air pollution we breathe. You can take simple steps to protect your health when the air quality is poor.
Air Quality Health Index (AQHI) (alberta.ca)

Did you know that Alberta Environment and Parks have free downloadable resources to learn about the AQHI, check them out Air Quality Health Index – Resources | Alberta.ca

Resource 10: Create a Clean Air Room[20]

What is a clean room?

- A room that is set up to keep levels of smoke and other particulates as low as possible during wildfire smoke events.
- A clean room should be free from activities that create particulates such as smoking, and the doors and windows should be kept closed.
- A clean room can also have a portable air cleaner that makes the air in the room cleaner than the rest of the home.

Why create a clean room?

- If there is an active fire in your area or if the Air Quality Index indicates smoke levels are unhealthy and forecasted to remain there, local authorities may advise you to stay indoors.

Who needs a clean room?

- As long as it is safe to stay indoors at home, anyone can benefit from spending time in a clean room during a wildfire smoke event.
- It is most helpful for people at high risk – children, older adults, and people with heart disease or breathing problems.

How do you set up a clean room?

1. Choose a room
    - It should be big enough to fit everyone in your household and comfortable to spend time in. A bedroom with a bathroom attached for example is a good choice.
2. Prevent smoke from entering the room
    - Close all windows and doors in the room, but don't do anything that makes it hard to get out.
    - If there is an exhaust fan or range hood in the clean room space, only use it for short periods.
3. Stay cool
    - Run fans, window air conditioners, or central air conditioning.
    - If your HVAC (heating, ventilation, and air-conditioning) system or window air conditioner has a fresh air option (meaning it pulls air from outside), turn it off, close the intake, or set the system to recirculate mode.
    - Avoid using an evaporative cooler or portable air conditioner with a single hose in smoky conditions unless there is a heat emergency. Using these devices can result in more smoke being brought inside.

[20] Create a Clean Room to Protect Indoor Air Quality During a Wildfire | US EPA

4. Filter the air in the room.

- Use a portable air cleaner (PAC) that is the right size for the room.
- Run the portable air cleaner continuously on the highest fan setting if you can. Pick one that does not produce ozone.

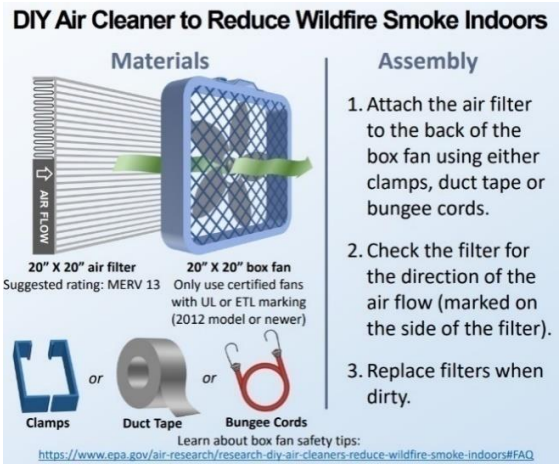
5. Using and maintaining the clean room

- Avoid activities that create smoke or other particles indoors such as:
- Smoking cigarettes, pipes and cigars,
- Using gas, propane or wood burning stoves and furnaces,
- Spraying aerosol products,
- Frying or boiling food,
- Burning candles or incense, or
- Vacuuming, unless you use a vacuum with a HEPA filter.
- Dust or mop surfaces in the clean room with a damp cloth as needed, to keep settled particles from getting back into the air.
- Avoid exercising while in the clean room to help reduce exposure to any particles that may enter the room
- When the air quality improves, even temporarily, air out the clean room by opening windows or open fresh air intakes on your HVAC system to freshen the air.

Resource 11: DIY Air Cleaner

Do-it-yourself air cleaners may be an economical option for some communities and homes. The effectiveness of the DIY Air Cleaner may depend on the size of room.

For more information: Research on DIY Air Cleaners to Reduce Wildfire Smoke Indoors | US EPA; DIY air cleaners evidence review Jan 25 2023 - FINAL ENGLISH.pdf (ncceh.ca)



PowerPoint Presentation (epa.gov)

For a video on building your own air filter from the Bow Valley Clean Air Society please visit: https://youtu.be/w9g7018kAxU?si=-TI15MI98cjycMLY

Resource 12: HVAC Standards[21]

If you have a central HVAC, you can install a high efficiency filter (MERV 13 of higher). Run the system's fan as often as possible to get the most out of the filter.

