



Report

MAULES CREEK COAL MINE REPORT ON OVERBURDEN HANDLING IN ADVERSE CONDITIONS: ACTIONS AND RESULTS

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1 INTRODUCTION

Whitehaven Coal Pty Ltd holds Environmental Protection Licence (EPL) 20221 for the Maules Creek Coal Mine (MCCM). In accordance with requirements E2 of this license - Particulate Matter Control Best Practice Implementation – Disturbing and Handling Overburden under Adverse Weather Conditions, a written report must be provided to the NSW Environmental Protection Authority (EPA) providing results from the monitoring program and detailing the following:

- Weather conditions during which activities were cease or modified;
- Changes made to operational activities as a result of adverse weather;
- Resultant dust levels when activities were altered or ceased.

The purpose of this report is to satisfy the EPL 20221 Condition E2 by reporting on actions completed by MCCM under "adverse conditions" and the resultant dust levels. Dust levels at MCCM were considered in terms of PM₁₀ concentrations (particulate matter with an equivalent aerodynamic diameter of 10 µm or less), and quantitatively assessed with reference to the 2005 NSW EPA *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2005). This report examines meteorological conditions and PM₁₀ concentrations during the period 1 April 2015 to 30 September 2015 inclusive.

2 PROJECT DESCRIPTION

The locations of current overburden activities are shown in **Figure 2-1** and were determined based on current and proposed mine planning (**Pacific Environment, 2015**). Note that only the sections FY16-1 and 16-2 are being used at this stage, and dumping at the other three sections has not yet started.

The locations were chosen to capture the variations in elevation and spread across the proposed overburden dump areas (see **Table 2-1** for further descriptions on the dumping locations). These locations were used to identify adverse meteorological conditions that result in unacceptable dust levels. In the modelling, dust was released from the overburden dump at the location shown and the resultant dust concentration predictions were made at each of the numbered boundary locations shown.

Adverse conditions for unacceptable dust levels beyond the site boundary were identified in **Pacific Environment (2015)** as follows:

- Investigation Level: wind speed ≥ 6 m/s
- Action Level: wind speed ≥ 8 m/s

These triggers levels are used in a Trigger Action Response Plan (TARP) for overburden handling during adverse weather, for critical locations in the Maules Creek Coal Mine.

A weather station was installed to record local meteorological data for the MCCM site and a tapered element oscillating microbalance (TEOM) was installed to measure PM₁₀ concentrations (**Figure 2-2**).

The TEOM station is located north of the MCCM site boundary, and northeast of the weather station.

A Risk Response Report (RRR) is generated daily containing weather forecasts from third-party meteorological internet services, which is usually Weatherzone (<http://www.weatherzone.com.au>). The RRR is then provided to the operations team at the start of each day or shift. Proactive measures are taken if the RRR predicts that wind speeds will reach investigation or action levels.

In addition, the weather monitoring station issues real-time wind speed alerts when the measured wind speed reaches the following wind speeds:

- >6 m/s: 'High';
- >8 m/s: 'Act'.

The recipients of these SMS alerts include the Environment Officers and the Production Team.

