

20140815_REP_EPLPRPU2

DISTURBING AND HANDLING OF OVERBURDEN IN ADVERSE WEATHER CONDITIONS ASSESSMENT REPORT

1. BACKGROUND

1.1 History

Mangoola Coal Operations Pty. Limited (Mangoola Coal) operates an open cut coal mine located near Wybong, approximately 20 kilometres west of Muswellbrook and approximately 10 kilometres north of Denman in the Muswellbrook Local Government Area.

In 2011, the NSW Environmental Protection Authority (EPA) commissioned a Best Practice study in dust management in mining operations in the Hunter Valley, hereafter known as the Katestone Report. As a result of this work, during 2012, Mangoola Coal's Environmental Protection Licence (EPL) was varied to include the requirement to develop and implement a dust reduction program as a result of the Pollution Reduction Programs (PRPs).

On 21st March 2013, Mangoola Coal's EPL (PRP U2) was varied to require Mangoola Coal to alter or cease the use of equipment on overburden and the loading and dumping of overburden during adverse weather conditions to minimise the generation of particulate matter from 22 March 2013.

A Dust Management Trigger Action Response Plan (TARP) was designed to provide a guideline as to the acceptable standards at Mangoola Coal to minimise the impact of airborne dust on the environment and local community. It was also developed to reduce the likelihood of non-compliance with air quality criteria, community complaints, and to protect employees and equipment on site.

This report has been developed to meet the requirements of Condition U2.3 of EPL 12894 which requires that an assessment report must be prepared and submitted to the EPA as outlined in Section 1.2 below.

1.2 Mangoola Coal Operational Activities

The primary mining method at Mangoola Coal is by hydraulic excavators loading rear dump trucks assisted by dozer push and cast blasting of overburden where appropriate. Dump trucks haul overburden to out of pit and in pit dump locations and ROM coal to the coal handling facilities along haul roads. The general mining sequence includes the stripping of topsoil, removal of overburden, extraction of coal resource, overburden emplacement and progressive rehabilitation.

During the reporting period, mining operations were permitted to occur on a 24 hours per day, seven days per week basis. The mine did have a Christmas to new year shutdown in 2013. Blasting is undertaken between the hours of 9.00 am and 3.00 pm Monday to Saturday. No blasting is undertaken on Sundays or public holidays.

Mangoola Coal is in an area influenced by dust sources from mining, agricultural activities and emissions from local anthropogenic activities such as motor vehicle exhaust, train locomotives and domestic wood heaters. Site-specific air quality data has been collected since 2006 to characterise existing particulate matter levels both prior to commencement of mining in 2010, and as part of Mangoola Coal’s operational air quality monitoring program. In general, the air quality in proximity to Mangoola Coal, in terms of dust deposition, is considered good.

1.3 Purpose

Condition U2.3 of Environmental Protection Licence 12894 (EPL 12894) requires Mangoola Coal to submit a report to the Environmental Protection Authority (EPA) by the 15th August which includes results of the actions taken in accordance with Condition U2.1 of the EPL.

The report includes an assessment of the effectiveness of changes made to mining activities due to adverse weather and documents meteorological conditions and the resultant dust levels.

The Disturbing and Handling of Overburden in Adverse Weather Conditions Assessment Report (hereafter called the report) will be made publicly available on the Mangoola Coal website by 29th August 2014 as per EPL 12894 Condition U2.4.

1.4 Scope

The controls being assessed in this report relate to overburden disturbing and handling at Mangoola Coal.

2. MANAGEMENT MEASURES FOR OVERBURDEN HANDLING

Mangoola Coal has developed and implements an Air Quality Management Plan for the operation as well as various site procedures, including the Dust TARP, that apply to the site. These air quality management and mitigation practices have been developed to minimise the impact of Mangoola Coal’s operations (the offsite impacts caused by wind-blown or traffic generated dust). These procedures will be regularly reviewed and updated as required.

In order to mitigate any potential air quality impacts from the operation, a number of air quality management controls have been incorporated in the design phase and will be implemented throughout the life of the operation. Examples of controls relating to the handling of overburden are included in **Section 2.1** below.

2.1 Controls for Managing Dust Emissions from Disturbing and Handling Overburden

A number of air quality controls were also incorporated into the design of the Mangoola Coal Mine while other controls are operational controls that will be reviewed and implemented for the life of the operation. The following are some of the key controls for managing dust emissions associated with disturbing and handling of overburden:

- overburden emplacement areas have been designed to minimise air quality impact on sensitive receivers to the east and south-east;
- all active roads will be clearly defined and the development of minor roads will be limited.
- an alarm is also sent to CHPP/Mining Supervisors when average wind speeds reach >8m/s. This is an additional trigger for Supervisors to review the performance of current controls under high wind speeds and implement further controls if required.
- use of water carts, defining of trafficked areas, imposition of vehicle speed limits and constraints on work under extreme unfavourable weather conditions;
- water carts will be used on active haul roads and unsealed working areas. Surface moisture levels on all haul roads will be maintained at suitably elevated levels and/or chemical treatments will be applied to achieve at least 80 percent dust suppression;
- Tip heads will be managed by applying dust suppression to the dump tipping area (via water cart) upon completion of the shift if they will be inactive for at least 24 hours.
- all drill rigs will be fitted with dust suppressant measures and will be regularly maintained for effective use. If the dust suppressant measures fail, the drill can only continue to operate if it is monitored and work ceases immediately if dust goes above deck height. Maintenance shall be contracted to rectify any issues with dust controls as soon as possible;
- use of water cart to suppress drill cuttings/turkeys mounds by creating a surface crust;
- automatic alarm system on the Tapered Element Oscillating Microbalance (TEOM) monitors to inform mine operators when dust monitoring indicates dust levels are approaching relevant criteria to enable appropriate operational response (supplementary monitoring also used as required for early warning alarms);
- restricting or ceasing dust-generating activities during adverse meteorological conditions as required. Meteorological data obtained from the continuous weather recording station will be utilised to assist with this process. An SMS alarm when wind speeds average over 8m/s will be sent to Mining Supervisors;

