Smoke Pollution Guidelines for Community Cricket

With the onset of bushfire smoke significantly affecting our game, grounds, and posing a health risk to players and officials, Cricket Australia (CA) has developed the following guidelines to assist Clubs and Associations in managing the risks associated with physical exercise in changing air quality and smoke haze.

These guidelines have been adapted from the Cricket Australia and International Cricket Council guidelines used for elite cricket together with the Australian Institute of Sport guidelines and government recommendations as a starting point.

Modifications address the need to take a more conservative approach to community cricket, particularly given the irregular availability of professional medical support available at this level.

CA advises using air quality measures published through the www.aqicn.org website to evaluate the current level of air quality and provide general advice on implications for players and officials involved in cricket training and matches. This website is also utilised by the ICC's Pollution guidelines.

The risk of health issues due to poor air quality is related to:

1. Concentration of pollutants in the air (air quality measures)
2. Exposure
    - how long you are exposed to the pollutants
    - how much you are breathing in (e.g. exercising v stationary)
3. Individual risk factors like
    - Asthma or other respiratory conditions
    - Pregnancy
    - Older or very young people
    - Cardiovascular disease

Are cricketers at risk?

While poor air quality can affect anyone's health and trigger medical conditions, those exercising are particularly at risk because of the increase in air entering the airways and triggering respiratory and cardiovascular conditions like asthma, bronchitis etc. At moderate exercise intensity, 10 times more air enters the airways (e.g. bowling, running between wickets, chasing in the field) than when stationary. During vigorous intensity it is 20 times more.

Therefore, for athletes performing extended and/or higher intensity exercise, the risk of airway irritation is higher at lower levels of pollution because the increase in the amount of air entering the airways increases their exposure to pollutants.

Consecutive days of exposure to polluted air can have a cumulative effect, lowering an athlete's threshold for symptoms which is relevant for games (or training) held over consecutive days.

Air Quality Measurements

The key air quality measurements used in deciding if it is safe to play are:

1. Visibility Measure
    - Typically measured and reported hourly
    - Also known as a NEPH measurement
    - Measures the visibility reduction due to pollutants (known as particle matter)
    - The higher the measure the poorer the visibility
    - This is not available in all states – however is the best option.

2. Particles Matter measures
    - PM2.5 is the key measure
    - Typically published every hour, but as a 12-hour rolling average (24-hour rolling average at some sites)
    - PM2.5 rating is a measure of the Particle Matters that are smaller than 2.5 micrometers in diameter (this is approximately 3% of the diameter of a human hair)
    - These PM2.5 particles are considered most hazardous because they bypass the protective mechanisms in the nose and throat that normally trap particles, travelling into the lungs.

3. Air Quality Index (AQI)
    - Reported as either;
        - a composite measure of a number of pollutants – it takes whatever pollutant has the highest reading at the time, so could be a measure of PM10 or NO2, or
        - an adjusted index from raw data (see below)

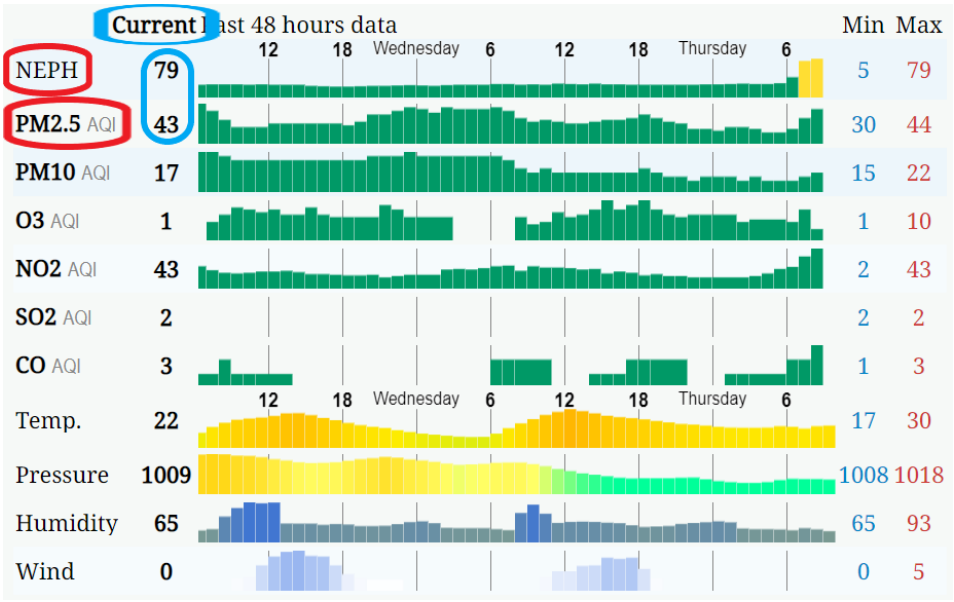
When deciding if a game/training should start, air quality measures that are as close to 'real-time' as possible are preferable (e.g. the NEPH/visibility measure v PM2.5 current measure) as these are most representative of the current conditions and not skewed by the conditions experienced previously.

To allow consistent use of terminology and data, CA recommends one source of information across all states and locations, which can be found at: **www.aqicn.org**.

This website is recommended because it provides air quality readings for all locations across Australia – scraping the data from each state's EPA output, and converts it into an AQI indexation from 0 – 500 for various types of pollutants (e.g. PM2.5AQI, PM10AQI) and provides a 12-hour rolling average with a weighting to the most recent hours (see below for explanation).

Data from different states provide different readings, some may only report PM2.5 and PM10, while others are a lot more comprehensive. All report on the PM2.5 reading – this is the reading we are concerned about (use the NEPH/visibility option if this not available).

