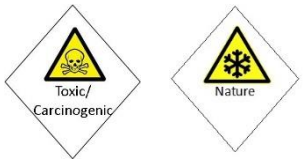
PURPOSE/APPLICATION

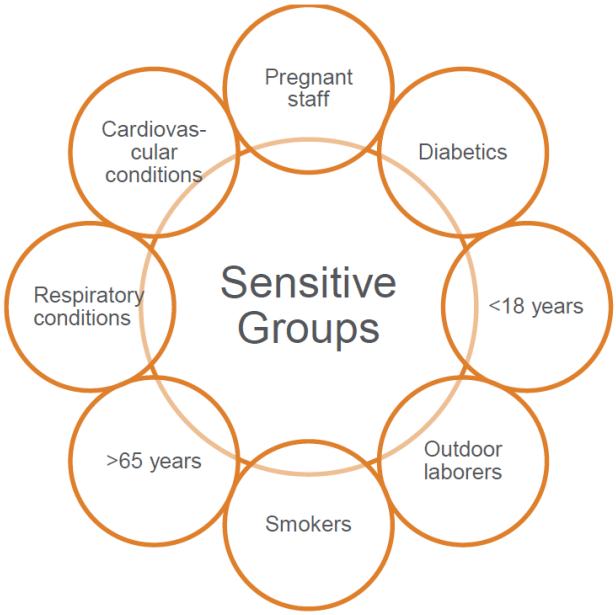
To provide guidance on management of the hazards associated with wildfire smoke common in Western Canada. During the wildfire season (generally early April to late October), fire can spread quickly through grasslands and forests producing dense smoke that can be a major source of toxic air pollutants. Smoke can be carried by high winds to work locations that are downwind hundreds or even thousands of kilometers away.

PPE	CPES minimum requirements Respirators (where required)
TRAINING	CPES HSE Orientation Site/Client Orientation (where required)
HAZARDS & CONCERNS	Exposure to hazardous air bourn substances Eye irritation Exacerbation of pre-existing health conditions



PRECAUTIONS

Workers with respiratory or cardiovascular conditions are more sensitive to the impact of wildfire smoke. Respiratory illnesses include conditions such as asthma, chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema, or lung cancer. Cardiovascular conditions include angina, previous heart attack, stroke, congestive heart failure, or heart rhythm problems (arrhythmia or irregular heartbeat). Workers with diagnosed respiratory conditions should follow their Physician's direction for working outdoors.



HEALTH HAZARDS ASSOCIATED WITH WILDFIRE SMOKE

Wildfire smoke is a mixture of gases and fine particulate created from the burning of trees and other organic materials. The composition of wildfire smoke can be highly variable however it traditionally contains the following:

Common Wildfire Smoke Component	Potential Symptoms of Exposure
Particulate matter 2.5 µm	Stinging eyes, scratchy throat, runny nose, coughing, sinus irritation, wheezing, shortness of breath, headaches, and fatigue
Carbon monoxide	Headaches, weakness, dizziness, confusion, visual impairment
Nitrogen dioxide	Irritation eyes, nose, throat; cough, breathing difficulty, chest pain
Sulfur dioxide	Irritation eyes, nose, throat; nasal mucus, choking, cough
Ozone	Irritation eyes, sore throat, chest pain when taking deep breath

Additionally, depending on type of material burned, wildfire smoke can contain volatile organic compounds and polycyclic aromatic hydrocarbons.

MONITORING EXPOSURE LEVELS

In Canada, the Air Quality Health Index (AQHI) is a scale ranging from 1 to 10+ designed to help understand the impact of air quality on health. This index is based on three-hour average concentrations of ground-level ozone, nitrogen dioxide, and fine particulate matter (PM2.5). Note, once the AQHI reaches 10+, air quality conditions may still become worse, there is just no higher rating.

Note, that the AQHI was developed for the general population with special considerations to sensitive exposure groups (e.g., infants, elderly, persons with heart or lung disease, etc.). Therefore, it is more conservative than established occupational exposure limits (OELs). While the AQHI and Air Quality Index (AQI) can be useful in understanding work conditions, (especially when monitoring is unavailable or when used in supplements), OELs are more appropriate and representative of the risk for the general workforce. In general, the long-term health risks from short-term exposure to low or moderate levels of smoke during a wildfire event are considered to be low.

All efforts should be made to obtain the best available data on local air quality. Seek regular updates from site owners and prime contractors where on-site air quality measurement devices are used to provide real time information about air quality. In high-risk areas Smoke Forecast Canada and FireWork are useful tools for predicting daily smoke forecasts in the evening or morning from early April to late October. **Note:** that the purpose of FireWork is to indicate anticipated air quality conditions, not the current air quality.