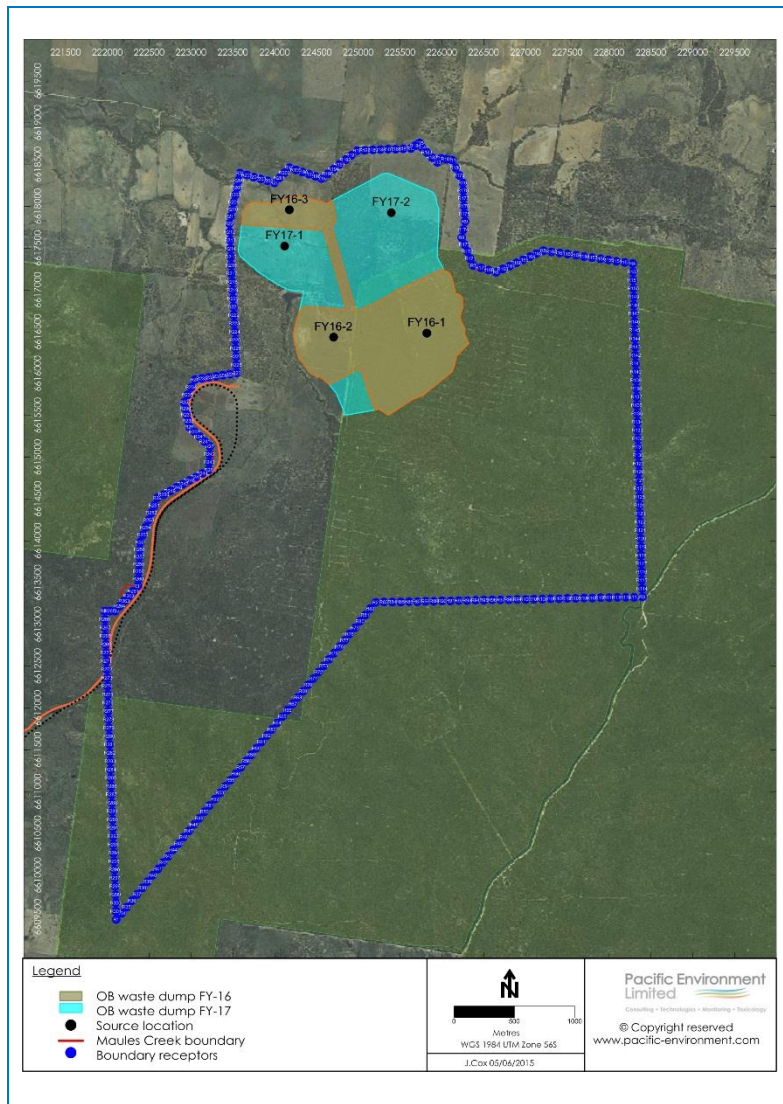


Figure 2-1: Overburden Activity Source Locations (Pacific Environment, 2015).

Table 2-1: Modelling Scenarios (Pacific Environment, 2015).

ID	Elevation (m)	Distance from nearest boundary (m)	Comments for selection
FY16-1	360	897	Highest dumping area close to eastern boundary in FY16
FY16-2	360	1,158	Highest dumping area close to western boundary in FY16
FY16-3	325	330	Highest dumping area close to the northern boundary in FY16
FY17-1	325	617	Highest dumping area close to western boundary in FY17
FY17-2	325	800	Highest dumping area close to eastern boundary in FY17