Breaking down the display:

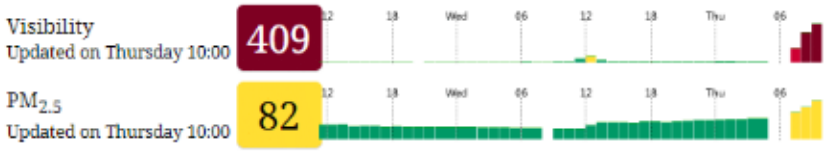


What does it mean when we refer to the AQICN 12-hour average? Interpreting the reading:

The AQICN.org website utilises the "**nowcast**" system. This system used by the US EPA to convert the raw pollutants readings gathered from all the different state EPAs, expressed in µg/m3 or ppb, into the AQI (scale from 0 to 500).

The NowCast is computed from the most recent 12 hours of PM monitoring data, but the NowCast weights the most recent hours of data more heavily than an ordinary 24-hour average when pollutant levels are changing – meaning it is more accurate than other options available to us (when hourly measurements are not available).

As can be seen below, it is important to be aware that the 12-hour average PM2.5 measure can be significantly lower than the ('actual' hourly) NEPH/visibility measure (if there has been a recent change in conditions), because it has been averaged out, so a visual and olfactory (smell) assessment is also vital. If it looks poor, or you can smell smoke, the air quality will also be poor.



Cricket Australia Air Quality Guidelines

The table below is adapted from the Australian Institute of Sport and NSW Public Health Unit recommendations and can be used as a guide on how to interpret the impact of air quality measures on elite (professional) and community (including Premier Cricket) cricket.

Elite Cricket		Community Cricket	
Air quality measure	**Action**	**Air quality measure**	**Action**
VERY GOOD (0-33)	Enjoy activities	**VERY GOOD (0-33)**	Enjoy activities
GOOD (34-66)	Enjoy activities	**GOOD (34 -66)**	Enjoy activities
FAIR (67-99)	**People unusually sensitive to air pollution:** Plan strenuous outdoor activities when air quality is better	**FAIR (67-99)**	**Asthmatic athletes:** Should have medical review prior to performing high intensity extended training outdoors
POOR (100-149)	***AIR POLLUTION HEALTH ALERT*** **Sensitive groups:** Avoid strenuous outdoor activities **Everyone:** Cut back or reschedule strenuous outdoor activities	**VERY POOR (100-149)**	***AIR POLLUTION HEALTH ALERT*** Asthmatics or symptomatic non-asthmatics should not compete or train outdoors. Minimise asymptomatic athlete exposure
VERY POOR (150-200)	***AIR POLLUTION HEALTH ALERT*** **Sensitive groups:** Avoid strenuous outdoor activities **Everyone:** Cut back or reschedule strenuous outdoor activities	**HAZARDOUS (150+)**	***AIR POLLUTION HEALTH ALERT*** Outdoor training should be rescheduled indoors, and exposure should be minimised for everyone. **Serious consideration should be given to delaying or cancelling play.**
HAZARDOUS (200+)	***AIR POLLUTION HEALTH ALERT*** **Sensitive groups:** Avoid strenuous outdoor activities **Everyone:** Significantly cut back on outdoor physical activities		

Deciding to play or train for cricket:

Noting how quickly weather conditions can change and smoke pollution can become significantly worse or significantly improve in the space of hours, the decision to play or train should ideally be considered in the same way as other weather events (rain, poor light) and be made on the day.

However, this needs to be balanced against the health risks, potential inconsistent application of approach where there are no official umpires, and in many cases the lack of a "real time" measure of air quality. This may require competition organisers to implement a blanket cancellation of matches prior to game day.

Player and officials' safety is Australian Cricket's number one priority and a conservative approach should be taken when deciding if it is safe to play or train.

Irrespective of specific air quality conditions on the day, competition organisers are advised to make all players and officials aware of the heightened risk to health when participating in smoke polluted conditions. In particular, prior communication ensuring those groups that are at greater risk (identified above) are encouraged to seek advice from their medical practitioner and take all preventative strategies recommended (e.g. use-preventer medications for those with asthma).

Taking into consideration the table above, Cricket Australia recommend the following considerations when deciding to play or train for cricket when air quality is a potential issue:

i. General air quality at the ground / training facility
   - **If any of the air quality measures are over 150, we advise serious consideration be given to suspending play/training**. Noting that 'real time' (PM2.5/NEPH/Visibility measure) may not be available in that specific state, the 12-hour rolling average measure should be considered along with the other points below (acknowledging that the 12-hour rolling average may over or underestimate the actual air quality at the time of judgement).

ii. Visibility
   - Where visibility is poor, air quality will be poor.
   - Assessment of visibility will be similar to bad light considerations.

iii. Player feedback
   - Match officials / coaches / captains should monitor players and officials for signs of feeling unwell and seek regular feedback.
   - Those with known respiratory conditions are coping and have the support they need including medications

Other Considerations

Matches:

Any delay due to smoke pollution should be treated like a rain delay in regards to making up time.

Training:

Where smoke pollution is an issue, other measures to limit health risks include:

1. Take training indoors,
2. Reduce the length of exposure outside,
3. Reduce the intensity of training,
4. Delay or reschedule training sessions.

Summary

As noted above, the recommendations included in this document are national guidelines adapted from policies and guidelines that are already in place.

This is by no means an exhaustive/all-encompassing approach. Rather, these guidelines have been formed with the intention of assisting Clubs and Associations in managing the risks associated with poor air quality, smoke and exercise.

It is important that cricket organisers, players, coaches and match officials adhere to advice from medical practitioners and implement all preventative strategies they recommend. Player and officials' safety is CA's number one priority; therefore, it is recommended that a conservative approach be taken when deciding if it is safe to play or train.