- only the minimum area necessary for mining operations will be disturbed at any time and topsoil stripping/handling activities will cease under adverse meteorological conditions (i.e. hot and windy);
- reshaping of overburden emplacement areas will be undertaken as soon as practicable.
- progressive site rehabilitation and revegetation, including undertaking progressive rehabilitation as close as possible to the mining operations, to minimise disturbed areas as appropriate to limit the potential for windblown dust;
- temporary revegetation of inactive mining areas where there is the potential for excessive dust generation;
- cover crops will be established on any topsoil and subsoil stockpiles that are not planned to be used in less than six months;
- blasting design and operation will be managed to assist with minimising dust generation in the blasting process. This process will include:
 - consideration of material and explosives characteristics;
 - excavating equipment specifications;
 - hole spacing and stemming material specification;
 - accurate placement and drilling of holes;
 - accurate explosives loading; and
 - well-managed stemming of blast holes.
- use of predicative forecasting to assist with mine planning when adverse meteorological conditions could give rise to dust emissions;
- mine personnel will be provided with training in dust controls during induction for mine operations;
- minimise double handling of material;
- identify material types that contain fine and/or friable material, and implement a risk based approach for effective dust mitigation;
- prepare work areas prior to commencement of mining activities to minimise dust generation potential, e.g. watering of extraction areas/tip heads where possible;
- sheltered dumping during periods of high winds (mine planning to include alternative dumping options in mine plans); and
- minimise the distance of fall of overburden materials during loading and tipping as far as practical.

3. MONITORING PROGRAM

On 31st May 2013, Mangoola Coal submitted to the EPA the Monitoring Program to assess its compliance with Condition U2.1 called the Dust Management Trigger Action Response Procedure, or the Dust TARP (MAN SD PRO 0006).

The Dust TARP is informed by visual monitoring, air quality and meteorological monitoring and meteorological and dust risk forecasting systems. An overview of the methodology is provided in this section.

3.1 Forecast Dust Risk

The Hunter Valley Modelling System, developed under ACARP Project C19034, comprises meteorological forecasting and dust dispersion modelling for the Hunter Valley. This system provides early warning of adverse meteorological conditions and potential dust risks, thus facilitating proactive management of mining activities to reduce dust generation potentials.

Meteorological and dust risk forecasts from the Hunter Valley Modelling System are automatically sent via email to the MAN Environment and Community Department and key personnel from the Mine Production Department and Coal Handling and Preparation Plant and include twice a day forecasts of:

- dust risk index;
- dust transport (dust risk contour plots); and
- meteorological conditions (including wind roses, vertical temperature profiles, rainfall).

Mining Supervisors review the daily forecast prior to beginning of each shift. Based on the dust transport contour plots on this forecast, dust risk is assigned as no or low risk, Level 1 (amber) and Level 2 (red) depending on the risk of dust transmission off site. Examples are provided in **Appendix 1**.

In the event that high dust risks are forecast the Mining Supervisor and/or Mining Superintendent implement contingency measures, as outlined in the Dust Management TARP, to ensure that dust generation potentials are reduced. The Environment and Community Department is responsible for providing additional environmental information as may be required to inform the production personnel's actions.

The dust risk forecast is discussed with the oncoming crew during the pre-shift XCOM session, including any contingency measures to be employed during the course of the shift.

Further review of dust risk, weather conditions and performance of control measure will also be discussed during the Daily Production Meeting.

3.2 Operational Activities

Operations are monitored by the shift Mining Supervisor and recorded on the supervisor summary sheet each shift. In addition, delays are recorded in the onsite production system. **Table 2.3** outlines the delays recorded by the onsite production system.

Table 3.1: Parameters Measured in Operational Activities

Parameter	Frequency
Changes made to operation due to dust	At receipt of dust alarm
External weather: dust	Each occasion

3.3 Real time PM10 and Meteorological Monitoring

Mangoola Coal operates four Tapered Element Oscillating Microbalances (TEOMs) which are Monitoring Points 1-4 under EPL 12894. Air quality (in PM10) and meteorological data is recorded by these monitors in 15-minute intervals. There is also an E- Sampler which is a supplementary monitor that is located close to the mine operation in the prevailing wind direction. This monitor records air quality data at 15-minute intervals. Weather Station North (WSN) is Monitoring Point 5 under EPL 12894. This weather station is located on Wybong Road and is north of the Mangoola site. Data monitoring is undertaken using the sampling methods in EPL 12894.

Air quality and meteorological monitoring data are evaluated against monitor-specific PM10 and meteorological triggers on a real-time basis with air quality and meteorological alarms automatically triggered by the data acquisition system.

The trigger levels for PM10 are in **Table 2.2** below. Alarms are sent via SMS to Mangoola employees included in the Dust Trigger Action Response Plan. Actions taken in response to Level 1 and Level 2 Trigger Levels are logged by the shift Mining Supervisor.

