MT ARTHUR COAL

U2 Particulate Matter Control Best Practice Implementation Report - Overburden Handling Under Adverse Weather Conditions

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Date Published

15 August 2014

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Contents

1 Introduction

Hunter Valley Energy Coal Pty Ltd (HVEC) operates the Mt Arthur Coal complex in the Upper Hunter Valley, NSW approximately five kilometres south west of Muswellbrook.

HVEC operates Mt Arthur Coal under Environment Protection Licence (EPL) 11457. On 21 March 2013, EPL 11457 was modified to include the following new condition:

- U2: Particulate Matter Control Best Practice Implementation - Disturbing and Handling Overburden Under Adverse Weather Conditions

Condition U2 (as at 21 March 2013) required a monitoring program to be developed and implemented to assess compliance with the requirements to alter or cease the use of equipment associated with the disturbance and handling of overburden during adverse weather conditions. Condition U2 is reproduced in full in **Appendix 1**.

HVEC prepared and submitted *Pollution Monitoring Program – Overburden Handling Under Adverse Weather Conditions* (the monitoring program) to the Environment Protection Authority (EPA),. The EPA confirmed on 9 August 2013 that the monitoring program was found to be generally compliant with the requirements of Condition U2.1.

On 5 September 2013, Condition U2 of EPL 11457 was revised based on the approved monitoring program. Condition U2.3 requires HVEC to submit a report to the EPA that documents the results of the actions taken in accordance with Condition U2.1. This report has been prepared to satisfy this requirement.

2 Program Components

2.1 Program development and implementation

Following the introduction of Condition U2 into EPL 11457 on 21 March 2013, the monitoring program was developed and implemented according to the following sequence:

- *27 May 2013:* Initial submission of the monitoring program for EPA approval;
- *26 July 2013:* Final submission of the monitoring program following EPA review and request for further information;
- *9 August 2013:* Approval of the monitoring program by the EPA, which initiated the commencement of studies and development of systems required to operate the monitoring program, including the following:
    - determination of areas of the site at highest risk of potentially generating elevated dust concentrations due to overburden handing (critical locations);
    - determination of trigger values for adverse meteorological conditions;
    - development of the Dust Trigger Action Response Plan (TARP); and
    - development of the Dust Response Line for tracking modifications to operations as a result of adverse weather conditions;
- *5 September 2013:* Revision of Condition U2 based on the approved monitoring program;
- *31 December 2013:* Finalisation of the Dust TARP for implementation following air dispersion modelling to determine critical locations and triggers for adverse meteorological conditions; and
- *1 January 2014*: Incorporation of triggers for adverse meteorological conditions into Mt Arthur Coal's real-time alarm system and effective commencement of operating the monitoring program.

From the period 22 March 2013 through to effective commencement of operating the monitoring program on 1 January 2014, HVEC continued to implement its existing dust management measures at the Mt Arthur Coal operation in accordance with the Air Quality and Greenhouse Gas Management Plan, which is approved by the Department of Planning and Environment.

HVEC's existing dust management system at the Mt Arthur Coal operation at this time included a real-time alarm system that sent SMS alerts to mine supervisors when wind speeds reached particular thresholds. This alarm system, combined with practices of in-field visual dust assessments by personnel in the pit, was used to cease or alter operations (including on overburden) to minimise dust generation

during high wind conditions. The real-time alarm system also incorporated dust alerts in response to air quality monitoring data. The pre-existing systems also included the mine equipment tracking system Modular to track changes made to operations during high wind conditions.

The approved monitoring program provides additional features to build upon the previous systems and further improve the rigour associated with monitoring adverse weather conditions and tracking changes made to mining activities to minimise dust generation. The revised systems and tools required to operate the monitoring program were completed on 1 January 2014. The practical reporting period for documenting the results of the actions taken in accordance with Condition U2.1 has been established as 1 January to 15 July 2014.