During periods of heavy smoke, plan to replace the filter in your air cleaner or HVAC system more often than recommended by the manufacturer. If you notice that filters appear heavily soiled when you replace them, you should consider changing them more frequently.

Maintain humidity levels between 35% and 50%.

Maintain a temperature at or below 26^{0}C. This can be done through centralized HVAC systems, and portable air conditioners. Other methods to keep cool include closing blinds, spending time in a basement or other cooler areas of the building, staying hydrated, using fans, cool showers, misting, damp wet towels, avoiding hot meals and reducing use of electrical appliances (Health Canada, 2011).

Resource 13: Portable Air Cleaners

When considering air cleaners (purifiers), the major characteristics to be evaluated are: 1) the types and number of air filters and 2) the air exchange capacity. Cleaners function by forcing air (with particles) through a filtration system that removes particles, returning clean air to the room. The rate at which the air is cleaned and returned will determine the capacity in cubic ft/minute. The recommended exchange target is 5 times the cubic space for the room per hour; that is completely exchanging the room's air five times in one hour.

There are several online review sites of which the following is one (https://www.alphachooser.com/air_purifiers-the-latest-air_purifiers_for_smoke). Some specifically address a single pollutant or set of pollutants (eg. smoke) such as the one above. In the above example, the Blueair Blue Pure 121 is the highest ranked PAC unit.

Additional Information on Portable Air Cleaners[22]:

PACs, also called air purifiers or air sanitizers, are stand-alone devices that can be operated to reduce the concentrations of pollutants indoors. PACs can target airborne

[21] Guidance for Cleaner Air Spaces during Wildfire Smoke Events - Canada.ca

[22] (Parichehr Salimifard Post-doctoral Researcher Emily Jones Doctoral Candidate Joseph Allen Associate Professor Director, All Rights Reserved ©2020)

particles, gases, or both. PACs employ various air-cleaning technologies that can be classified into two categories: 1) fibrous media air filters, and 2) electronic air cleaners. PACs with a specific type of fibrous media filter called a High Efficiency Particulate Air (HEPA) filter can be used to provide supplementary protection against airborne COVID-19 transmission. Only PACs with HEPA filters should be used to reduce COVID-19 transmission risks. Air cleaning devices with additional air cleaning technologies, such as ozone, UVC, or ion-generators, should be avoided for two main reasons: 1) their ability to improve air quality is less well-studied compared to fibrous media filters; and 2) their use may produce by-products that can cause adverse health effects.

The effectiveness of an air cleaner depends on several factors including the efficiency of its filter, the airflow rate through its filter, its location in a room, and its operating hours. One of the commonly used metrics to characterize the effectiveness of air cleaners is Clean Air Delivery Rate (CADR), expressed in cubic feet per minute (cfm). CADR is a function of 1) the single-pass efficiency of the filter and 2) the airflow rate passing through the filter.

To maintain good indoor air quality, providing 5 ACH (air change per hour) is recommended. In other words, the volume of air in the indoor space should be replaced with fresh outdoor air 5 times in an hour or one time every 12 minutes.

• Although air change rates most commonly refer to outdoor air ventilation, they are also used to describe how much clean air a PAC can provide to a space. For example, a PAC with a CADR of 30 cfm can be interpreted as equivalent to an additional 30 cfm of fresh outdoor air ventilation on top of the actual airflow rate due to outdoor air ventilation.

If the outdoor air ventilation rate is not reliably known, a simpler rule of thumb for sizing a PAC for a room of 500 ft2 area and 8 ft ceiling height is to select a PAC with CADR of 300 cfm. This PAC can provide a supplemental ~5 ACH in the room.

Association of Home Appliance Manufacturers (AHAM) reports (*www.ahamdir.com/room-air-cleaners*) the CADR values for three particle size ranges of 0.09-1.0 µm, 0.5-3.0 µm, and in 5.0- 11.0 µm. AHAM uses tobacco smoke particles to determine the CADR for particles in the 0.09-1.0 µm size range and reports the CADR values for particles in the 0.5-3.0 µm and 0.5-11.0 µm size ranges as dust and pollen, respectively. When choosing a PAC to reduce the risk of airborne COVID-19 transmission, consider the CADR value for tobacco smoke or dust.