Table 3.2: PM10 Concentration Alarm Triggers

Level 1 Dust Alarm	Level 2 Dust Alarm
1-hr rolling average greater than 70 µg/m ³ OR 24-hr rolling average greater than 40 µg/m ³	1-hr rolling average greater than 150 µg/m ³ OR 24-hr rolling average greater than 50 µg/m ³

The trigger levels for meteorological alarms are presented in table in **Table 2.3** below. Alarms are sent via SMS to Mangoola employees included in the Dust Trigger Action Response Plan. This alarm acts as an additional prompt to check on operations in light of changing meteorological conditions.

Table 3.3: Meteorological Triggers

Level 1 Meteorological Alarm
Average wind speed exceeds 8m/s

3.4 Trigger Responses

Site-wide trigger levels and associated actions/responses based on real-time monitoring and dust risk forecasts are documented in Appendix 2. Mine-activity specific trigger levels and associated actions/responses are given in Appendix 3. These have been communicated to Mangoola Coal personnel and contractors through training and the Mining Supervisors have responsibility for inspecting the operation and making changes as required to manage air quality impact in accordance with the Dust TARP.

3.5 Key Performance Indicators

Key performance indicators for the effective implementation of the Dust TARP are compliance to the impact assessment criteria in Project Approval 06_0014. These are given in Table 7.

Table 3.4: Key Performance Indicators for PM 10 Particulate Matter Emissions

Impact Assessment Criteria Type	Averaging Period	Criterion
Long Term (PM10)	Annual	30µg/m3
Short Term (PM10)	24 hour	50µg/m3

4. RESULTS

4.1 Forecast Dust Risk

The dust risk forecast system operated effectively from 22nd March to 30th June 2014 (reporting period). Emails were generated daily in the morning and evening. The morning charts were also printed and placed on the boards in the Mining Supervisors' office. A weather summary is provided at Daily Production meetings. Figures **4.1 to 4.4** show the dusk risk prediction figures at four representative locations NW, NNW, NE and SE of Mangoola Coal compared to 24-hour PM10

concentrations from four representative monitoring stations for each of those locations.

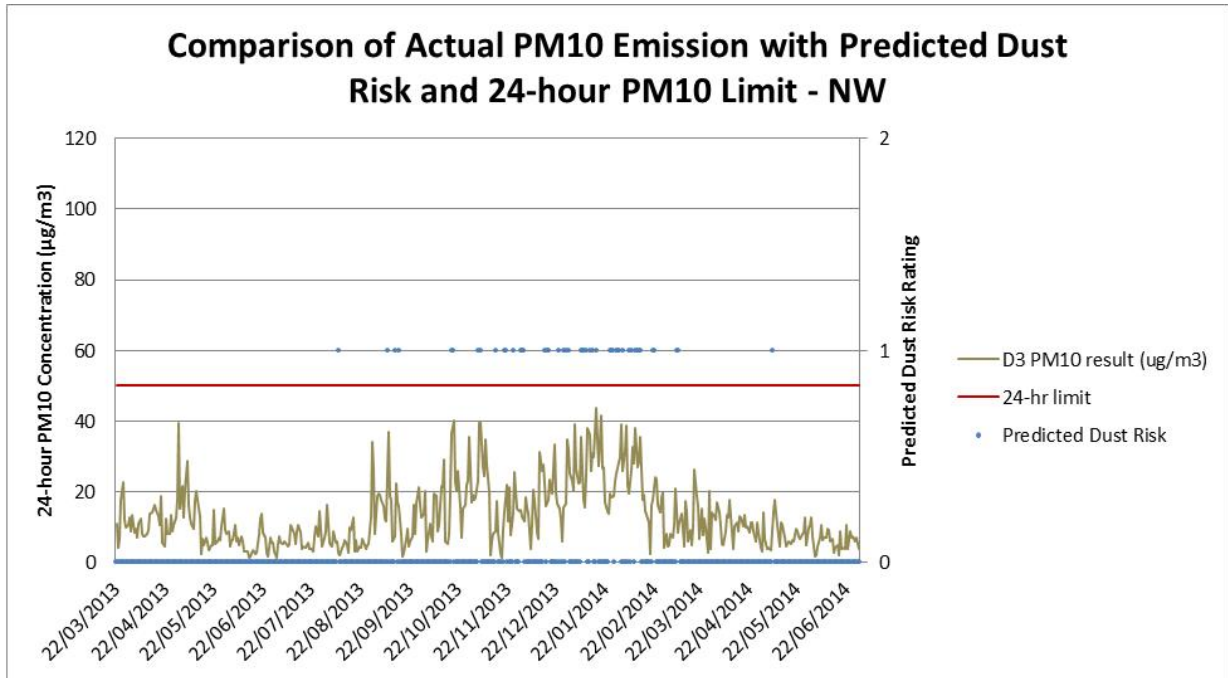


Figure 4-1: Predicted dust risk compared with PM10 monitoring results – NW location.