2.2 Critical locations

Following EPA approval of the monitoring program, a specialist air quality consultant was commissioned by HVEC to undertake air quality modelling to identify areas of the site at highest risk of potentially generating elevated dust concentrations due to overburden handing. These areas were categorised as critical locations for the purposes of the monitoring program.

This risk assessment involved the consultant conducting air dispersion modelling to simulate overburden handling activities around the existing and future active overburden areas to be utilised during the program implementation period. Critical locations for overburden handling activities were determined by sensitivity analysis of different overburden locations around the site.

Dust deposition was used as an indicator of visible dust impacts from overburden handling emissions at the site boundary which is often located in close proximity to the overburden handling activity. Using this metric, higher wind speeds are shown to result in higher dust emissions from overburden handling activities (as the activity is wind speed dependent) and this in turn yields higher dust deposition predictions at receptors.

The key air dispersion modelling assumptions included:

- Each overburden location was represented by three identical sources to simulate three overburden handling activities (e.g. dozer and loading/unloading operations) simultaneously occurring in one overburden location;
- Emissions from the overburden handling activity were modelled as wind sensitive to account for wind dependency in the overburden handling emission factor equation; and

- Overburden handling activity was modelled as a volume source.

Normalisation of the predicted dust deposition levels was used to identify the locations where high relative dust deposition occurs. The predicted dust levels were not a reflection of actual anticipated levels, but rather how the results relate to one another across modelling scenarios. A CALMET file was used to evaluate the effects when actual data from the operation's statutory real-time meteorological station WS09 and full terrain is accounted for in the air dispersion modelling. The CALMET file used meteorological data from 2010 and terrain from July 2013.

The final critical locations as determined by the risk assessment modelling are listed in Table 1 and shown on Figure 1.

Table 1: Critical locations

Critical Location ID	Pit ID	Terrain Height (m AHD)	Distance from Boundary (km)	Location Activity
VD1 260 and VD1 270	Windmill	260	1.1	Dump
VD1 280	Macleans	280	1.6	Dump
CD2 280	Calool	280	2.1	Dump
Macleans Pit 175 m AHD	Macleans	175	1.0	Dig bench

Only one critical location is a dig rather than a dump location. This location was selected due to the potential for dust issues when digging at 175 m AHD and above in this pit. During analysis of shovels/excavators operating in Macleans pit during the adverse weather condition periods recorded, it was identified that dig progression in this area did not reach 175 m AHD until 4 March 2014. Prior to this, during January and February 2014 all shovels/excavators operating in this dig location were located at a height of between 161 and 164 m AHD. Therefore, no loading operations occurred in critical locations for any of the adverse weather condition periods assessed. Loading operations have not been considered in dust abatement calculations.

Figure 1: Critical locations

2.3 Adverse meteorological condition trigger values

Adverse meteorological condition trigger values, which form the basis of the Dust TARP for overburden handling activities in critical locations, were also determined by the air dispersion modelling.

Normalised dust deposition levels from modelling of emission sources in critical locations were plotted to identify the wind directions and wind speeds where the highest dust deposition are likely to occur.

Based on wind speed and direction from the air dispersion modelling the specialist air quality consultant determined the following trigger values for key meteorological parameters that are likely to give rise to elevated visible dust emissions beyond the site boundary from critical locations:

- Wind speed: ≥ 7m/s;
- Wind direction: between 100 and 135 degrees (inclusive); and
- Rain: ≤ 0.3mm.

These meteorological parameters are recorded at the Mt Arthur Coal operation's WS09 onsite automatic weather station, which is located in the mine's industrial area and samples at 15 minute intervals. The location of the weather station is shown on Figure 2.

2.4 Dust trigger action response plan

The Dust TARP was developed based on the identified adverse meteorological condition trigger values (Section 2.3) and overburden handling activities in critical locations.

In the Dust TARP, an adverse meteorological conditions alarm is set to alert once when the trigger values are met for two consecutive 15 minute intervals. The commencement of the adverse weather condition (AWC) period for calculation purposes is also considered to occur when the trigger values are met for two consecutive 15 minute intervals and a visual assessment has confirmed elevated dust generation. Similarly, in order to reduce the impact of short-term weather fluctuations, the adverse weather condition period is considered to have ended when all trigger values are not met for two consecutive 15 minute intervals.