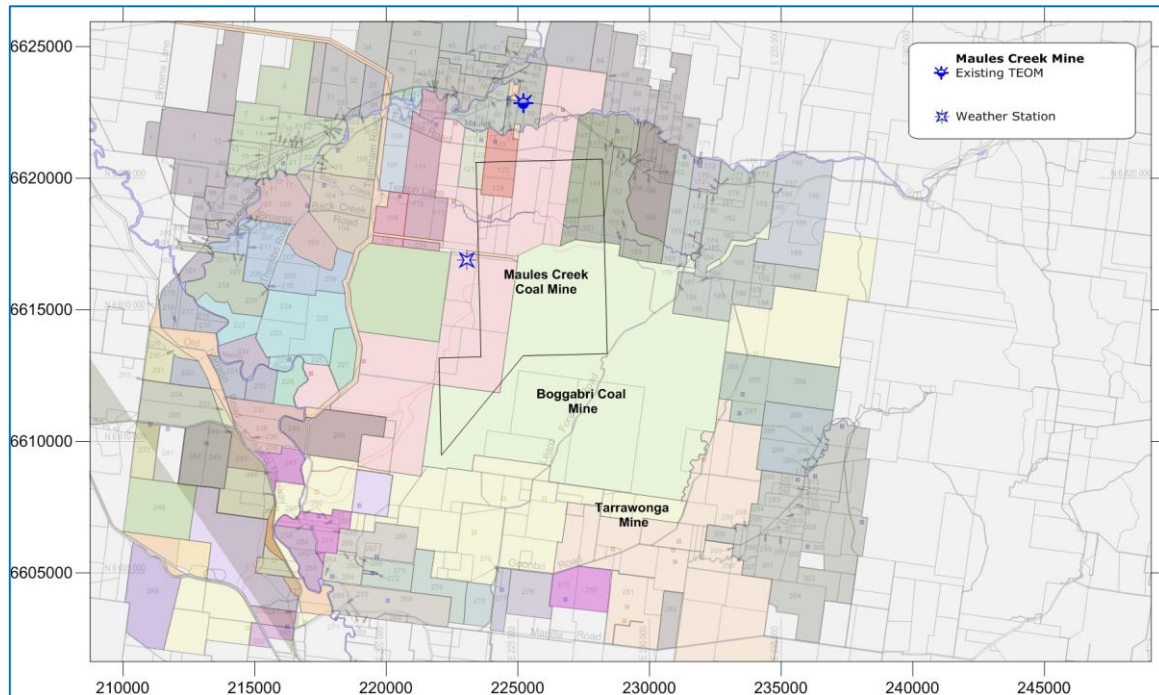


Figure 2-2 Site plan for MCCM

3 AIR QUALITY CRITERIA

The Approved Methods specifies air quality assessment criteria relevant for assessing impacts from air pollution (NSW EPA, 2005). The air quality goals relate to the total dust burden in the air and not just the dust from the Project. In other words, consideration of background dust levels needs to be made when using these goals to assess potential impacts. These criteria are health-based i.e. they are set at levels to protect against health effects. These criteria are consistent with the *National Environment Protection Measure for Ambient Air Quality* (referred to as the Ambient Air-NEPM) (NEPC, 1998).

Table 3.3 summarises the air quality goals for PM₁₀, which represents particulate matter with an equivalent aerodynamic diameter of 10 microns (10⁻⁶ m) or less. It is important to note that the criteria are applied to the cumulative impacts due to the Project and other sources.

Table 3-1: EPA air quality standards/goals for particulate matter concentrations

Pollutant	Standard	Averaging Period	Source
PM ₁₀	50 µg/m ³	24 hour	NSW EPA (2005) (assessment criteria) EPA impact assessment criteria; and Ambient Air NEPM reporting goal which allows five exceedances per year.
	30 µg/m ³	Annual	NSW EPA impact assessment criteria

Notes: µg/m³ – micrograms per cubic meter.

4 METEOROLOGY DATA SUMMARY

From 1 April 2015 to 30 September 2015, MCCM documented daily visual dust level assessments, relevant weather observations and any resultant changes to mining activities. The percentages of trigger level wind speed occurrences during this period are shown in **Table 4-1**.

The trigger levels were exceeded on an hourly-average basis approximately 1.5% of the time.

Table 4-1: Percentage of trigger level wind speed occurrence

Trigger level	Wind Speed (m/s)	Percentage of period (%)
Investigation	≥6	1.26
Action	≥8	0.14

Table 4-2 presents the 36 occasions that adverse weather conditions alerts were triggered on, and whether actions were required to manage potential air quality impacts due to overburden dust. Alerts with no action was taken were typically those where pit activities were already curtailed, suspended due to rain, and/or wet ground conditions due to recent rain. Note also that eight of the 36 wind events encountered were short spikes of 5 to 10 minutes in duration, and only one of these was a greater than 8 m/s event.

There was an average of six wind speed alerts per month from April 2015 to September 2015. June and September represent the extremes, with only one alert in June, and 11 alerts in September. In September, an above average number of alerts was caused by:

- Three alerts on 3 September due to the passage of a cold front and associated low pressure system;
- Five alerts from 22 – 24 September due to persistent moderate-to-strong southerly winds.