RECOMMENDED MITIGATIONS FOR EXPOSURE LEVELS

AQHI	ACTIONS	PPE RECOMMENDATIONS
Low: 1-3	No work restrictions	No additional PPE recommended
Moderate: 4-6	No work restrictions Monitor AQHI for further deterioration	Consider the distribution of particulate respirators for voluntary use
High: 7-10	Consider adding 15-minute breaks at least once every four hours during strenuous and emergency work outdoors Breaks should be in an air-filtered environment – office trailer, enclosed cab of vehicle with windows closed Workers with underlying health conditions that may be impacted should be offered the option to leave the worksite until conditions improve	N-95 air-purifying respirators with should be made available for use by all workers
Very High: 10+	Consider limiting strenuous outdoor work to emergency work until the index is downgraded 15-minute breaks should be given as required (minimum of every 4 hours) during strenuous and Emergency Work outdoors Breaks should be in an air-filtered environment – office trailer, enclosed cab of vehicle with windows closed Workers with underlying health conditions that may be impacted should be offered the option to leave the worksite until conditions improve	N-95 or Half-mask air-purifying respirators with P-100 filters should be made available and encouraged for use by all workers Where required, it testing should be done according to CSA Standard Z94.4-02, Selection, Use, and Care of Respirators

OTHER PRECAUTIONS

Other considerations to assess when potential exposure to wildfire smoke exists include, but are not limited to:

- Office trailers: Ensure windows are closed and trailers are equipped with properly maintained filters. High-efficiency particulate air - HEPA filters are recommended.
- Air intake: Adjust HVAC systems of buildings and vehicles to increase recirculation of air. Close fresh-air intakes on HVAC systems to prevent wildfire smoke from getting inside.
- Heat stress: Proximity to a wildfire and working under a respirator will increase the likelihood of heat

stress. It is estimated that working under a half-mask respirator will increase a worker's heat exposure by approximately 2°C.

- Eye irritation: Smoky air conditions may cause eye irritation, such as itching, red, burning, or watery eyes. Refrain from rubbing your eyes to avoid transferring contaminants from your hands to your face and eyes. In cases where eye irritation requires first aid attention, flush your eyes with clean water from an eye wash station.

PPE CONSIDERATIONS

During intense periods of poor air quality, N95 masks are a common choice to protect workers.

- Depending on the relevant legislation or client requirements, workers may require a N95 mask fit-test prior to use. In the event of an emergency such as a wildfire evacuation, a worker may elect to wear a N95 mask for protection against inhalation of wildfire smoke without the requirement for a fit test.
- As an alternative to N95 masks, workers can also elect to wear a fit-tested half/full-face respirator with P100 filters. Where required, fit testing should be done according to CSA Standard Z94.4-02, Selection, Use, and Care of Respirators.

STYLE	SPECIFICATIONS	CARE
N95 	N95 Respirators are generally the preferred respirator for working in wildfire smoke. These respirators remove 95% of particulates when worn according to the manufacturer's specifications. To select a respirator that is approved by Health Canada verify: NIOSH N95 or CA-N95 and CA-N99 (will be stamped on the device). Although typically sold as once size-fits-all however some individuals will require alternative sizing. Some N95 models are available in multiple sizes.	Typically, single-use and disposable, but may be reused until visibly dirty, damp, or damaged.
P100 	P100 Respirators remove 99.9% of particulates when worn according to the manufacturer's specifications. To select a respirator filter that is approved by NIOSH, filters should be marked with P100.	Typically, reusable respirators should be cleaned and stored as per the manufacturer's specifications. Filters should be replaced as per the manufacturer's specifications.

FIT TESTING REQUIREMENTS

When required by legislation or client requirements, fit testing for N95, half face, or full-face respirators should be completed according to CPES's HSESM Section 6 PPE, and COP-02 Respiratory Protection.

FIELD SEAL CHECK FOR RESPIRATORS

When using air-purifying respirators, workers must perform a field seal check to ensure the mask is properly sealed. The field seal check consists of a negative and positive pressure check.

N95 RESPIRATORS

1. Put the respirator on and arrange the straps or ear loops. If the respirator has two vertical straps, the top one should sit above your ears and the lower one should sit below your ears:	**2.** Mold the nose piece (usually a metal strip) around the bridge of your nose with both hands to create a snug fit.	**3.** Test the respirator for leaks by covering it with both hands. When you inhale, the material should pull in towards your face. When you exhale, you should not feel air escaping from around the edges. If air leaks in or out around the nose, re-mold the nosepiece. If air leaks in or out around the cheeks or chin, adjust the placement of the straps on your head or tighten the ear loops. If you cannot get a good fit, ask your supervisor for a respirator that is better fitted to your face.
		

P-100 RESPIRATORS

1. The negative pressure check (Figure 1) is conducted by closing off the inlet opening with the palm of the hand.
2. Inhale so that the face piece collapses slightly and hold your breath for 10 seconds. The face-to-face piece seal is acceptable if the face piece remains slightly collapsed and no inward leakage of air is noticed.
3. The positive pressure check (Figure 2) is conducted following the negative pressure check.
4. Cover the exhalation valve with your hand and exhale gently into the facepiece. The seal is acceptable if slight positive pressure can be built up inside the face piece without detection of outward leakage of air.
5. If the seal check fails, the respirator should be re-checked for tears, cuts or distorted or missing valves. The respirator can also be re-adjusted. Continued failure of the seal check should be reported to the supervisor.

Figure 1: Negative Pressure Check

Figure 2: Positive Pressure Check

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