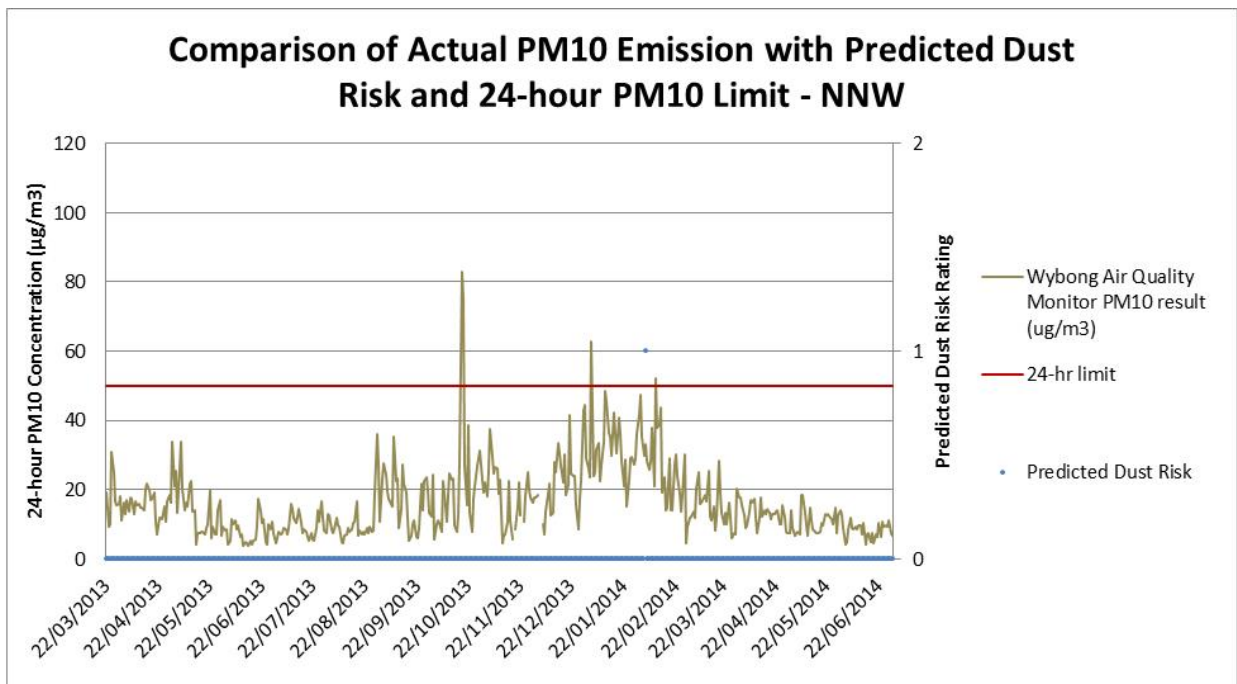


Figure 4-2: Predicted dust risk compared with PM10 monitoring results – NNW location.

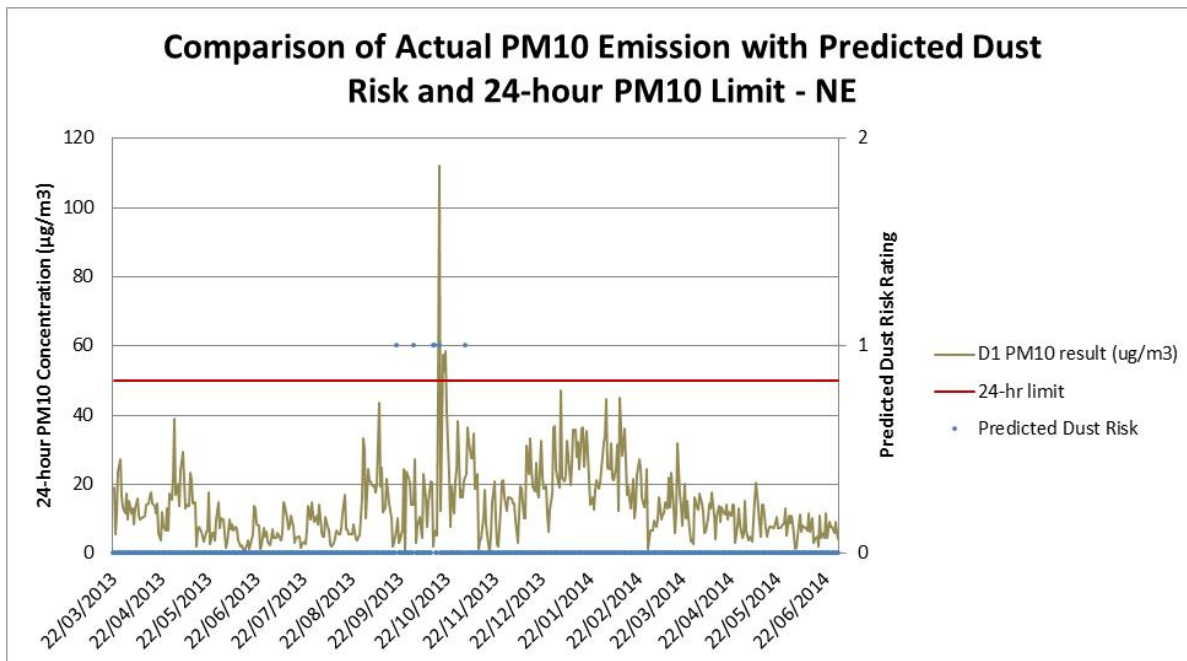


Figure 4-3: Predicted dust risk compared with PM10 monitoring results – NE location.