Note that no actions were taken for alerts in July as pit activities were already restricted due to wet ground conditions, and wet ground conditions also meant that water carts were not necessary.

Table 4-2: Summary of weather alerts and actions

Month	Wind Alerts >6 m/s	Wind Alerts >8 m/s*	Alerts with Action Taken	Alerts with No Action Taken
April 2015	5	1	2	4
May 2015	5	1	2	4
June 2015	1	0	0	1
July 2015	5	3	8	0
August 2015	6	3	7	2
September 2015	11	1	8	3

*All but one of these (a single spike on 12/08/15) occurred within an event that commenced as a 6 m/s event.

5 RESULTANT DUST CONCENTRATIONS

A time series of the 24-hour average PM₁₀ concentration for the period 1 April 2015 to 30 September 2015 is presented in **Figure 5-1**. The data in **Figure 5-1** are limited to adverse conditions, shown by the corresponding plotted wind speed, all of which are greater than 6 m/s. The TEOM station is located north of the MCCM site boundary (**Figure 2-2**).

As the TEOM is located north of the weather station, southerly winds are expected to most significantly affect PM₁₀ concentrations.

A maximum PM₁₀ concentration of 13.6 µg/m³ was recorded on 7 April 2015 and is attributed to high wind speeds. On this day, there were north-westerly winds between 11:00 and 16:10, with 31 peaks greater than 6 m/s and one peak greater than 8 m/s. No actions were taken on this day as operational activities were already limited due to skeleton staff present (due to a local holiday) and wet ground conditions.

Elevated PM₁₀ concentration (greater than 10 µg/m³) due to increased wind speeds (greater than 6 m/s) were recorded on: 2 August 2015, 12 August 2015, 15 September 2015, 22 September 2015 and 29 September 2015.

Despite elevated PM₁₀ concentration on the days stated above, the 24-hour average PM₁₀ concentrations at MCCM during adverse conditions were well below the NSW EPA criterion of 50 µg/m³.