Resource 14: Cleaner Air Spaces or shelter-in-place[23]

Choosing a Clean Air Shelter – Municipal Guide

1. Fitted with heating, ventilation and air conditioning (HVAC) or additional/portable air filtration and air conditioning systems that are capable of filtering fine particulate matter (PM2.5) and controlling temperature, relative humidity, and air exchange rate.

Performance indicators for proper operation of a building are outlined in Standard 62.1-2019 *Ventilation for Acceptable Indoor Air Quality of the American Society of Heating, Refrigerating and Air-Conditioning Engineers* (ASHRAE, 2019).

2. Equipped with an entryway that allows occupants to enter the building via a staging area, thus preventing the direct exposure of the indoor environment to outdoor air during entry and exit.

3. Able to prevent infiltration of outdoor air pollutants (e.g., quality doors, tight building envelope). If possible, windows may be sealed to reduce infiltration of outdoor air.

4. Sized to accommodate the highest capacity of occupants.

Maximum occupancy of buildings should be determined before an emergency to ensure that the building is capable of housing people safely.

Building occupancy recommendations are outlined in ASHRAE Standard 62.1-2019. Larger communities may require larger or multiple buildings than smaller communities.

5. Connected to emergency power in the possible event of a power outage. Fuel-burning generators can be used as a back-up power source, keeping in mind that they be located away from the building and downwind of any clean air intakes.

6. Staffed with a facility manager/building operator who understands the operation of the HVAC system and the air distribution of the building, and is able to monitor smoke conditions, interpret the data from alarms and monitoring equipment (e.g., PM2.5, carbon monoxide (CO), temperature, and humidity levels), and modify the operation of the system as needed.

Air systems should have adequate fresh air intakes during operation to prevent negative pressure in the building, which can draw pollutants inside.

7. Identify one or more facilities with tight sealing windows and doors and public access (for example, libraries, school gymnasiums, buildings at public fairgrounds or civic auditoriums).

As a rule of thumb, newer buildings will generally be more desirable than older ones.

[23] (Health Canada. 2020. Guidance for Cleaner Air Spaces during Wildfire Smoke Events)

Consider using institutional controls to limit smoke infiltration, such as limited door and window use.

Consider the following once the building has been selected *(Health Canada, 2020; USEPA, 2019):*

1. At a minimum, a cleaner air shelter should have central air conditioning with filtration that is at least medium or high-efficiency, particularly at the fresh (outdoor) air intake(s).

2. If needed, filters should be upgraded prior to the fire season after assuring that the system can handle the increased airflow resistance.

3. Building managers should ensure that filters are properly fit and sealed to prevent air bypassing the filter media.

4. Filters should be regularly maintained and/or replaced according to the manufacturer's recommendations. Even during smoke events, building managers should continue to ensure that the building is adequately ventilated and that fresh air intakes have high-efficiency (MERV 13 or higher) filters to clean the air entering the building.

5. The HVAC system must be capable of handling a pressure drop from installing a filter stack of MERV 13/14.

6. Install/inspect room air cleaners where appropriate, such as in cleaner air shelters with separate, smaller rooms (e.g. classrooms, meeting rooms).

7. Choose room air cleaners with sufficient capacity, i.e., a tobacco smoke Clean Air Delivery Rate (CADR) that is at least 2/3 the room volume.

8. Choose an air cleaner with a higher CADR for rooms with ceilings higher than 8ft. Ensure proper maintenance of air cleaners, keep spare filters on hand, and provide instructions on changing the filter to trained personnel.

9. Assure that the facility can handle the increased cooling load due to higher occupancy.

10. Install a properly calibrated carbon monoxide alarm that has a digital display and battery backup function (available at most hardware stores).

11. Provide a radio for updates on fire status and access to a telephone in case of emergency.

12. Ensure adequate services such as restroom facilities and garbage disposal/collection.

13. Odor-removing filters may be considered for occupant comfort.

14. The building should be equipped with a PM2.5 monitors to allow simultaneous measurement of indoor and outdoor levels.