The Dust TARP outlines clear criteria for mine supervisors to determine elevated levels of dust generation. It prescribes the required actions and operational changes required by mine supervisors in response to adverse weather conditions. In

accordance with the monitoring program, equipment on overburden includes bulldozers and the loading and unloading of overburden by shovels/excavators and trucks respectively.

The Dust TARP, whilst satisfying the requirements of the monitoring program, extends beyond the scope of Condition U2 and is applicable to all locations and all key sources of dust generation at the Mt Arthur Coal operation. The Dust TARP also has provision for mine supervisors to manually trigger the Dust TARP when excessive dust has been observed and immediate action is required but an automatic alarm has not yet been issued. It is also triggered by pre-existing dust and high wind alarms for dust management.

This report only includes actions and operational changes made in critical locations in response to adverse weather conditions.

2.5 Response log of actions taken

Response logs were developed and maintained to document the actions taken to minimise the emission of dust during adverse weather and the resultant dust levels, as required by Condition U2.2. The response logs include relevant information from the following sources:

- The Dust Response Line call log, where details of changes made to operations in response to alerts and in-field visual dust assessments by mine supervisors is recorded as text;
- Equipment and operational delay tracking recorded by the mine equipment tracking system Modular; and
- Shift record sheets.

Information recorded by these various sources has been summarised into log sheets in **Appendix 2** for each AWC period. Where multiple AWC periods occurred on the same date, these have been consolidated into the one log sheet for the date.

2.6 Dust abatement calculations

The quantity of dust emissions that were not released due to the cessation of operations on overburden was calculated as follows:

- Bulldozer operation on overburden:
    - Hours operations ceased (h) x TSP emission rate (kg/h)
- Loading and unloading overburden by shovels/excavators and trucks respectively:

- Tonnes of overburden that would have been loaded/unloaded during cessation x TSP emission rate (kg/t)

Shovels/excavators at the operation have the ability to log dust delays against the piece of equipment through the Modular tracking system. A shovel/excavator logs a dust delay when it ceases operating and the trucks assigned to it consequently cease operating as well. Therefore, for calculation purposes, dust delays logged for shovels/excavators loading overburden have been used to determined cessation of unloading operations at the critical dump locations.

The alteration of operations does not allow the calculation of emissions abated as the operations still occur, but will have been moved to a location that minimises the potential for elevated dust concentrations. For example, a shovel/excavator may re-route the trucks assigned to it to non-critical dump locations during adverse weather conditions, rather than cease operating, to reduce potential dust emissions.

TSP emissions rates were calculated as specified in the approved monitoring program, using AP-42 equations, reproduced below in Box 1, and using the following factors for overburden in alignment with the *Air Quality and Greenhouse Gas Assessment: Mt Arthur Coal Open Cut Modification* (PAE Holmes, 2013):

- 10 per cent silt content; and
- 2 per cent moisture content.

Box 1: AP-42 Emission Factors for Overburden Operations

Equipment (bulldozers) on overburden

$$\text{TSP emissions (kg/h)} = 2.6 \times \frac{s^{1.2}}{M^{1.3}}$$

Loading and unloading of overburden

$$\text{TSP emissions (kg/t)} = 0.74 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \right)$$

Where:

M	=	material moisture content (%)
s	=	material silt content (%)
U	=	wind speed (m/s)

Operational rates as listed in Table 2 for each shovel/excavator considered in this report were used to calculate the tonnes that would have been loaded/unloaded if operations had not ceased, in order to calculate dust abatement. These operational rates are based on actual rates for overburden recorded in bank cubic metres for each shovel/excavator in January and February 2014. The density of overburden is assumed to be 2.4 tonnes per bank cubic metre for conversion of bank cubic metres to tonnes.