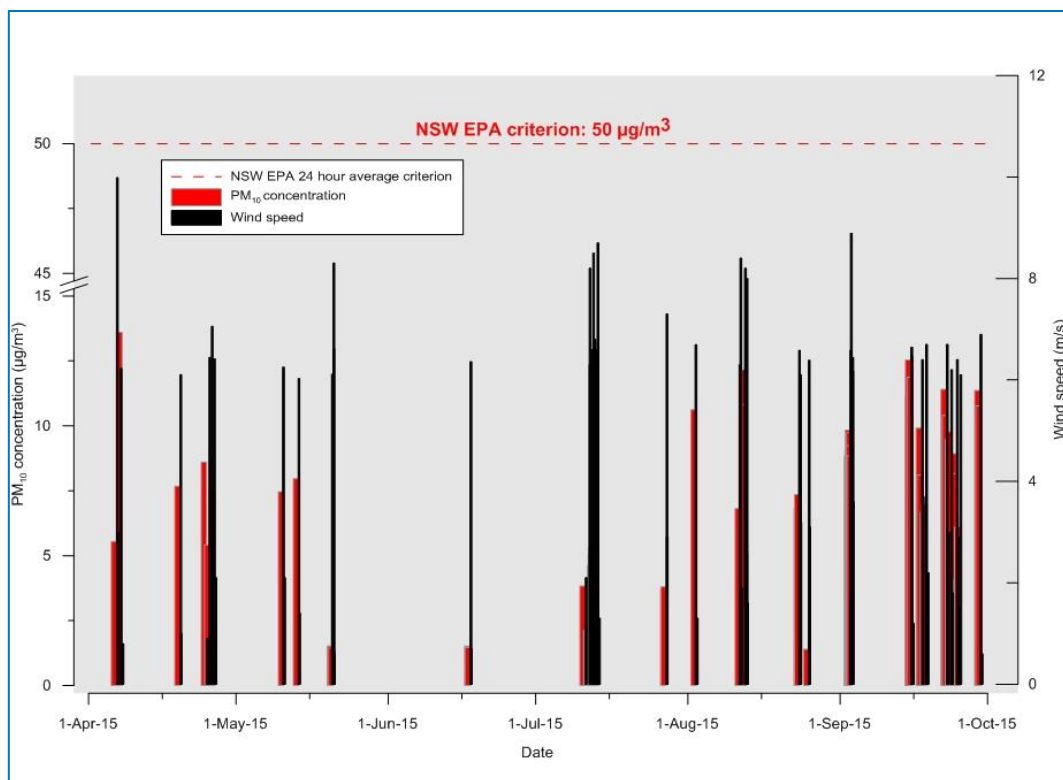


Figure 5-1: Wind speed and PM₁₀ concentrations for times with adverse conditions (wind speeds exceeding 6 m/s). Note the broken PM₁₀ y-axis from 15 – 45 µg/m³.

Time-series plots of daily variations in 24-hour average PM₁₀ concentration and wind speeds during adverse conditions are presented in **Figure 5-2** to **Figure 5-5**. Wind speed magnitude is plotted on the right y-axis, and also indicated by the length of the arrow, with wind direction represented by the direction of the arrows. The examples shown were identified as days with elevated PM₁₀ concentration (greater than 10 µg/m³) and increased wind speeds (greater than 6 m/s). A variety of examples were selected, including days where adverse wind conditions were predicted and proactive action was taken, and days where adverse wind conditions were not predicted and reactive action was taken.

Figure 5-2 shows PM₁₀ concentrations and wind speed values for the 2 August 2015. On this day there were north-westerly winds from 9:00 that strengthened to greater than 6 m/s by 11:00 with 13 peaks until 14:40, which eased off steadily after 15:00. The TARP alert was triggered by wind speed predictions, and in anticipation of this, the lower dumps were used and the excavator was suspended at 10:00. There was no excessive dust generation as PM₁₀ concentrations remained below 13 µg/m³.

