Hazelwood Coal Mine Fire – $PM_{2.5}$ Health Protection Protocol

Introduction

This $PM_{2.5}$ protocol has been developed in response to the Hazelwood open cut brown coal mine fires in February 2014. It is an appendix to the Environment Protection Authority Victoria (EPA) /Department of Health (DH) Bushfire Smoke, Air Quality and Health – Air quality assessment and community health protection messaging: an integrated approach February 2014 (the DH/EPA Smoke Protocol).

Prior to the brown coal mine fires, the EPA issued smoke advisories based on the DH/EPA Smoke Protocol, including recently developed science associated with state-wide bushfire smoke assessment and forecasting. The DH/EPA Smoke Protocol includes health advice based on particle (ie PM) levels, with a table of associated visibility levels designed for practical community use.

In response to the brown coal fires, EPA established $PM_{2.5}$ air quality monitoring in the eastern and southern areas of Morwell, measurement of which commenced on 17 February 2014 and 21 February 2014 respectively.

Rationale

Both $PM_{2.5}$ and PM_{10} are present in smoke. $PM_{2.5}$ can be breathed deep into the lungs and is therefore a useful air quality monitoring standard to inform recommended precautionary actions to protect public health.

Since 2003, the National Environment Protection Council has adopted an air quality standard for $PM_{2.5}$ (as a 24 hour average) of 25 micrograms per cubic metre ($\mu g/m^3$). This standard is based on providing protection from the health effects of $PM_{2.5}$.

Table A summarises the $PM_{2.5}$ response procedure between DH and the EPA.

Table B provides the smoke advisory levels for $PM_{2.5}$ (ie as a 24 hour rolling average, reported on an hourly basis) and corresponding cautionary advice as smoke impacts worsen.

13 March 2014
Approved by Chief Health Officer and CEO EPA

Hazelwood Coal Mine Fire – $PM_{2.5}$ Health Protection Protocol

High-Extreme Smoke Advisory Level – $PM_{2.5}$ Response Procedure for when the $PM_{2.5}$ 24 hour rolling average, one hour value is greater than 250 µg/m^3)

The Objective

The objective is to prevent sensitive groups in the community being exposed to fine particles in air as $PM_{2.5}$ above 250 µg/m^3 for more than 3 consecutive days. At the end of two days at this trigger level and smoke intensity is predicted to remain or increase, the Chief Health Officer will strongly recommend that sensitive groups temporarily relocate until there is sustained improvement in air quality.

Procedure

1. Notification and updates:

When the 24 hour average of $PM_{2.5}$ reaches 250 µg/m^3, the EPA notifies the DH on-call Officer on 1300 790 733. This is at the end of Day 1.

Notification occurs at 24 hours, followed by updates at 36 and 48 hours respectively.

2. Monitoring and Assessment: at 36 hours

The EPA provides to the DH on-call Officer:

- data for the previous 12 hours and $PM_{2.5}$ rolling 24 hour average value at 1.5 days (ie 36 hours)
- qualitative prediction for next 12 hours (ie to the end of day 2) – indicating whether smoke intensity is expected to reduce, remain the same, or increase.

Actions

- The DH Health Risk Assessment (HRA) Team is not activated if the 1.5 day (36 hour) $PM_{2.5}$ rolling 24 hour average value is at or below 250 µg/m^3 and predicted to decrease

OR

- If the $PM_{2.5}$ rolling 24 hour average value is above 250 µg/m^3 and EPA, in consultation with fire agencies predicts smoke intensity to maintain or increase, the DH on-call Officer advises the DH HRA Team. EPA continues assessing the $PM_{2.5}$ levels for the next 12 hours (ie to the end of day 2).

3. Monitoring, Assessment & Decision: at 48 hours

At the end of day two (ie 24 hours after first notification)

- EPA provides the DH on-call Officer with:
  - data for previous 12 hours and the $PM_{2.5}$ rolling 24 hour average value at 48 hours
  - qualitative prediction for next 12 hours (ie into day 3) – indicating whether smoke intensity is expected to reduce, remain the same, or increase.

Actions

- DH HRA Team is not activated if the value at 48 hours is at or below 250 µg/m^3 and smoke intensity is predicted to decrease over the next 12 hours

OR

- If the $PM_{2.5}$ rolling 24 hour average is above 250 µg/m^3 and EPA, in consultation with fire agencies, predicts smoke intensity to maintain or increase, the DH HRA Team is activated to determine whether the Chief Health Officer should strongly recommend that sensitive groups relocate temporarily until the air quality improves for a sustained time.

4. Monitoring and Assessment after the Chief Health Officer has issued High (Extreme) advice – subsequent advice required by the Chief Health Officer:

- A number of factors will be used by the DH HRA Team as the basis for informing the Chief Health Officer regarding a change to fine particle levels in air as $PM_{2.5}$ that may warrant a change in the advice from the Chief Health Officer to sensitive groups in the community.

- The DH HRA Team will consider advice from the EPA in relation to smoke intensity and the change to fine particle levels in air as $PM_{2.5}$ since the first issuing of advice by the Chief Health Officer to sensitive groups in the community. The Team will also consider other advice from both the EPA and Fire Services regarding predicted smoke intensity.