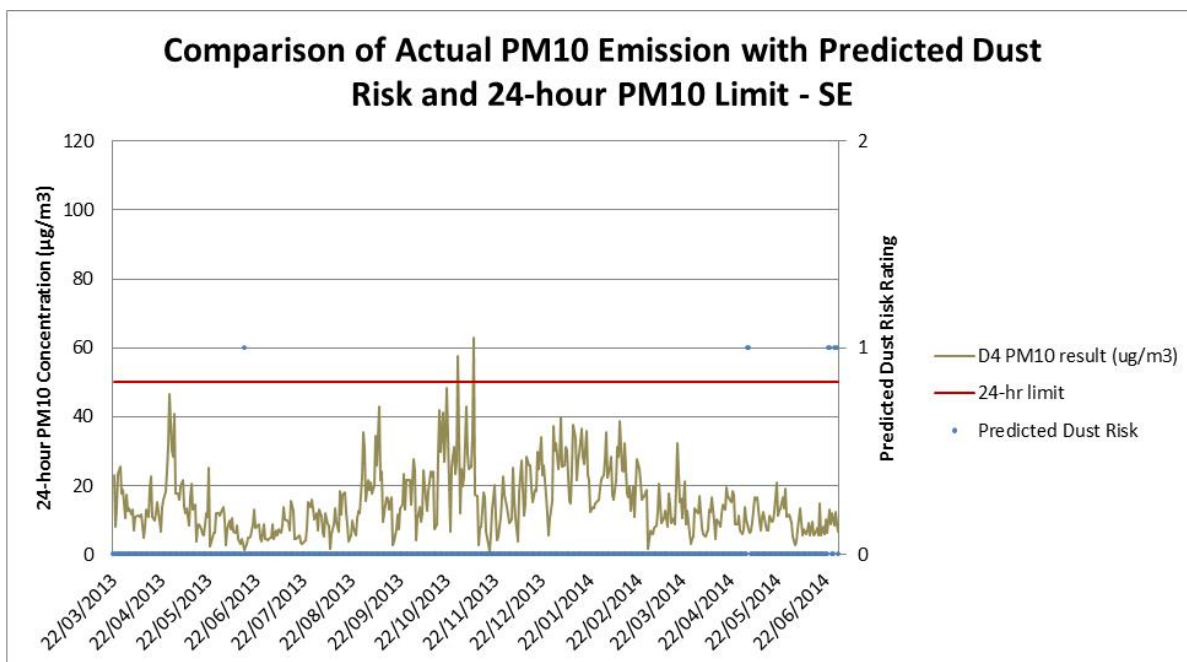


Figure 4-4: Predicted dust risk compared with PM10 monitoring results – SE location.

4.2 Operational Activities

Mining Supervisors are familiar with the requirements for managing dust emissions from the disturbing and handling of overburden in adverse weather conditions through training and site procedures (including the Dust TARP). Mining Supervisors inspect their work areas throughout the day and particularly in adverse weather conditions. Mangoola Operators have also been trained regarding environmental dust management.

During the reporting period, there were some occasions where existing controls were not effectively managing dust and equipment was parked up. **Table 3.1** presents a summary of the equipment delays recorded during the reporting period due to an unacceptable environmental dust/dust risk.

It should be noted that this includes longer duration delays and does not necessarily include equipment slowing down to operate to conditions or short delays for equipment to relocate to more sheltered areas. It also would not include contract equipment moving topsoil which may not use the Leica tracking system on site or proactive planning of activities to avoid excessive dust (e.g. activities like blasting, topsoil handling and mulching activities are often avoided on excessively windy days unless it can be managed).

Table 4.1: Summary of Equipment Delays for Dust/Environmental Dust.

Weather External Idle Time Type	Total Hours
Environmental Dust	163.2
Dust	17.1

Figure 4-5 presents a comparison of the dust alarms received and equipment delays. There is not always a correlation where inspections have found that Mangoola Coal is not the main source of dust (e.g. bushfires) or where changes can be made to the operation that do not result in equipment delays but do improve dust emissions (e.g. watering the drill prep areas, the use of an another water cart on or relocating to a lower dump or more sheltered area of the operation).

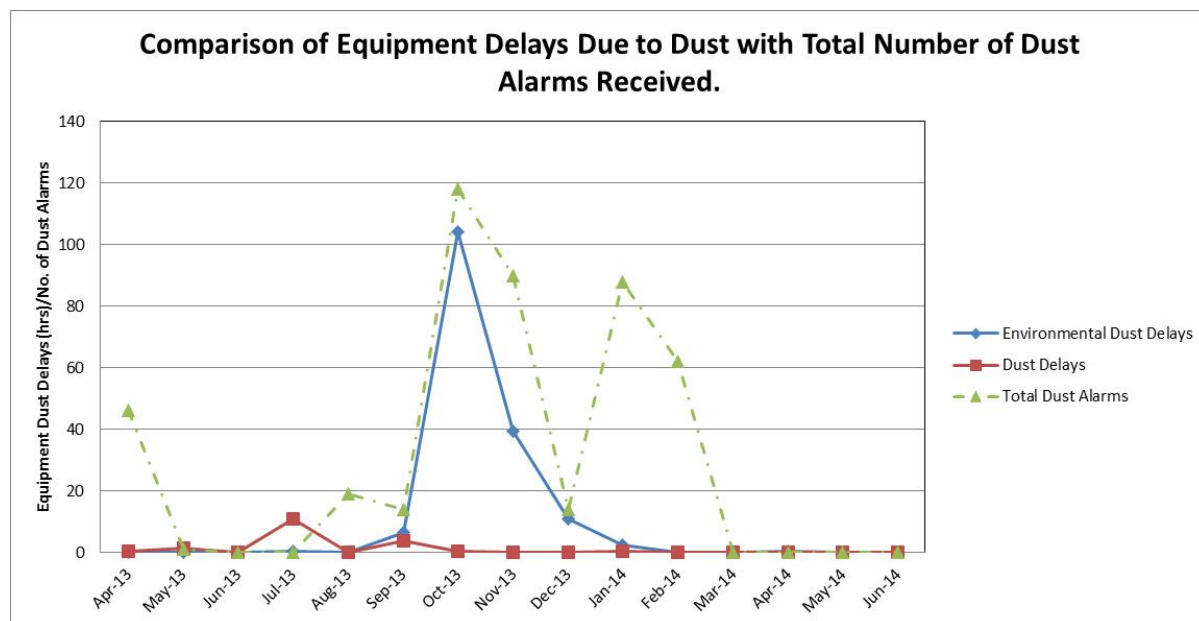


Figure 4-5: Equipment dust delays versus dust alarms received

4.3 Responses to Alarms

Figure 4.6 provides a breakdown of the type of dust alarms received on site. These include all alarms including those caused by bushfire smoke, regional haze, regional