Table 2: Loading/unloading rates used in calculation for equipment

Equipment ID	January 2014 Recorded Operating Rate (Tonnes/hour)	February 2014 Recorded Operating Rate (Tonnes/hour)
S204	3,796	5,529
S205	5,587	5,892
S211	3,257	2,832
S215	2,595	3,056
S216	3,438	3,956
S218	2,928	3,368

2.7 Resultant dust levels

Resultant dust levels (TSP concentrations) during each adverse weather condition (AWC) period are sourced from the Mt Arthur Coal operation's real-time tapered element oscillating microbalance (TEOM) monitor at Roxburgh Road (DC05), north west of the operation. This monitor is the only statutory TEOM monitor representative of nearby sensitive receptors located downwind of the critical locations during the determined adverse weather conditions. The location of DC05 is shown on Figure 2.

DC05 monitors particulate matter less than ten microns (PM_{10}). In order to convert PM_{10} to TSP concentrations the readings were multiplied by 2.5, in accordance with the operation's Air Quality and Greenhouse Gas Management Plan.

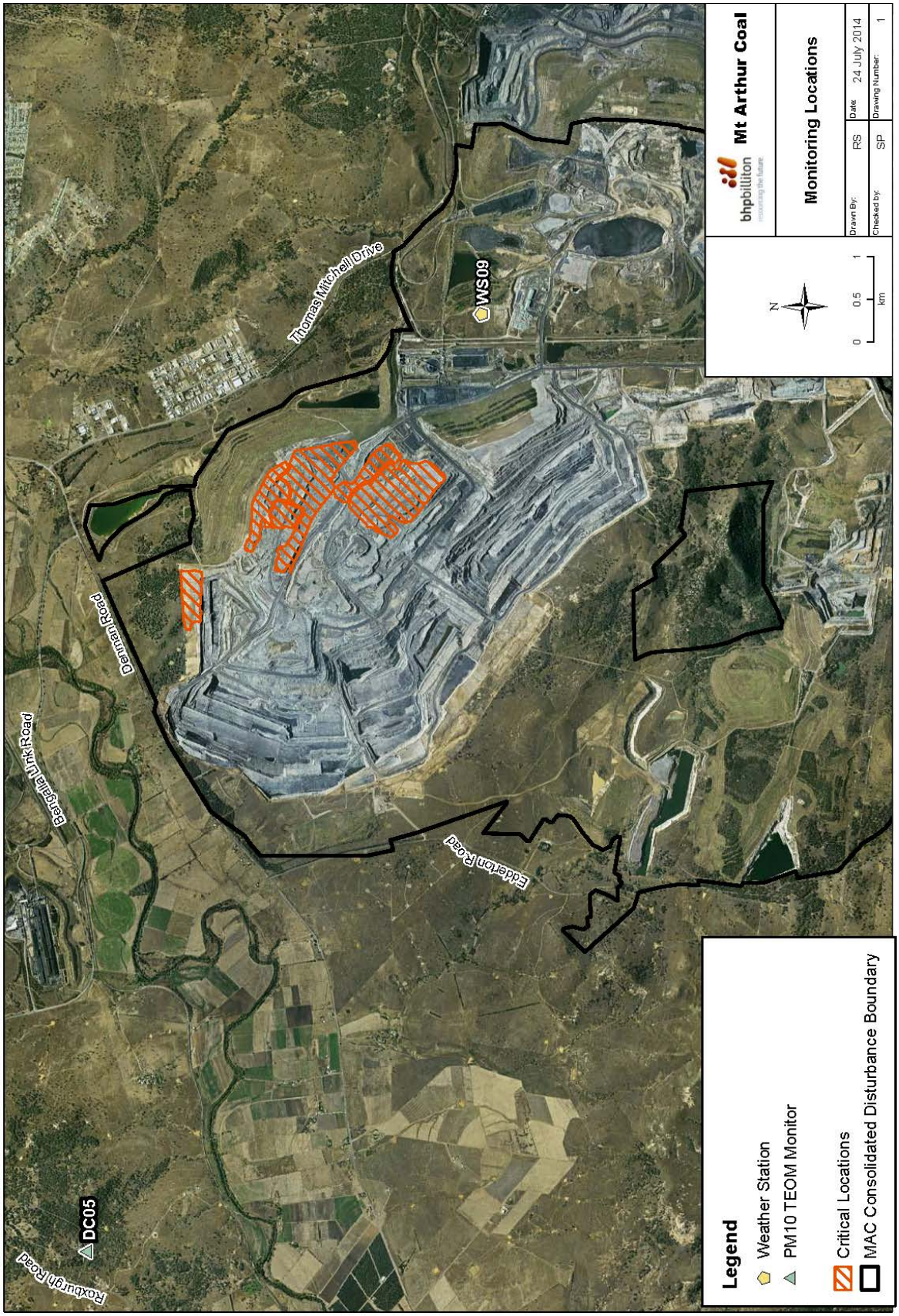


Figure 2: Monitoring station locations

3 Monitoring Program Results

3.1 Key Performance Indicators

The key performance indicators (KPIs) presented in the monitoring program to determine compliance with Condition U2.1 are provided in Table 3, along with comments on the achievement of the KPIs during the reporting period.

Table 3: Key performance indicators

Key Performance Indicator	Justification	Performance During Reporting Period
Adverse meteorological condition parameters will be selected based on those with the greatest influence on elevated dust concentrations	Ensure operational response is based on the key meteorological parameters (as determined through atmospheric dispersion modelling) that influence elevated dust concentrations.	**Achieved**. Adverse meteorological condition trigger values were determined by air dispersion modelling and incorporated into the finalised Dust TARP for implementation on 1 January 2014. Refer to Section 2.3 for further details.