- In addition to the receipt of advice from the DH HRA Team, the Chief Health Officer may also consult with any other parties to enable appropriate consideration of any factors necessary to enable an informed decision prior to the issue of further advice to sensitive groups in the community.

Table A - Summary of $PM_{2.5}$ response procedure between DH and EPA

	Days of exposure to air		
Action points	**T=24[1] hours**	**T=36 hours**	**T=48 hours**
Notification & updates	EPA notifies DH on-call Officer if $PM_{2.5}$ (24 hour rolling average value) is >250 µg/m^3	EPA updates DH (see below)	EPA updates DH (see below)
Monitoring & Assessment		EPA provides DH with: • the last 12 hrs of $PM_{2.5}$ rolling average values • qualitative prediction of change in smoke intensity over the next 12 hours	EPA provides DH with: • the last 12 hrs of $PM_{2.5}$ rolling average values • qualitative prediction of change in smoke intensity over the next 12 hours

[1] This is the first hour that the $PM_{2.5}$ rolling average reaches 250 µg/m^3

Hazelwood Coal Mine Fire – $PM_{2.5}$ Health Protection Protocol

	Days of exposure to air		
Decision		No activation of DH Health Risk Assessment (HRA) Team if: • the 12th hour 24 hour rolling average value (which represents 36 hours of community exposure) for $PM_{2.5}$ is ≤250 µg/m³ **and** • the smoke intensity is predicted to decrease **OR** **Alert** DH HRA Team and continue assessment of monitoring data for the next 12 hours if $PM_{2.5}$ (rolling 24 hour average) is >250 µg/m³ and current smoke intensity is predicted to remain the same or increase	No activation of DH HRA Team if: • the 12th hour 24 hour rolling average value (which represents 48 hours of community exposure) for $PM_{2.5}$ ≤250 µg/m³ **and** • the smoke intensity is predicted to decrease **OR** **Activate** DH HRA Team if $PM_{2.5}$ (rolling 24 hour average) is >250 µg/m³ and the current smoke intensity is predicted to remain the same or increase over the next 12 hours
Chief Health Officer – subsequent advice/ actions			The issuing of further advice by the Chief Health Officer involves factors in addition to an improvement in air quality: fire suppression status, plume predictions, weather outlook information etc. Any advice from the Chief Health Officer will therefore be made in consultation with the Fire Services Commissioner, EPA, CFA, DHS and VicPol.

Hazelwood Coal Mine Fire – $PM_{2.5}$ Health Protection Protocol

Table B - Smoke advisory levels for $PM_{2.5}$ (24 hour rolling average) & cautionary advice for increasing smoke impacts

Smoke advisory level	Air Quality Categories	$PM_{2.5}$ 24 hr µg/m³	Potential health effects	Cautionary health advice/actions
Not applicable	Good	<25	Meets the relevant air quality standard	None
LOW	Unhealthy sensitive	26-55	People with lung or heart conditions, elderly, children	**Sensitive groups:** People with heart or lung conditions, children and older adults should **reduce** prolonged or heavy physical activity No specific message for everyone else other than sensitive groups.
HIGH – General	Unhealthy - all	56-95	**Increased** likelihood of effects for people with lung or heart conditions, elderly, and children. General population respiratory symptoms	**Sensitive groups:** People with heart or lung conditions, children and older adults should **avoid** prolonged or heavy physical activity. Everyone else should **reduce** prolonged or heavy physical activity
HIGH - General	Very unhealthy - all	96-156		**Sensitive groups:** People with heart or lung conditions, children and older adults should **avoid all** physical activity outdoors. Everyone else should **avoid** prolonged or heavy physical activity.

Hazelwood Coal Mine Fire – $PM_{2.5}$ Health Protection Protocol

Smoke advisory level	Air Quality Categories	$PM_{2.5}$ 24 hr µg/m^3	Potential health effects	Cautionary health advice/actions
HIGH - Hazardous	Hazardous	157-250	**Significant** likelihood of effects for people with lung or heart conditions, elderly, and children. **Increased** likelihood of respiratory symptoms in the general population	**Sensitive groups:** People with heart or lung conditions, children 5 years and younger, pregnant women[2] and people over 65 years should **temporarily relocate** to a friend or relative living outside the smoke-affected area. If this is not possible, **remain indoors** and **keep activity levels as low as possible**. **Consider closing** some or all **schools** until air quality improves Everyone should **avoid all** physical activity outdoors. Healthy people with symptoms should seek medical advice and take a break away from the smoky conditions. **Reschedule outdoor events** eg concerts and competitive sports schools until air quality improves
HIGH – Extreme	Extreme	>250	**Serious** likelihood of effects for people with lung or heart conditions, elderly, pregnant women and children. Respiratory symptoms in the general population	Cautionary health advice/actions the same as for HIGH-Hazardous above except for sensitive groups. **Sensitive groups:** If the 24 hour rolling average $PM_{2.5}$ values remain in this category for two days and are predicted to continue at this level or increase: People with heart or lung conditions, children 5 years and younger, pregnant women and people over 65 years are **strongly recommended** to temporarily relocate until there is sustained improvement in air quality.

[2] Pregnant women have been added to this category for the extended time of the Latrobe Valley brown coal mine fire incident as an additional level of protection. This group is not a vulnerable group for the Smoke Protocol (ie bushfires).

13 March 2014
Approved by Chief Health Officer and CEO EPA