WILDFIRE SMOKE CODE

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1.0 PURPOSE

The Company has developed a Wildfire Smoke Code to identify the proper level of protection that will assist all employees in performing their tasks effectively and efficiently when working in an environment where wildfire smoke is present. This code will help employees minimize the risks of exposure and gain knowledge of safe work practices.

2.0 SCOPE AND APPLICATION

The guidelines and recommendations are provided to increase awareness of correct control measures to be used by Company employees and contractors where there may be potential exposure to wildfire smoke. In conjunction with referenced legislation, this code is to be viewed as the minimum requirements identified by the Company as it applies to wildfire smoke. This code applies, without exception, to all Company Divisions, Departments, or subsidiaries.

3.0 DEFINITIONS

The following definitions are specific to the Wildfire Smoke Code. This list is not to be considered exclusive, and additional definitions may be required for specific applications as outlined in company standard operating procedures.

3.1 ACGIH

American Conference of Governmental Industrial Hygienists.

3.2 Air Quality Index (AQI)

This map provides the Air Quality Index (AQI) for a specific location and shows the range of air quality from good to hazardous. The AQI is the EPA's color-coded tool for communicating air quality to the public.

3.3 Air Quality Health Index (AQHI)

The Air Quality Health Index is a tool that relates the air quality outside to your health, using a scale from 1 to 10+. The higher the AQHI number, the greater the health risk and the need to take precautions.

3.4 CDC

Centers for Disease Control and Prevention.

3.5 Company

Means North American Construction Group Ltd. (NACG) and all directly or indirectly owned subsidiary companies, including joint ventures.

3.6 Company Personnel

Includes the Company's employees, officers, directors, agents, associates, consultants/contractors, temporary employees, and third-party processors.

3.7 Strenuous Activity

Something that takes a lot of effort, work, or energy.

3.8 µm

Microns, or micrometers (represented as µm), are a measurement length equal to one-millionth of a meter. (1,000µm is equal to 1mm.)

3.9 Wildfire

A wildfire is an uncontrolled fire that burns in wildland vegetation, often occurring in rural areas. Wildfires can ignite in forests, grasslands, savannas, and other ecosystems.

4.0 EXPECTATIONS

The Wildfire Smoke Code has been developed to establish essential guidelines and protocols to ensure that all individuals associated with the company, including employees, contractors, visitors, and the general public, are well-informed about the potential risks and hazards associated with working in and being exposed to smoky conditions. It aims to provide comprehensive information and instructions on effectively mitigating these risks.

This code is designed to work in conjunction with existing provincial and federal legislation and regulations within the company's areas of operation. While it serves as a supplement, it does not supersede any regulatory requirements mandated by the relevant authorities.

5.0 ROLES AND RESPONSIBILITIES

5.1 Employees

- Properly wear and use the appropriate personal protective equipment specified in this code in accordance with the training and instruction received,
- Inspect personal protective equipment before using it,
- Not use personal protective equipment that is unable to perform the function for which it is designed,
- Be responsive, through adequate training, to minimize the risk of exposure when working in a smoky climate/condition,
- Immediately inform the Supervisor of any violations or infractions of this code that did or could result in an incident or injury to the worker, employees, contractors, or general public within the area,
- Immediately inform the Supervisor of any change in climate or weather conditions that may adversely affect the safety of employees, contractors, or the general public within the area,
- Ensure that a “buddy system” monitoring process is exercised when required to minimize the risk of exposure to employees during work activities.
- Adhere to workplace safety protocols and guidelines related to wildfire smoke.
- Follow instructions from HSE or supervisors regarding outdoor work activities or work schedule adjustments.

5.2 Supervisors

- Ensure that workers properly use and wear the appropriate personal protective equipment specified in this code in accordance with the training and instruction received,
- Ensure appropriate personal protective equipment as specified in this code is readily available for all employees, contractors, visitors within Company areas of operation or active worksites,
- Immediately correct any violations or infractions of this code that have been brought to the attention of the supervisor, which did or could result in an incident or injury to the worker, employees, contractors, or general public within the area,
- Provide corrective actions or discipline required to ensure compliance with this code and document action appropriately,
- Inform site security and proper authorities of wildfires,
- Stay informed about current air quality levels using reliable sources, such as local air quality monitoring websites, apps, and alerts,

- Continuously assess the air quality and make necessary adjustments to work practices based on changing conditions,
- Provide regular updates to employees about air quality levels and any changes in workplace practices or safety measures,
- Ensure availability and distribution of personal protective equipment (PPE), such as N95 respirators, to employees who need to work outdoors.
- Reschedule, relocate, or limit outdoor work activities based on air quality levels.