dust events and other external sources. The site also received several dust alarms when the operation was closed down and equipment parked up.

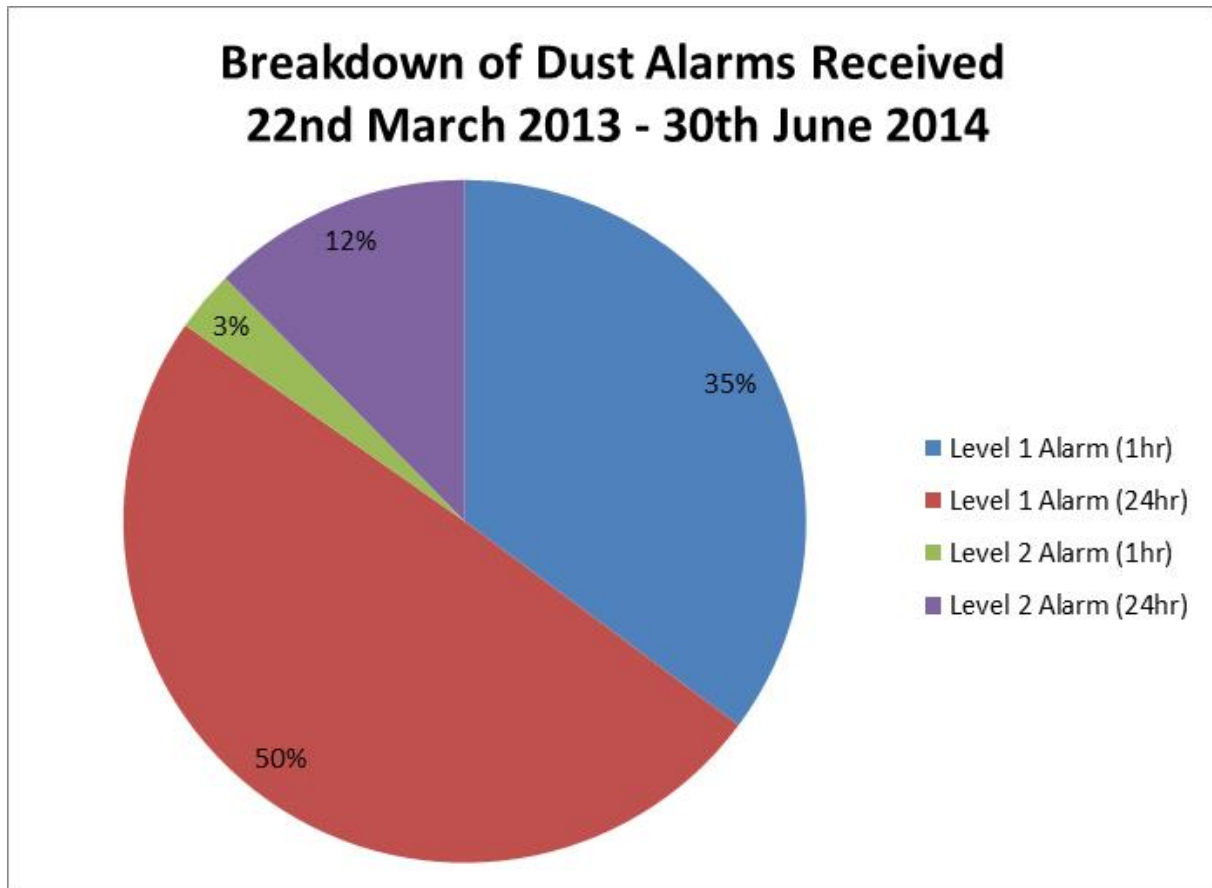


Figure 4-6 Breakdown of Dust Alarms Received by Type.

Table 4.2 provides a summary of the dust alarms received via SMS in accordance with Mangoola Coal's Dust TARP. Note that alarm data sets include all alarms received including those Mangoola Coal personnel found, following investigation, may have been triggered by other sources (e.g. the Black Jack Mountain and Hungerford Hill bushfires). The following is a summary of dates where smoke/bushfire activity was noted in the region and was influencing PM10 concentrations causing elevated results. These fires are believed to have triggered over 55% of the dust alarms received:

- ~17th October 2013 to 29th October 2013
- 8th November 2013
- Early January 2014 (11th and 12th in particular); and
- 29th to 30th April 2013.