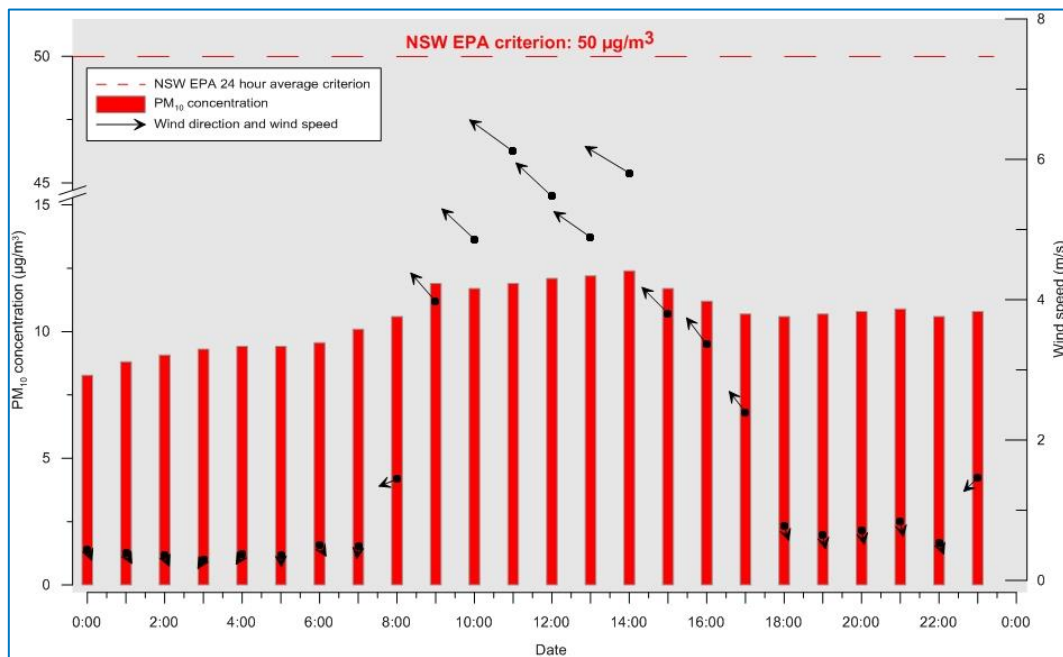


Figure 5-2: Daily variations of 24-hour average PM₁₀ concentration and wind speed on 2 August 2015 when an action level was triggered

On the 12 August 2015, there were north-westerly winds from 10:00 onwards, strengthening to greater than 6 m/s by 13:00 (**Figure 5-3**). At 12:50, dumping was commenced at lower tip levels, and suppressant was added on light vehicle routes. Following these actions, PM₁₀ concentrations remained less than 13 µg/m³ despite wind speeds exceeding 8 m/s.

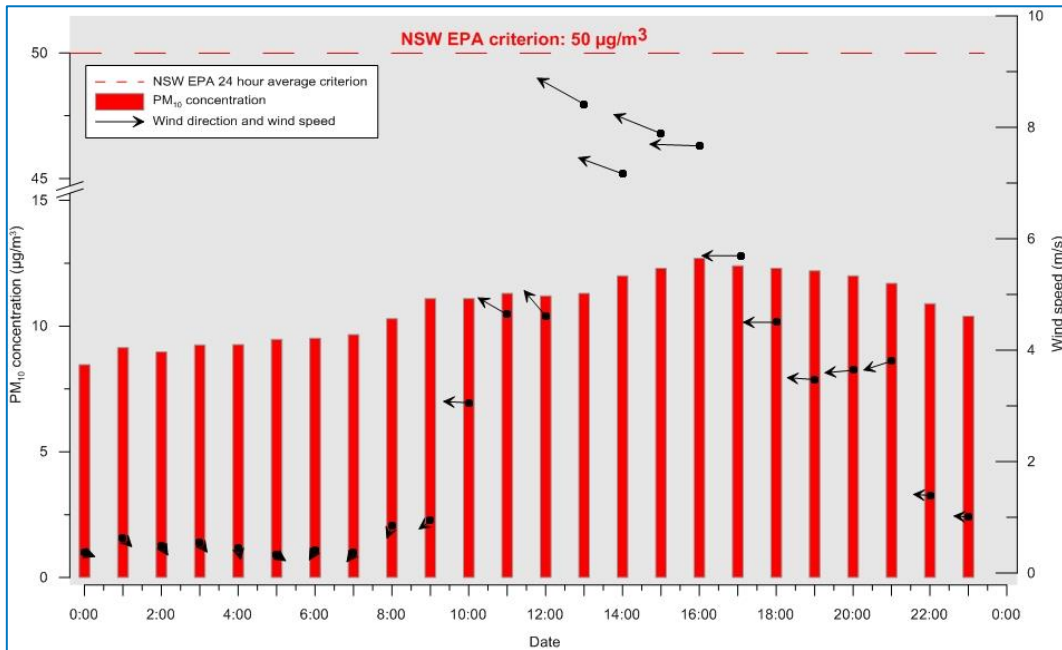


Figure 5-3: Daily variations of 24-hour average PM₁₀ concentration and wind speed on 12 August 2015 when an action level was triggered

On 22 September 2015, there were southerly winds throughout the day, increasing to greater than 6 m/s for 40 minutes, with three peaks greater than 6 m/s. The TARP level 2 alert was already triggered by wind predictions in the daily RRR. Conditions were monitored continually, and additional water carts and hot seating of water carts were used. These mitigating measures ensured that PM₁₀ concentrations remained less than 11 µg/m³.