15. For operations with a kitchen or cafeteria, cooking and using exhaust fans should be limited to periods when outdoor smoke levels are low. Operation of exhaust fans may increase infiltration of outdoor air through openings in the building envelope, and gas stoves can contribute to poor air quality if those fans are not operating.

16. Wet mopping of floors and other surfaces can reduce the amount of settled dust that can be re-suspended in indoor air.

Goals:

PM2.5 should be kept as low as possible. Indoor levels should be lower than outdoor levels.

Carbon monoxide (CO) should be kept below 10 ppm.

Carbon dioxide (CO_2) should be kept below 1000 ppm.

Temperature should be kept below 26 °C.

Relative humidity should be kept between 35 and 50%.

Other pollutants such as nitrogen oxides (NOx), polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) should also be kept as low as possible.

Resource 15: Clean Air Spaces

Inside Vehicles (USEPA, 2019)

Individuals can reduce the amount of smoke in their vehicles by keeping the windows and vents closed, and, if available, operating the air conditioning in "recirculate" mode. The ventilation systems of older cars typically remove a small portion of the particles coming in from outside. Newer models may have better air filters that remove more particles from the air, but the vehicle owner should not assume that they will get the same level of protection they would get from a dedicated clean room or cleaner air space. Most vehicles can recirculate the inside air, which will help keep the particle levels lower. Drivers also need be aware of carbon dioxide build up in newer cars with the vents and windows closed. If driving a vehicle for a long period of time, open windows or vents occasionally when smoke levels are low to avoid a buildup of carbon dioxide. Vehicles should not be used as a shelter, but rather as a means of transportation to indoor locations with cleaner air.

Offices and Similar Indoor Workplaces (USEPA, 2019)

Wildfire smoke can be a hazard for people who work in offices and commercial buildings. Office building HVAC systems are much more complicated than homes. Eliminating or substantially reducing the outdoor air supply in office buildings and other indoor workplaces as a first step to reduce exposure to smoke is generally not recommended. Changing the outdoor air supply in public and commercial buildings can adversely affect

other essential functions of the building. These buildings typically have heating, ventilating and air conditioning systems (HVAC systems) that bring outside air into the building through filters, blend it with building return air, and thermally condition the air before distributing it throughout the building. These buildings also have exhaust air systems for restrooms and kitchens, and may also have local exhaust systems for garages, laboratory fume hoods, or other operations. These exhaust systems require makeup air (outdoor air) in order to function properly. Also, without an adequate supply of outdoor air, these systems may create negative pressure in the building. Negative pressure will increase the movement of unfiltered air into the building through any openings, such as plumbing/sewer vents, doors, windows, junctions between building surfaces, or cracks. In general, buildings should be operated at slight positive pressure in order to keep contaminants out, and to help exhaust air systems function properly.

HVAC systems should be operated continuously while occupied in order to provide the minimum quantity of outdoor air for ventilation, as required by the standards or building codes to which the building was designed. For many office buildings, this is often in the range of 15–20 cubic feet per minute (cfm) per person, although it could be less in older buildings.

Steps for Building Managers to Protect Office Workers

1. Ensure that the HVAC system's filters are not dirty, damaged, dislodged, or leaking around the edges.

2. Before the wildfire season or during smoke events if necessary, employers and building operators should ensure that a qualified technician inspects the HVAC systems, makes necessary repairs, and conducts appropriate maintenance.

3. Filters should fit snugly in their frames, and should have gaskets or sealants on all perimeter edges to ensure that air does not leak around the filters.

4. Consider installation of the highest efficiency filters that do not exceed the static pressure limits of the HVAC systems, as specified by the manufacturer or system designer.

5. Pressure gauges should be installed across the filter to indicate when the filter needs replacing.

6. Indoor contaminants can be further reduced by using stand-alone high-efficiency particulate air (HEPA) filtering units

Resource 16: Funding

- Government of Canada – Environment and Climate Change Canada Funding Programs Environment Climate Change Funding

- Green Municipal Fund - GMF helps local governments switch to sustainable practices faster. Our unique mix of funding, resources and training gives municipalities the tools they need to build resiliency — and create better lives for Canadians.
  Green Municipal Fund | Federation of Canadian Municipalities (fcm.ca)

- Clean Energy Improvement Program - Municipalities can now work towards establishing a program that will make energy efficient upgrades easier and more affordable.
  Clean Energy Improvement Program | Alberta.ca