5.3 Management

- Ensure compliance with this code by all levels of the company, including contractors, visitors, and the general public within Company areas of operation or active worksites.
- Ensure adequate training and monitoring for compliance is established through the use of the Corporate Health, Safety, and Environment team.

6.0 METHOD

6.1 Wildfire Smoke

Wildfire smoke is comprised of a mixture of gaseous pollutants (e.g., carbon monoxide), hazardous air pollutants (HAPs) (e.g., polycyclic aromatic hydrocarbons [PAHs]), water vapor, and particle pollution. Particle pollution represents a central component of wildfire smoke and is the principal public health threat.

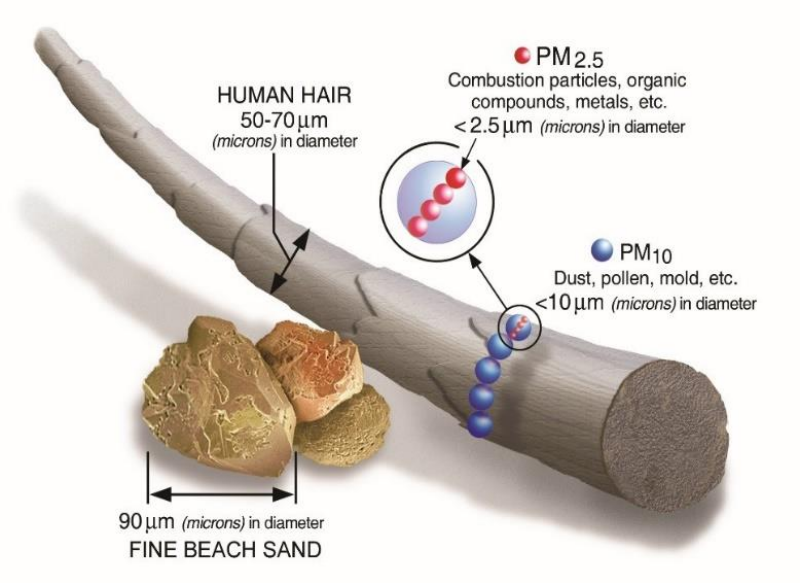
Particle pollution (also referred to as particles, particulate matter, or PM) is a general term for a mixture of solid and liquid droplets suspended in the air. There are many sources of particle pollution; the most common is combustion-related activities, such as wildfires. Because of various sources, particles come in many sizes and shapes. Some particles are so small that they are only visible using an electron microscope (see Figure 1-1). Particles can be made up of different components, including acids (e.g., sulfuric acid), inorganic compounds (e.g., ammonium sulfate, ammonium nitrate, and sodium chloride), organic chemicals, soot, metals, soil or dust particles, and biological materials (e.g., pollen and mold spores).

Particles in the air are characterized by aerodynamic diameter and can be grouped into two main categories:

- Coarse particles (PM10-2.5) are particles with diameters generally larger than 2.5 µm and smaller than or equal to 10 µm. Coarse particles are primarily generated from mechanical operations (e.g., construction and agriculture), but a small percentage is present in wildfire smoke (Vicente et al. 2013; Groβ et al. 2013).

- Fine particles (PM2.5), generally 2.5 µm in diameter or smaller, represent the primary pollutant emitted from wildfire smoke, comprising approximately 90% of total particle mass (Vicente et al. 2013; Groβ et al. 2013). Fine particles from wildfire smoke are of most significant health concern. This group of particles also includes ultrafine particles, generally classified as having diameters less than 0.1 µm.