Table 4.2: Summary of Alarms Received by Monitoring Station

TEOM ID	Location from the Mine	Total	Level 1 Alarm (1hr)	Level 1 Alarm (24hr)	Level 2 Alarm (1hr)	Level 2 Alarm (24hr)	No. of Results Above 24-hr PM10 KPI	No. of Results Above Annual Average PM10 KPI
D1	NE (96 Ridgeland Rd)	47	2	35	0	10	4 - Black Jack Mountain Bushfires	0
D2	South (22 Bells Lane)	64	15	34	1	14	1 - Hungerford Hill Fires	0
D3	NW (275 Wybong PO Rd)	209	113	85	6	5		0
D4	SE (830 Mangoola Rd)	133	30	70	6	27	2 - influence from Black Jack Mountain Fires and Hungerford Hill fires	0

4.4 Performance Against KPI 's

Figure 4.7 presents compliance with the annual rolling average PM10 KPI outlined in Mangoola Coal's Dust Management TARP. The average result is tracking well below the criteria of 30µg/m3.

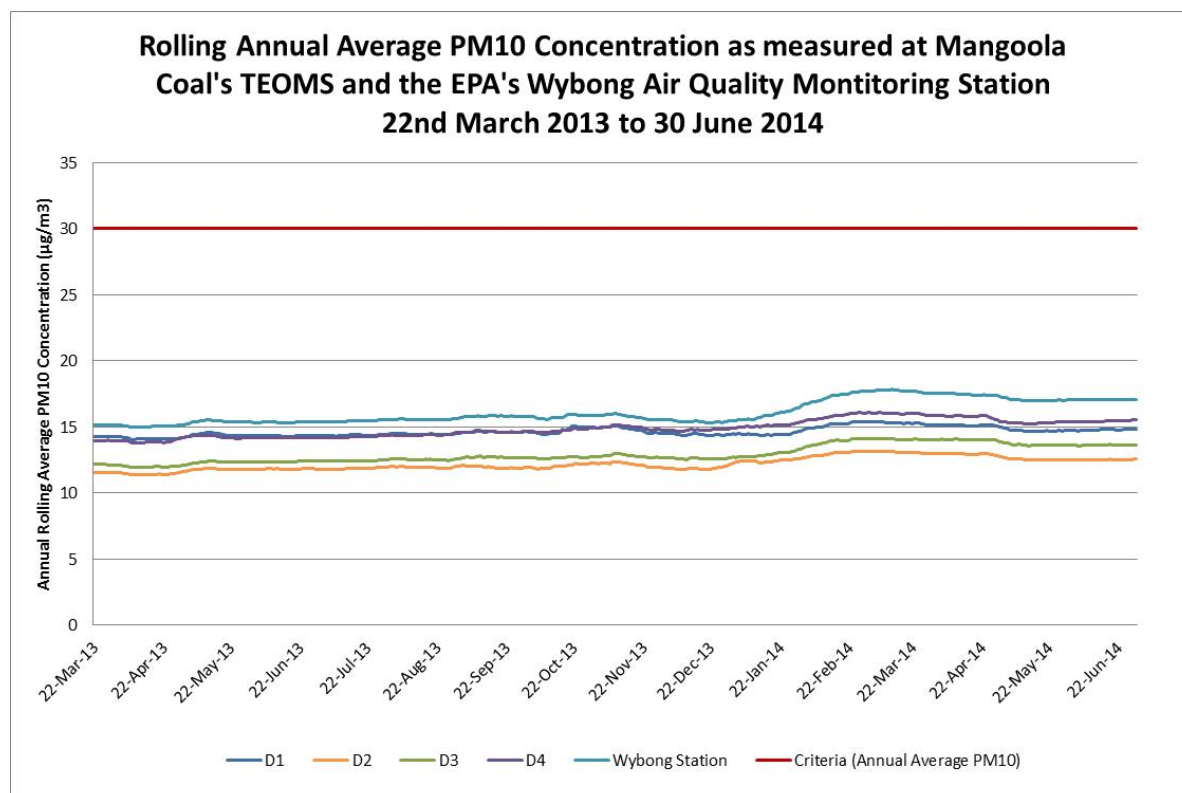


Figure 4-7: Rolling Annual Average PM10 Concentration Compared to the Dust TARP KPI Annual Criteria.

5. DISCUSSION AND CONCLUSION

This report demonstrates that Mangoola has implemented commitments made regarding operations during adverse weather conditions and has performed well against the specified KPIs even with the influence on local bushfires over the reporting period. The workforce has been given awareness training and are clear on operational requirements including changes that maybe needing to be made when weather is adverse. Evidence of such operational changes have been demonstrated throughout this report.

6. DEFINITIONS

Term	Glencore Coal Assets Australia Definition
PM ₁₀	Particulate matter less than 10 micrometers (µm) in size
Project Approval	Mine plan modification Project Approval 06_0014
TEOM	Tapered Element Oscillating Microbalance dust sampling unit
µg/m ³	Micrograms per cubic metre

7. REFERENCES

7.1 Legislation

- <<insert reference>>

7.2 Australian Standards

- <<insert reference>>

7.3 Glencore

- <<insert reference>>

7.4 Glencore Coal Assets Australia

- <<insert reference>>

7.5 <<Site>>

- <<insert reference>>

8. APPENDICES

8.1 Appendix 1—Dust Risk Prediction Example

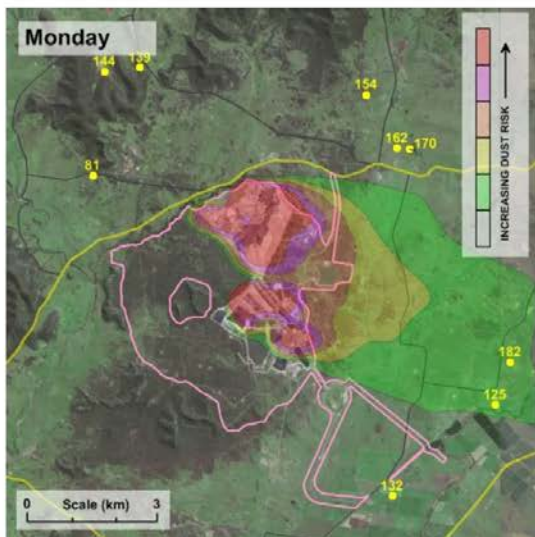
Air Quality Control System: Dust Risk Prediction (example from 30th June 2014)