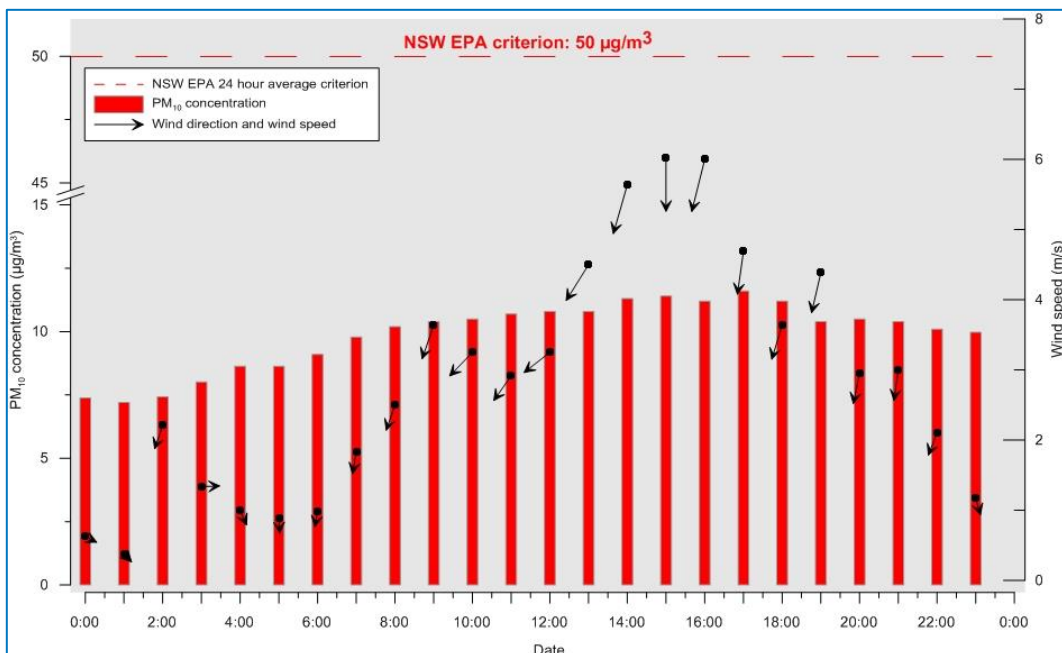


Figure 5-4: Daily variations of 24-hour average PM₁₀ concentration and wind speed on 22 September 2015 when an action level was triggered

On 29 September 2015, there were light to moderate north-westerly winds from 09:00. These were moderate to strong in middle of the day, and two peaks greater than 6 m/s over a one hour period were recorded, which were not predicted. As a result of strong winds, conditions were monitored continually and additional water carts were used. These mitigating measures ensured that PM₁₀ concentrations remained less than 11 µg/m³.