Figure 1-1 Particle pollution



6.2 Understanding the Potential Risk of Exposure to Wildfire Smoke

Particle pollution exists in the air, both indoors and outdoors. Because of their small size, particles can easily penetrate buildings, increasing indoor particle concentrations. During a wildfire or other combustion-related activities, concentrations of particles can substantially increase in the air to the point that particle pollution is visible to the naked eye.

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 and work in these areas. The most significant health risk comes from small particles in the smoke. These particles can enter the eyes, breathing (respiratory) system, and bloodstream. This can cause:

- Burning eyes,
- Runny nose,
- Coughing,
- Trouble breathing or illnesses like bronchitis.

Individuals with the following conditions may experience adverse effects at lower smoke levels and earlier exposure:

- Heart or lung disease (such as congestive heart failure, angina, chronic obstructive pulmonary disease, emphysema, asthma),
- Older adult (especially if you have heart or lung disease),
- Pregnant,
- Smoke,
- Do heavy/strenuous outdoor work.

Figure 1-2 Risk of Exposure

Irritation of the eyes	▪ Burning ▪ Red eyes
Respiratory symptoms	▪ Coughing ▪ Phlegm ▪ Wheezing ▪ Difficulty breathing
Respiratory effects	▪ Bronchitis ▪ Reduced lung function ▪ Increased risk of asthma exacerbation and aggravation of other lung diseases ▪ Increased risk of emergency room visits and hospital admissions.
Cardiovascular effects	▪ Heart failure ▪ Heart attack ▪ Stroke

6.3 Wildfire Smoke Air Quality Response Plan Based on AQHI

The Air Quality Health Index (AQHI) is a scale designed to help individuals understand what the air quality around them means to their health. The AQHI scale ranges from 1 to 10+, with higher values indicating a higher health risk.

6.3.1 Monitoring and Communication

- **Regular Monitoring**: Use local AQHI monitoring tools (e.g., Environment Canada, Weather CAN app) to monitor AQHI levels in real-time.
- **Communication Plan**: Establish clear communication channels on site to inform employees about AQHI levels and necessary actions. Use emails, text alerts, or a dedicated communication platform.

6.3.2 AQHI Levels and Corresponding Actions

6.3.2.1 AQHI 1-3 (Low Risk)

- **Action**:
  - No specific actions are required. Ideal air quality for outdoor activities.
- **Communication**:
  - Inform employees that air quality is good and no precautions are necessary.

6.3.2.2 AQHI 4-6 (Moderate Risk)

- **Action:**
  - Consider reducing or rescheduling strenuous outdoor activities, particularly for those with respiratory issues or other health conditions.

- **Communication:**
  - Notify employees about moderate risk and advise sensitive individuals to limit outdoor activities.

6.3.2.3 AQHI 7-10 (High Risk)

- **Action:**
  - Reduce or reschedule strenuous outdoor activities. Sensitive groups should avoid outdoor physical activities.
  - Close windows and doors.
  - Use air purifiers with HEPA filters in work areas.
  - Provide N95 respirators for employees who must work outdoors.

- **Communication**:
  - Alert employees about the high risk. Reduce or reschedule strenuous activities outdoors.

6.3.2.4 AQHI 10+ (Very High Risk)

- **Action:**
  - Avoid all outdoor physical activities.
  - Remain indoors if possible and keep indoor air clean.
  - Cease all non-essential outdoor operations.
  - Implement remote work options if possible.
  - Ensure HVAC systems are running efficiently with clean filters.

- **Communication:**
  - Alert employees about the high risk. Limit outdoor activities and remain indoors as much as possible.

NOTE: Air Quality Health Index (AQHI) ratings are regional and may not accurately reflect the air quality at specific work sites. Site-specific conditions may vary, potentially necessitating different levels of response.

6.3.3 Smoke Inhalation

If personnel experience health symptoms related to wildfire smoke exposure, such as breathing difficulties or respiratory issues, immediately move to an indoor environment, such as a vehicle or building, with better air quality. Once inside, contact the supervisor for assistance and seek appropriate medical attention promptly.

6.4 Prevention Practices

During an air quality event, all individuals working within the affected area are advised to be aware of potential health concerns that can be associated with poor air quality conditions and take the following precautions to reduce exposure and risk:

- Close all outside windows and doors (field office and lunchrooms).
- Turn down furnace thermostats and furnace fans to the minimum setting.
- Reduce physical activity levels, as necessary, to decrease the inhalation of airborne pollutants.
- If you have an air conditioner, keep the fresh-air intake closed and the filter clean to prevent outdoor smoke from entering.

