

Air Quality Policy

This policy has been developed by Triathlon BC to assist Race Directors and Technical Officials make an appropriate decision when the Field of Play is impacted by low visibility or forest fire smoke.

LOW VISIBILITY

Low visibility is generally caused by fog/mist or darkness.

The swim leg of an event is not to commence unless:

- The first turning mark is clearly visible from the start line, and
- Each subsequent turning mark is clearly visible to competitors, and
- Every position on the course has a clear view of a safe exit location on the shore

The bike leg of an event is not to commence unless there is at least 100m visibility at all positions on the course.

AIR QUALITY HEALTH INDEX

Overview

The *Air Quality Health Index* is standardised across Canada and provides a number from 1 to 10+ to indicate the level of health risk associated with local air quality. Occasionally, when the amount of air pollution is abnormally high, the number may exceed 10. The AQHI provides a local air quality current value as well as a local air quality maximums forecast for today, tonight and tomorrow and provides associated health advice.

As it is now known that even low levels of air pollution can trigger discomfort for the sensitive population, the index has been developed as a continuum: The higher the number, the greater the health risk and need to take precautions. The index describes the level of health risk associated with this number as 'low', 'moderate', 'high' or 'very high', and suggests steps that can be taken to reduce exposure.

Calculation

The national AQHI is based on three-hour average concentrations of ground-level ozone (O₃), nitrogen dioxide (NO₂), and fine particulate matter (PM_{2.5}). O₃ and NO₂ are measured in parts per billion (ppb) while PM_{2.5} is measured in micrograms per cubic metre (ug/m³). The AQHI is calculated on a community basis (each community may have one or more monitoring stations).

First, the average concentration of the 3 substances (O₃, NO₂, PM_{2.5}) is calculated at each station within a community for the 3 preceding hours. This is considered valid only if at least 2 out of 3 hours are available at the station. If more than 1 of the preceding 3 hours is missing the station average is set to "Not Available". This part of the process results in three "station parameter averages" for each station.

Second, the 3 hour "community average" for each parameter is calculated from the 3 hour substance averages at the available stations. If no stations are available for a parameter, that parameter is set to "Not Available". This part of the process results in 3 community parameter averages.

Third, if all three community parameter averages are available, a community AQHI is calculated. The formula is:

The result is then rounded to the nearest positive integer; a calculation less than 0.5 is rounded up to 1.

Health Risk	Air Quality Health Index	Health Messages for At-Risk Population	Health messages for General Population
Low	1-3	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities
Moderate	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	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	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.

FOREST FIRE SMOKE

Particle levels are the principal concern in forest fire smoke. The size of the particles in the air we breathe affects their potential to cause health problems.

Particle pollution may contain substances like carbon, sulphur and nitrogen compounds, metals and organic chemicals. The AQHI calculation uses coarse particles in the range of 2.5-10 microns in diameter. Fine particles, with diameters less than 2.5 microns are often linked to health effects. Particles in this size range are slow to clear from lungs when they are inhaled.

Particles from smoke tend to be extremely small, with a size range near the wavelength of visible light (0.4 to 0.7 microns). At this size range, smoke particles efficiently scatter light and make it difficult to see, and can be inhaled deeply into the lungs. This is why these smoke born fire related particles are a greater concern than larger particles.

Health Effects of Forest Smoke

Particulate matter exposure is the principle public health threat from short term smoke exposure. The health effects of smoke range from eye, nose or throat irritation to serious problems such as reduced lung function, bronchitis, exacerbation of asthma and **even a risk of death.**

Athletes are at risk when they are breathing deeply and rapidly.

Risk Assessment of Smoke Conditions

Not all areas have continuous official monitoring for AQHI or, Race Directors and Technical Officials may not have available access to official monitoring station data, so a way of establishing particulate levels in the air has been developed by NOAA. A visibility index gives a quick, alternative way to estimate smoke levels. Using landmarks at known distances, an observer can provide a reasonable estimate of particulate concentration. It would be wise to identify landmarks before they are needed and know the approximate distances to allow for an effective visibility measurement.

TABLE 1 : For estimating particulate matter concentrations from Visibility Assessment

Air Quality Category	AQHI Equivalent (M2.5 1-3 hour average in ug/m ³)	Visibility in Km
Good	1-3 (0 - 40)	15 Kms and Up
Moderate Unhealthy for sensitive groups	4-6 (41 - 175)	5 - 14 Kms
Unhealthy	7-8 (176 – 300)	2.5 - 4 Kms
Very Unhealthy	9-10 (301 – 500)	1.5 – 2 Kms
HAZARDOUS	10+ (>500)	< 1.0 Km

When estimating particulate matter concentrations visually, it is important to face away from the sun. Determine the limit of your visibility range by looking for landmarks at know distances. The visibility range is the point at which even high-contrast objects totally disappear. (Example: a dark building viewed against the sky at noon). Once visibility has been determined in kilometres, use Table 2 to identify the appropriate messaging and actions based on the air quality category. The visibility index is not effective at night or when humidity is high.

TABLE 2 : Appropriate Message and Actions based on the air quality category

Air Quality Category	Message	Actions for Events
Good Visibility : 15 kms and up AQHI 1-3	Ideal air quality for outdoor activities	Ideal conditions for an event
Moderate / Unhealthy for Sensitive Groups Visibility: 5-14kms AQHI 4 - 6	Be aware of health effects of smoke and related symptoms	Be aware of health effects of smoke and related symptoms
Unhealthy Visibility: 2.5-4kms AQHI 7 - 8	Reduce or re-schedule strenuous activities, especially if you experience symptoms	Consider reduction of length of events and / or cancellation of junior events. Provide warning to competitors with respiratory issues e.g. Asthma
Very Unhealthy Visibility: 1.5-2kms AQHI 9 - 10	Avoid prolonged strenuous activities and stay indoors if possible	Consider reduction in length of events. Cancel or postpone event. Cancel Junior Events
HAZARDOUS Visibility: < 1.0km AQHI 10+	Avoid all strenuous activities and stay indoors	Cancel all events and training

Should the air quality be such that an event is impacted to the extent that a decision needs to be made as to whether the event should be re-scheduled, reduced in length or cancelled, it should be done in consultation with the Race Director or the Appointed Contingency Committee and the Technical Delegate for the event. The final decision to modify the race plan will rest with the Race Director.

GENERAL MESSAGE to all Participants, Workers and Attendees at events impacted by Forrest Fire Smoke: *Seek medical Care if experiencing symptoms such as repeated coughing, shortness of breath or difficulty breathing, wheezing, chest tightness or pain, heart palpitations, unusual fatigue or light headedness.*