- EcoAction Community Funding Program - The EcoAction Community Funding Program provides financial support to non-profit and non-government organizations for local action-based projects that produce measurable, positive effects on the environment. 2021 funding is available for freshwater, but a new area is picked yearly.
  EcoAction Community Funding Program - Canada.ca

- Federation of Canadian Municipalities - grants for partner organizations to deliver asset management training and tools to Canadian municipalities/
  Grants for partner organizations | Federation of Canadian Municipalities (fcm.ca)

Appendix A

One of the strategies for reducing exposure to wildfire smoke is to stay in a cleaner air space, where steps have been taken to limit infiltration of the pollutants from wildfire smoke along with controlling other factors associated with poor indoor air quality. The following two checklists can be used by local jurisdictions for selecting or retrofitting a building to be used as a cleaner air space and operational considerations during a wildfire event.

PREPARING A CLEANER AIR SPACE

1	Select a central heating, ventilation, and air conditioning (HVAC) system that is capable of filtering fine particulate matter ($PM_{2.5}$), and controlling temperature, relative humidity, and air exchange rate. An HVAC specialist may also recommend additional air filtration or air conditioning equipment for use during a wildfire smoke event, where necessary.
2	If available, consider having a vestibule or other entryway that does not directly expose the indoor environment to outdoor air, to limit infiltration of pollutants during entry and exit.
3	Create a tight envelope (i.e., well sealed doors and windows) to prevent infiltration of pollutants from outdoor air.
4	Install carbon monoxide (CO) alarm(s), preferably those featuring a low-level digital display showing real-time readings.
5	Install $PM_{2.5}$ monitors to allow simultaneous measurement of indoor and outdoor levels.
6	Ensure adequate space is available to accommodate the highest capacity of occupants.
7	Ensure suitable electrical capacity to handle additional equipment.
8	Consider emergency power in the possible event of a power outage, keeping in mind to locate any generators away from the building and downwind of any clean air intakes.

PREPARATION DURING A WILDFIRE EVENT

1	Assign a facility manager who has an understanding of the HVAC system operation and the air distribution of the building, and can monitor indoor and outdoor pollutant levels and control the environmental conditions.
2	Use filters for the HVAC system with a minimum efficiency reporting value (MERV) rating of 13 or more to remove $PM_{2.5}$. Ensure replacement filters are available. Replace filters as required. Odour-removing filters may be considered for occupant comfort.
3	Consider using portable cleaners with high efficiency particulate air filters.
4	Recirculate the air outdoor conditions are poor and draw in fresh air when the smoke plume abates to reduce the levels of pollutants trapped indoors, such as carbon dioxide (CO_2).
5	Evacuate immediately if CO alarm sounds. Consider using monitoring alarms with low-level displays and take appropriate action as recommended. Evacuation procedures should be planned in advance.
6	For buildings with kitchen or cafeteria, limit cooking and using exhaust fans to periods when outdoor smoke levels are low. Individual HVAC air handling systems may need to be adjusted or curtailed when the building is used as a cleaner air space, as determined by an HVAC specialist or facility manager.
7	Strive for a humidity level of 35 to 50% and a temperature of 26 °C or lower, using air conditioning and dehumidifiers.
8	Minimize movement of people in and out of the building.
9	Wet-mop the floors and other surfaces to reduce the amount of settled dust that can be resuspended in indoor air.

PREPARE YOURSELF FOR THE WILDFIRE SMOKE SEASON

The following checklist is for the general public to prepare for the wildfire smoke season.