- When operating equipment and light vehicles, keep windows and vents closed. Run fans on re-circulate mode to avoid drawing in outdoor air.
- Smoking during wildfire smoke events can significantly worsen health risks due to the combined exposure to harmful pollutants.

Due to the poor air quality, individuals with respiratory conditions (such as COPD and asthma) and individuals with existing cardiovascular conditions (such as angina, previous heart attack, and congestive heart failure) may notice a worsening of symptoms. Monitor for worsening symptoms and take the precautions recommended by their physician.

6.4.1 Respirators for Wildfire Smoke

To protect the health of employees from wildfire smoke, prioritize accessing cleaner air. Options include using a portable air cleaner, finding indoor environments with filtered air, or relocating to areas with less smoke. If cleaner air is not accessible, certain respirators and filters can offer protection from wildfire smoke. Understand their limitations and potential risks (refer to Appendix B—Respiratory Protection Guideline).

Respirators are identified by letter and number combinations, such as N95, which indicate different testing standards (see 950C-C-050 PPE—Respiratory Protection Code).

Key points for effective filtration of fine particles:

- A proper fit is critical. Inhaled air must pass through the filter material, not around it.
- A well-fitted respirator can reduce fine particle concentrations by over 90%.

6.5 What to Do When a Wildfire Approaches

Adhere to instructions from emergency officials and evacuate the area immediately if directed.

Steps to ensure a safe evacuation:

- Monitor Updates: Monitor updates from local news stations, emergency services, and official media channels for real-time information.
- Communication Systems: Utilize the site's communication systems (e.g., two-way radios, PA systems) to inform everyone about the situation.
- Emergency Evacuation Plan: Ensure all workers are familiar with the site's emergency evacuation plan, including assembly points and evacuation routes.
- Gather Personnel: Assemble all workers. Conduct a headcount to ensure everyone is accounted for.
- Documentation and Equipment: Secure important site documents (e.g., plans, permits) and power down heavy machinery. Disconnect electrical equipment and shut off gas supplies (If possible).

6.6 Reporting Wildfires

Report any observed fires to the appropriate authorities. Follow emergency procedures and promptly notify site security. If a fire is observed outside of regular working hours, contact emergency services by dialing 911.

7.0 TRAINING REQUIREMENTS AND MATERIALS

- New Hire Orientation

- Standard First Aid
- All workers must undergo fit testing before using a respirator to ensure it fits properly and provides adequate protection. Follow 950C-C-050 PPE—Respiratory Protection Code.

8.0 RESOURCES

- Alberta Employment and Immigration – Work Safe Alberta – Best Practice – Working Safely in the Heat and Cold
- Alberta Occupational Health and Safety Code Part 18, Section 244-246 Respiratory Protective Equipment
- Alberta Government Bulletin FI007 Wildfire Smoke
- American Conference of Governmental Industrial Hygienists – TLVs and BEIs
- BC – Center for Disease Control
- United States Environmental Protection Agency, https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq U.S.
- Department of Health & Human Services – Centers for Disease Control and Prevention (National Institute for Occupational Safety and Health); https://www.cdc.gov/niosh/topics/firefighting/wffsmoke.html950C-C-050 PPE - Respiratory Protection Code
- US Department of Labour: Occupational Safety and Health Administration, Part 1910, Subpart I – Personal Protective Equipment, Standard Number 1910.134 Respiratory Protection
- Environmental Protection Agency (EPA) US Fire and Smoke Map or the state health department's air quality website.

9.0 SUPPORTING DOCUMENTS

- Health, Safety, and Environment Management System Standard

10.0 APPENDICES

- Appendix A – Respiratory Protection Guideline
- Appendix B **–** Occupational Exposure Limits

Appendix A Respiratory Protection Guideline

A.1 Personal Protective Equipment (PPE) Options for Wildfire Smoke

To safeguard against the adverse effects of wildfire smoke, selecting appropriate Personal Protective Equipment (PPE) is critical. The following PPE options are recommended:

Respirators

- **N95 Respirators**: These are the most commonly recommended for protection against wildfire smoke. N95 respirators filter out 95% of airborne particles, including PM2.5, providing adequate protection when properly fitted.
- **P100 Respirators**: These offer a higher level of filtration, removing at least 99.97% of airborne particles. P100 respirators are suitable for individuals requiring enhanced protection.