Execute TARP for overburden handling activities in critical locations to 90 per cent compliance	Ensure operational response is focused on the highest risk sources of visible dust from overburden handling that may, under adverse meteorological conditions, result in elevated dust concentrations.	**Requires Improvement**. The Dust TARP achieved a 78 per cent response rate during adverse weather conditions from 1 January to 15 July 2014. An operational response is considered to be at least one of the following: • dust delays logged on equipment (cessations); • entry on shift record sheets to log actions taken (cessations, modifications or continued operations); or • call made to the Dust Response Line to log actions taken (cessations, modifications or continued operations) after in-field visual dust assessment of overburden handling activities in critical locations. Refer to Sections 2.4 and 2.5 for further details.
Maintain response log following trigger of an adverse weather condition to track changes to operations	Retain records to enable review of operational responses and assessment of dust abatement and resultant dust levels	**Achieved**. Response logs were developed and maintained to track operational changes during adverse weather conditions as detailed in Section 4. Information from these response logs have been summarised into log sheets in **Appendix 2** for each adverse weather condition period.

3.2 Adverse weather condition periods recorded

There were 18 AWC periods recorded during the reporting period, all of which occurred in January and February 2014, as listed in Table 4. This is consistent with normal seasonal conditions as the stronger south-easterly winds occur predominantly in the spring and summer months.

Table 4: Adverse weather condition periods

No.	Date	Start Time	End Time	Duration (hrs)	Ave Wind Speed (m/s)
1	7 January 2014	13:15	16:45	3.50	7.83
2	7 January 2014	17:30	18:00	0.50	7.69
3	7 January 2014	19:45	20:15	0.50	7.17
4	8 January 2014	15:00	15:15	0.25	7.02
5	8 January 2014	17:15	20:00	2.75	7.51
6	8 January 2014	22:15	22:30	0.25	7.05
7	12 January 2014	19:30	21:00	1.50	7.18
8	19 January 2014	17:30	18:15	0.75	7.79
9	19 January 2014	21:15	22:00	0.75	7.30
10	20 January 2014	17:30	18:30	1.00	7.75
11	22 January 2014	13:45	14:15	0.50	7.10
12	25 January 2014	16:15	20:00	3.75	8.14
13	25 January 2014	21:15	22:00	0.75	7.12
14	26 January 2014	16:45	18:15	1.50	7.07
15	4 February 2014	14:15	15:30	1.25	8.18
16	21 February 2014	20:15	21:00	0.75	7.39
17	22 February 2014	20:30	20:45	0.25	7.31
18	27 February 2014	16:15	18:00	1.75	7.77

Meteorological conditions during each adverse weather period, as sourced from WS09, are provided in **Appendix 3** for the reporting period.