1	Are you or is someone in your family at risk for wildfire smoke health effects?	Some people may be more sensitive to the health effects of wildfire smoke exposure, including: seniors pregnant people infants and young children people who work outdoors people involved in strenuous outdoor exercise people with an existing illness or chronic health conditions, such as: cancer, diabetes, mental illness, lung or heart conditions
2	Do you have an adequate supply of medications?	If you, or members of your family, are in one or more of the at-risk groups and are in a region where air quality is impacted by wildfire smoke, be prepared by: speaking with a doctor or health care provider about developing a management plan for wildfire smoke events. maintaining a supply of necessary medications at home and always carrying these medications with you during wildfire season. Work with your health care provider to create a plan on what to do in case your medications are unable to stabilize your condition. Consider these points to ensure you are prepared for a wildfire smoke event.
3	Do you have an adequate supply of food and water?	
4	Do you have spare filters for the air filtration unit (a high efficiency heat ventilation air conditioning (HVAC) system or an air purifier) in your home?	To ensure you have clean air in your home, you can prepare in advance by: learning how to use recirculation settings on your HVAC system to prevent smoke from entering your home purchasing a clean, good quality air filter (for example, HEPA filter) for your ventilation system. See Health Canada, 2020. Wildfire smoke 101: Using an air purifier to filter wildfire smoke for details. ensuring you have at least one functioning carbon monoxide alarm in your home To find more information on protecting your indoor air when your outdoor air is poor, visit: Factsheet: Protecting your indoor air from outdoor pollutants Infographic: Protecting your indoor air from outdoor pollutants
5	Do you know where you can go to take a break from the smoke?	If you can't maintain clean air inside your home during a wildfire smoke event, be aware of locations in your community where you can find clean air. Libraries, shopping malls and community centres typically have filters and air conditioning

		that make them safe places to take a break from the smoke. For more information, contact your local health or emergency authorities. Please be sure to respect the COVID guidance on physical distancing from the local authorities in that area.
6	Do you know where to find information about local air quality conditions?	Use the interactive Air Quality Health Index (AQHI) map.
7	Do you know where to look for help during an emergency?	**Resources & Tools** Alberta Emergency Alerts App Alberta Wildfire App Help in Tough Times - Resources for people affected by wildfire Public Health: Coping with Emergencies Support For Albertans Affected By Wildfire (printable) **Emergency planning and alerts** 72 Hour Emergency Kit (Government of Alberta - Alberta Emergency Management Agency) Alberta Emergency Alert (Government of Alberta) Alberta Government Wildfire Page

Appendix B

Wildfires play an important role in Alberta's ecosystems. They create new habitat for wildlife and reduce the amount of fuel on the forest floor. However, wildfires can be unpredictable and difficult to control. Prescribed fires (or intentionally planned and lit fires) are safely controlled by experienced fire personnel. They can help to mimic naturally occurring wildfires.

To learn more about fire and disturbance ecology, visit Fire and disturbance ecology - Science and conservation (pc.gc.ca)

PRESCRIBED FIRE OPERATIONS

Prescribed fires help to restore healthy forests and grasslands. They enhance habitat for wildlife. They also reduce the risk of wildfire to our communities. Prescribed fires are only lit when predetermined weather and site conditions are met.

For information on prescribed fires in national parks (Banff, Jasper, Waterton), visit:

https://www.pc.gc.ca/en/nature/science/conservation/feu-fire/feuveg-fireveg/dirige-prescribed/projet-projects

For more information on prescribed fires across Alberta, visit:

Prescribed Fire | AAF - Agriculture and Forestry (alberta.ca)

Appendix C

Additional supporting documents

1. HEALTH IMPACT ANALYSIS OF $PM_{2.5}$ FROM WILDFIRE SMOKE IN CANADA (2013-2015, 2017-2018); 2020 HEALTH IMPACT ANALYSIS OF PM2.5 FROM WILDFIRE SMOKE IN CANADA (2013–2015, 2017–2018) - SCIENCEDIRECT

   Carlyn J Matz [1], Marika Egyed [2], Guoliang Xi [3], Jacinthe Racine [4], Radenko Pavlovic [5], Robyn Rittmaster [6], Sarah B Henderson [7], David M Stieb [8]

2. Health impact analysis of PM2.5 from wildfire smoke in Canada (2013-2015, 2017-2018) - PubMed (nih.gov)

3. SMOKE EXPOSURE FROM WILDFIRE: GUIDELINES FOR PROTECTING COMMUNITY HEALTH AND WELLBEING; GOVERNMENT OF NORTHWEST TERRITORIES, MAY 2016 SMOKE-EXPOSURE-WILDFIRE-GUIDELINES.PDF (GOV.NT.CA)SMOKE-EXPOSURE-WILDFIRE-GUIDELINES.PDF (GOV.NT.CA)

4. City of Calgary Climate Ready Home Guide. There are some materials specific to managing wildfire smoke. https://www.calgary.ca/environment/climate/climate-ready-home-guide.html