Contaminant	PPE Options			
	Choice	**Respirator**	**Cartridge / Filter**	**Eye Protection**
Wildfire smoke particulate & irritant chemicals	best	full face respirator	Multi-gas & p100 (Connected with filter adapter or combination cartridge)	provided by a face respirator
	better	half face respirator	Organic vapour / acid gas or organic vapour & p100 (Connected with filter adapter or combination)	goggles
	minimum	n95 particulate respirator	n/a	tight fitting safety glasses

Appendix B Occupational Exposure Limits

B.1 Occupational Exposure Limits (OELs) in Canada

Various provincial and federal agencies in Canada set Occupational Exposure Limits (OELs) for particulate matter and carbon monoxide (CO). These limits are often based on the American Conference of Governmental Industrial Hygienists (ACGIH) recommendations but can vary by jurisdiction.

- **Particulate Matter (PM):**

  ACGIH Guidelines (often adopted by Canadian provinces):

  - **Respirable Dust**: 3 mg/m³ (TWA)
  - **Inhalable Dust**: 10 mg/m³ (TWA)

- **Carbon Monoxide (CO):**

  ACGIH Guidelines:

  - **TLV (Threshold Limit Value):** 25 ppm (TWA)
  - **Ceiling Limit:** Not specified

Provincial OELs:

Alberta:	**Particulate Matter:**	Total Dust: 10 mg/m³ (TWA) Respirable Dust: 3 mg/m³ (TWA)
	Carbon Monoxide:	TWA: 25 ppm Ceiling Limit: 100 ppm (15 minutes)
British Columbia:	**Particulate Matter:**	Total Dust: 10 mg/m³ (TWA) Respirable Dust: 3 mg/m³ (TWA)
	Carbon Monoxide:	TWA: 25 ppm Ceiling Limit: Not specified
Ontario:	**Particulate Matter:**	Total Dust: 10 mg/m³ (TWA) Respirable Dust: 3 mg/m³ (TWA)
	Carbon Monoxide:	TWA: 25 ppm Ceiling Limit: Not specified

Reliable Sources for Canadian OELs

For the most accurate and up-to-date information, refer to the following resources:

- **Alberta**: Alberta OHS Code
- **Ontario**: Ontario Ministry of Labour, Training and Skills Development
- **British Columbia**: WorkSafeBC
- **ACGIH**: ACGIH TLVs and BEIs
- **Canada Labour Code**: Canada Labour Code

These sources provide comprehensive guidelines and regulations on occupational exposure limits and other safety standards specific to Canada and its provinces.

B.2 Occupational Exposure Limits (OELs) in the United States

In the United States, Occupational Exposure Limits (OELs) for particulate matter and carbon monoxide (CO) are set by various organizations such as the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).

- **Particulate Matter (PM):**

  OSHA:

  - **Respirable Dust**: 5 mg/m³ (TWA)
  - **Total Dust**: 15 mg/m³ (TWA)

  NIOSH:

  - **Respirable Dust**: 5 mg/m³ (TWA)
  - **Total Dust**: 10 mg/m³ (TWA)

- **Carbon Monoxide (CO):**

  OSHA:

  - **PEL (Permissible Exposure Limit):** 50 ppm (TWA)

  NIOSH:

  - **REL (Recommended Exposure Limit**): 35 ppm (TWA)
  - **Ceiling Limit:** 200 ppm (15 minutes)

Reliable Sources for U.S. OELs

For the most accurate and up-to-date information, refer to the following resources:

- **OSHA**: OSHA Standards
- **NIOSH**: NIOSH Pocket Guide to Chemical Hazards
- **ACGIH**: ACGIH TLVs and BEIs

These sources provide detailed guidelines and regulations on occupational exposure limits and other safety standards specific to the United States.