3.3 Record of actions taken, dust abatement and resultant dust levels

As discussed in Section 2.5, a summary log sheet was developed for each AWC period recorded. There are 12 log sheets in total in for the reporting period, contained in **Appendix 2**, as multiple AWC periods occurring on the same date have been consolidated into the one log sheet for the date.

Each log sheet details:

- Time/date of the AWC period;
- Performance against the monitoring program KPI to execute the Dust TARP for overburden handling activities in critical locations;

- All changes as recorded by the Dust Response Line, including those not necessarily related to critical locations but rather reflecting the broader operation;
- A list and details of the equipment that was handling overburden in critical locations at the time;
- Dust delays logged on equipment and a graphical depiction of these logged dust delays, as well as other alterations made to equipment, such as re-routing of trucks from critical dump locations to lower level dumps to reduce the risk of dust emissions;
- Dust abatement calculation details and results; and
- Graphs of resultant dust levels at the relevant downwind air quality monitor for the full day the AWC period occurred.

In the field, operational changes may have exceeded those documented in the log sheets. This is due to the limitations of the systems available to provide information on operational changes. For example, a number of bulldozers at the Mt Arthur Coal operation do not have a Modular tracking system installed and so dust delays can often not be logged by bulldozer operators and locations of bulldozers can only be deduced in retrospect by shift plans. The Dust Response Line logs may also not reflect all operational changes in critical locations as they provide only a short summary on observations and changes to all activities across the whole of the mine and in some cases may lack sufficient detail. As a result of these limitations, these additional dust management actions have been excluded from this report.

There were two AWC periods where an SMS alert was not distributed by the real-time alarm system and mine supervisors did not make any corresponding log of operational changes made. These periods are noted in Table 5. Following this, an upgrade was carried out on Mt Arthur Coal's real-time alarm system to reduce the risk of SMS alerts failing.

3.4 Dust abatement results

Dust abatement results are summarised for the reporting period in Table 5 for each AWC period. Details of dust abatement calculations are provided in the log sheets in **Appendix 2**.

Table 5: Dust abatement results

No.	Adverse Weather Condition Period	Total Dust Abatement (kg)
1	7 January 2014 #1	83.5
2	7 January 2014 #2	0.0[1]
3	7 January 2014 #3	0.0[1]

No.	Adverse Weather Condition Period	Total Dust Abatement (kg)
4	8 January 2014 #1	8.5
5	8 January 2014 #2	55.2
6	8 January 2014 #3	12.1
7	12 January 2014	0.0[2]
8	19 January 2014 #1	41.5
9	19 January 2014 #2	14.5
10	20 January 2014	34.7
11	22 January 2014	9.3
12	25 January 2014 #1	159.5
13	25 January 2014 #2	0.0
14	26 January 2014	0.0
15	4 February 2014	118.1
16	21 February 2014	0.0
17	22 February 2014	0.0[2]
18	27 February 2014	49.7
Total		**586.8**

[1] Trucks re-routed to non-critical locations
[2] Real-time alarm system failed to distribute SMS alert.

A total of 586.8 kg of dust abatement was attained through the implementation of EPL 11457 Condition U2. However, this is only a small part of the likely overall total abatement achieved by the Mt Arthur Coal operation based on action taken from additional site-wide triggers (beyond the adverse meteorological conditions defined by the monitoring program), to include high winds, measured PM_{10} dust levels and in-field visual dust assessments. Areas of the operation incorporated into dust management procedures also extend beyond critical locations defined by the monitoring program, to include the whole of the mine and encompass activities in addition to overburden handling. In addition, no abatement is calculated from the relocation of overburden dumps to non-critical locations.