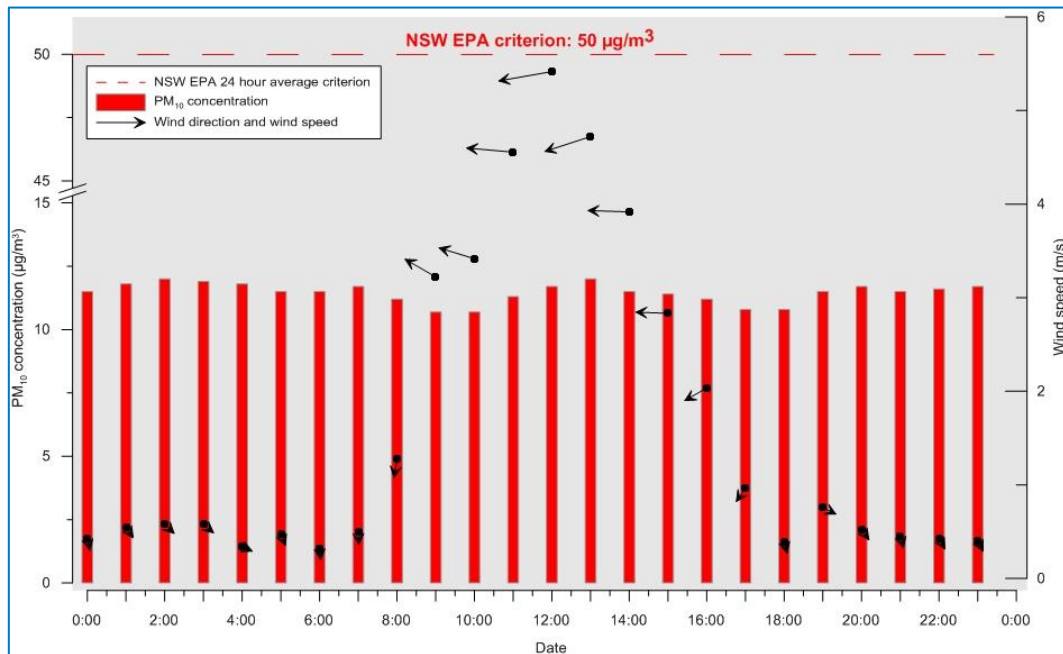


Figure 5-5: Daily variations of 24-hour average PM₁₀ concentration and wind speed on 29 September 2015 when an action level was triggered

6 ACTIONS TAKEN DURING ADVERSE CONDITIONS

The MCCM has a number of proactive and reactive measures for dust control, based on dust monitoring or visual observation.

The same reactive measures for overburden handling are used in response to an “adverse weather” trigger and include the following steps:

- The Environmental Officer assesses the Risk Response Report that is generated daily to forecast weather and is provided to the operations team each day;
- The Open Cut Examiner (OCE), Dispatch and Operators provide observations on dust generation associated with materials handling;
- The Mine Manager, OCE, Dispatch and/or Environmental Officer will determine if excessive dust is being generated;
- The Mine Manager, OCE and/or Dispatch will issue an instruction for the particular mining activity causing the excessive generation of dust to cease immediately;
- The OCE / Environmental Officer will assess what additional mitigation measures can be applied, including intensive watering of the exposed or active surfaces, reducing the intensity of the activity. This assessment will include consideration of direction in relation to receptors and off-site impacts;
- If the OCE, in consultation with the Environment Officer, is not satisfied that the additional measures will reduce dust emissions to an acceptable level (due to the prevailing weather

conditions) the activity will not recommence until the additional measures have been implemented and/or more favourable weather conditions occur;

- All parties will be responsible for monitoring the activity once it recommences to measure the effectiveness of control measures and to ensure dust emissions are acceptable.

Based on the recorded PM₁₀ concentrations during adverse weather conditions, the actions taken by MCCM are considered appropriate.

7 CONCLUSIONS

A review of meteorological data for MCCM identifies a small percentage of instances when adverse conditions for overburden handling occur. A review of the resultant dust levels during these conditions indicate that although short term peaks are observed, concentrations generally decrease immediately afterwards and the resultant 24-hour average PM₁₀ concentration are well below the NSW DEC criterion.

An investigation into dust levels during adverse weather conditions suggests that peaks in PM₁₀ concentrations are generally not related to mine operations and influenced by external factors. Analysis of hourly 24-hour average PM₁₀ concentration data shows little relationship with wind direction and no clear signal from MCCM.

In the future, MCCM will continue to document the procedural response measures undertaken during adverse conditions as part of the TARP for overburden handling during adverse weather.

8 REFERENCES

NEPC, 2003. 2003 Amendment to the National Environment Protection Measure for Ambient Air Quality 198.

NEPC, 1998. National Environmental Protection Measure and Impact Statement for Ambient Air Quality.

NSW EPA, 2005. Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Department of Environment and Commerce).

Pacific Environment, 2015. Maules Creek Coal Mine: Prp E2 – Disturbing and Handling Overburden under Adverse Weather Conditions. Adverse Conditions Report.