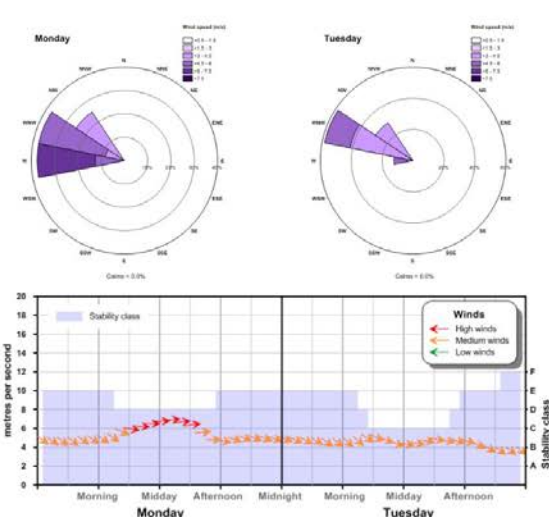
Air Quality Control System
Mangoola: 30 June 2014

Bureau of Meteorology forecast
Singleton: Partly cloudy.
Maximum temperature: 16 deg C

Predicted dust risk

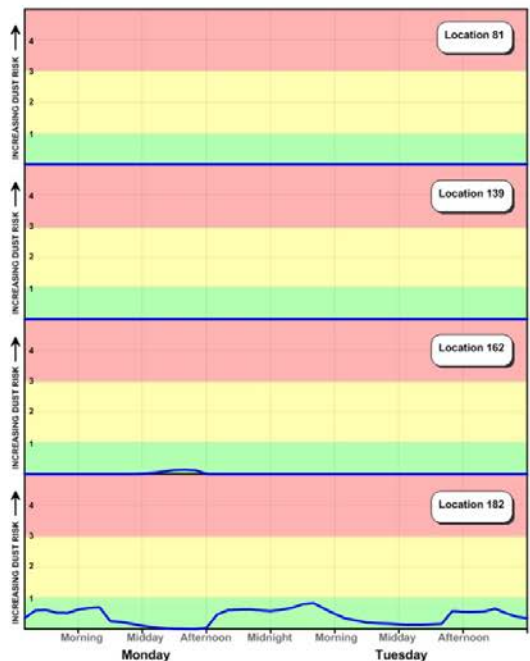


Predicted meteorology



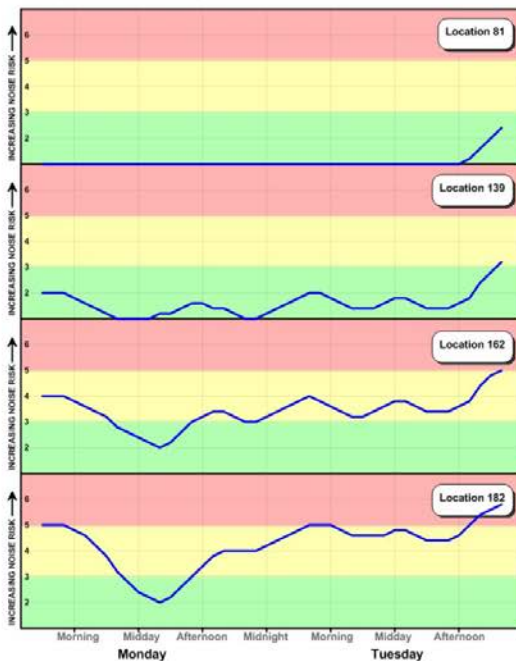
Dust risk at selected locations

0 to 1: Low risk. Contribution from site unlikely to cause air quality impacts
1 to 2: Medium risk. Exercise caution / observe conditions / additional mitigation on standby
3 to 5: High risk. Additional mitigation likely to be necessary to minimise air quality impacts



Noise risk at selected locations

1 to 3: Low risk. Meteorology is attenuating noise at the receptor
3 to 5: Medium risk. Meteorology is neither enhancing nor attenuating noise
5 to 6: High risk. Meteorology is enhancing noise at the receptor



Limitation statement:

The sole purpose of this report is to provide forecasts in connection with Glencore's Air Quality Control System. Modelling and forecasting is not a precise science. Forecasts are only an indication of what might happen in the future and they may not be achieved. They rely upon complete sets of input data and assumptions. There is no guarantee that these assumptions will in fact be correct or accurate. Jacobs has prepared the modelling system and this report in accordance with the usual care and thoroughness of the consulting profession for the sole purpose described above and by reference to applicable industry standards, guidelines, procedures and practices in existence at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and forecasts presented in this report, to the extent permitted by law. No responsibility is accepted by Jacobs for use of any part of this report in any other context. This report has been prepared on behalf of and for the exclusive use of, Glencore, and is subject to, and issued in accordance with, the provisions of the agreement between Jacobs and Glencore. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon this report by any third party.

<http://envforecasting.globalskm.com/>
envforecasting@globalskm.com

Produced: 30/06/2014 05:08