Table 6 shows the hours that haul trucks logged as a dust delay in the Modular tracking system by month, from 1 January 2014 to 30 June 2014. This is indicative of the time in which equipment ceased operating to reduce dust generation across the operation during the period examined in this report.

Table 6: Site-wide dust delays

Month	Dust Delays Logged (Hrs)	Dust delays as a per cent of available equipment hours
January 2014	2,161.1	3.0%
February 2014	1,459.9	2.2%
March 2014	5.3	0.0%
April 2014	5.8	0.0%
May 2014	0.3	0.0%
June 2014	1,013.2	1.6%
Total	**4,645.6**	**1.1%**

3.5 Resultant dust levels

Graphs of resultant dust levels recorded at DC05, downwind of critical locations, for the full day each AWC period occurred are provided in the log sheets in **Appendix 2**.

Despite the dust abatement achieved by the implementation of EPL 11457 Condition U2, no trend or regular pattern was observed in the resultant dust levels measured downwind of critical locations following the cessation or modification of operations during AWC periods.

4 Conclusion

Air quality is a key environmental issue for the communities of the Hunter Valley. Mine operations, such as HVEC's Mt Arthur Coal in the Upper Hunter Valley, play a key role in the management of air quality in the region. HVEC has recognised this through the implementation of a number of controls outlined in the operation's Air Quality and Greenhouse Gas Management Plan.

HVEC has further improved the systems and tools used to monitor adverse weather conditions and track changes made to mining activities at the Mt Arthur Coal operation to minimise dust generation.

The KPIs to determine adverse meteorological parameters with the greatest influence on elevated dust concentrations and to maintain a response log to document changes to operations following the trigger of an adverse weather condition were successfully achieved. A Dust TARP was also developed and implemented, achieving a 78 per cent response rate in critical locations during adverse weather conditions from 1 January to 15 July 2014.

5 Definitions and Abbreviations

Definitions of some of the terms used in this report are as follows:

Adverse weather conditions	Meteorological conditions modelled as being likely to cause elevated dust concentrations and for which visual assessment has confirmed elevated dust generation.
Critical locations	Areas of the site identified as being at highest risk of potentially generating elevated dust concentrations due to overburden handling activities.
Elevated dust concentrations	Elevated visible dust emissions (as determined by dispersion modelling) beyond the site boundary.
Elevated dust generation	Dust generation that may lead to elevated dust concentrations.
EPA	Environment Protection Authority.
EPL	Environment Protection Licence.
HVEC	Hunter Valley Energy Coal Pty Ltd.
KPI	Key performance indictor.
PM_{10}	Particulate matter less than 10µm.
Resultant dust levels	TSP concentrations as calculated based on PM_{10} concentrations directly measured across the operation's real-time air quality monitoring network.
TARP	Trigger Action Response Plan.
TEOM	Tapered element oscillating microbalances.
TSP	Total suspended particulate, an indicator of visible dust.

6 References

HVEC (2013) *Mt Arthur Coal Pollution Monitoring Program – Overburden Handling Under Adverse Weather Conditions*. 18 July 2013.

HVEC (2013) *Mt Arthur Coal Air Quality and Greenhouse Gas Management Plan*. 27 May 2013.

PAE Holmes (2013) *Air Quality and Greenhouse Gas Assessment: Mt Arthur Coal Open Cut Modification*

Appendix 1: EPL Condition U2

U2 Particulate Matter Control Best Practice Implementation – Disturbing and Handling Overburden Under Adverse Weather Conditions

U2.1 The licensee must 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.

U2.2 To assess compliance with Condition U2.1, the Licensee must:

- Monitor dust levels at relevant monitoring locations within the Licensee's existing air quality monitoring network; and
- Document the actions taken to minimise the emission of dust during adverse weather and the resultant dust levels.

