

Impacts of Heavy Bushfire Smoke on Sydney Workplaces (2019-2020)

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Objectives

Heavy bushfire smoke impacted workplaces in Sydney, regional New South Wales (NSW), and many other parts of Australia during 2019-2020. The *National Environment Protection (Ambient Air Quality) Measure* (airborne particle goal for the PM_{2.5} fraction) in Australian outdoor air is 25 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), averaged over a 24-hour period. 25 $\mu\text{g}/\text{m}^3$ is equivalent to an Air Quality Index (AQI) of 100. Advice on hazardous smoke levels (as PM_{2.5}) had been issued by New South Wales Health - if the AQI was hazardous (200+) adults should avoid strenuous outdoor activities. Regional monitoring data from the EPA was available, but was reported as a 24-hour average, so was not useful for assessing current conditions (the smoke plume was variable over time), and not always useful for local conditions (the smoke plume was variable in space).

Methods

Local airborne particle testing was conducted near the city using a TSI DustTrak II Model 8530 Aerosol Monitor with a PM_{2.5} impactor, and a calibration factor of 0.38 for ambient air. The instrument was configured with a Kenelec Tripod-Based Dust System, and Agent G2+ datalogger, which sent SMS alerts at a pre-set alarm level of 100 $\mu\text{g}/\text{m}^3$. A chart of results could be viewed online at any time.

Results

Use of on-site direct-reading aerosol photometers allowed outdoor work to proceed when conditions were satisfactory, but the official ambient air-quality readings (available online) were lagging. The maximum PM_{2.5} recorded by the Environmental Protection Authority (EPA) near the City of Sydney (Rozelle) on 10 December 2019 was 534 $\mu\text{g}/\text{m}^3$ (as a 1-hour average). Including a calibration factor of 0.38, the peak PM_{2.5} recorded by an aerosol photometer near the City of Sydney on 10 December 2019 was 1330 $\mu\text{g}/\text{m}^3$ (as a 1-minute average).

Conclusions and Recommendations

Advice for workplaces was issued by SafeWork NSW and SafeWork Australia. The Centre for Air Pollution, Energy and Health Research (CAR) issued useful guidance note entitled *Bushfire smoke: what are the health impacts and what can we do to minimise exposure?* Outdoor smoke exposure can be controlled by work scheduling, or respiratory protective equipment (RPE). Indoor smoke can be controlled by the use of recirculating air purifiers with HEPA (high efficiency) filters.

Keywords

smoke, PM_{2.5}, bushfire, wildfire, aerosol photometer, air cleaners