

Analysis of air quality during the Hazelwood mine fire

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Executive summary

The Hazelwood mine fire started on 9 February 2014, causing a major air pollution event that affected thousands of residents in nearby towns. The fire was declared safe on 25 March 2014, burning over a period of 45 days.

The Hazelwood mine fire was ignited by embers from nearby shrub/grassfires burning in land adjacent to the township of Morwell where the Hazelwood mine is located. The smoke plume from the Hazelwood mine fire could be clearly identified in satellite images showing the extent of the smoke plume.

This report summarises the air quality measurements made during the Hazelwood mine fire by various organisations including EPA Victoria, Country Fire Authority (CFA) Victoria and CSIRO. Pollutants measured include particles smaller than 2.5 μm ($\text{PM}_{2.5}$) and smaller than 10 μm (PM_{10}), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), volatile organic compounds (VOCs) (e.g. benzene and formaldehyde), polycyclic aromatic hydrocarbons (PAHs) (e.g. benzo(a)pyrene), dioxins and metals. The air quality measurements started approximately four days after the mine fire started with the more targeted monitoring commencing on 26 February.

Due to the close proximity (~500 m) of southern Morwell to the Hazelwood mine, smoke concentrations measured at in this area of Morwell were especially elevated when compared to those recorded in the east of Morwell and Traralgon. In particular, concentrations of $\text{PM}_{2.5}$, CO and benzene exceeded air quality standards and guidelines during the smoke event. Concentrations of benzo(a)pyrene were also elevated and resulted in the yearly averaged concentrations exceeding air quality guidelines.

Concentrations were highly variable. The highest concentrations occurred during south-westerly winds when the smoke from the Hazelwood mine fire was blown into the town of Morwell. The low plume buoyancy of the fire resulted in the plume being trapped within the lower boundary layer allowing for minimal dispersion and hence elevated ground concentrations. Concentrations of air

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were primarily elevated in February with a significant decrease observed as the fire intensity abated through March for all pollutants measured.

Large bushfires such as the Eastern Victoria Great Divide fires in 2006/07 also resulted in significant air quality impacts, and similarities and differences between that event and the Hazelwood mine fire have been highlighted:

- Impact on ambient particle concentrations between the Hazelwood mine fire and the 2006/07 bushfires that burned for 65 days were of similar magnitude and duration.
- Maximum hourly and daily PM_{2.5} concentrations were slightly higher in the Ovens Valley than in southern Morwell, but the number of hours that PM_{2.5} concentrations remained above 250 µg m⁻³ was higher at southern Morwell.
- During the Hazelwood mine fire EPA Victoria recorded its highest 8-hour average CO concentration ever measured. CO concentrations were higher in southern Morwell compared to those measured at a staging area in Northeast Victoria during the 2006/07 bushfires, although only a short period during the fires was sampled and concentrations may have been higher. In general though, bushfires are less likely to cause increased CO levels above air quality guidelines in downwind communities, but are a potential health risk on the fire ground, within the immediate vicinity of the fire.
- Benzene concentrations were elevated during the Hazelwood mine fire, and were higher than those measured in Northeast Victoria during the 2006/07 bushfires. The measured benzene to toluene ratio is consistent with that of wood burning rather than traffic-related emissions. The ratios were similar to those recorded for smoke measurements in peat fires and underground coal fires.