U2.3 The Licensee must submit a report to the EPA which documents the results of the actions taken in accordance with Condition U2.1. The report must include an assessment of the effectiveness of changes made to mining activities due to adverse weather and document meteorological conditions and the resultant dust levels. The report must be submitted by the Licensee to the Environment Protection Authority Regional Manager Hunter, at PO Box 488G, NEWCASTLE by 15 August 2014.

U2.4 The report required by Condition U2.3 must be made publicly available by the Licensee on the Licensee's website by 29 August 2014.

Appendix 2: Adverse Weather Condition Period Log Sheets

Date: 7 January 2014

AWC Period Time and Duration
AWC period #1: 13:15 to 16:45 (3.5hrs)
AWC period #2: 17:30 to 18:00 (0.5hrs)
AWC period #3: 19:45 to 20:15 (0.5hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line.

Dust TARP Dust Response Line Log

Time Logged	Response
14:32	REDUCED VEHILCE SPEED. MINIMIZED GRADING. UTILIZED WATER CART IN PRIO RITY AREAS. , ALL AREAS OF THE PITT. 10AM, N/A
16:34	USED LOWER LEVEL DUMPS. UTILISED WATER CARTS IN PRIORITY AREAS & CEASE D OPERATIONS IN THE RED ROCK & CEASED OPERATIONS ON HIGHER LEVEL DUMPS
20:45	2045, RESUMED FULL OPERATION ENTIRE PIT

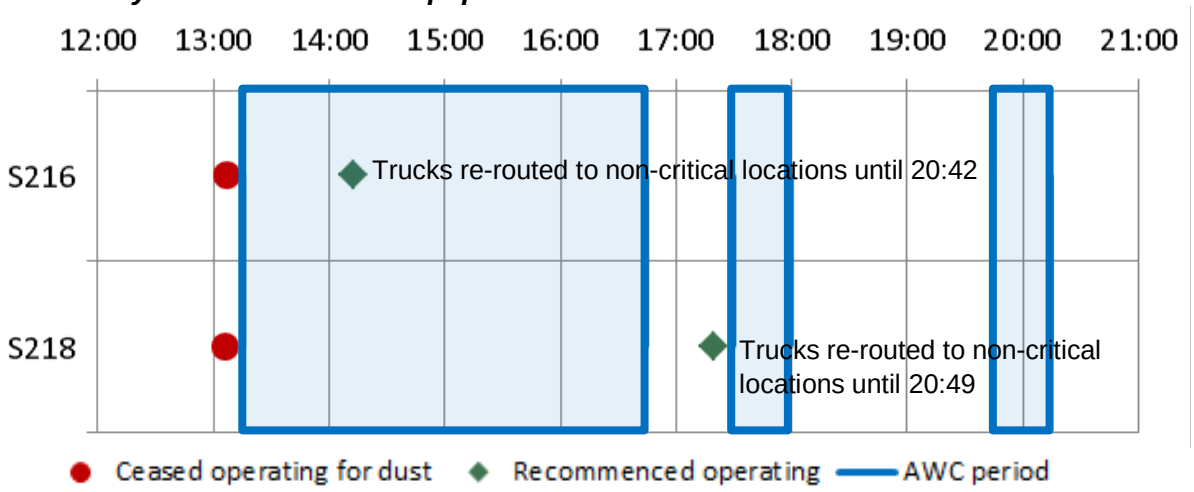
Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S216	CD2 280	Unloading	Approximately 70 per cent of trucks to CD2 280 leading up to AWC period #1 (considered 100 per cent for abatement calculation purposes). At recommencement virtually all trucks re-routed to non-critical locations until 20:42, therefore S216 not considered in abatement calculations for AWC periods #2 or #3	Yes
S218	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to AWC period #1. At recommencement virtually all trucks re-routed to non-critical locations until 20:49, therefore S218 not considered in abatement calculations for AWC periods #2 or #3	Yes
DZ386	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ386 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Date: 7 January 2014

Dust Delay Plot for Relevant Equipment



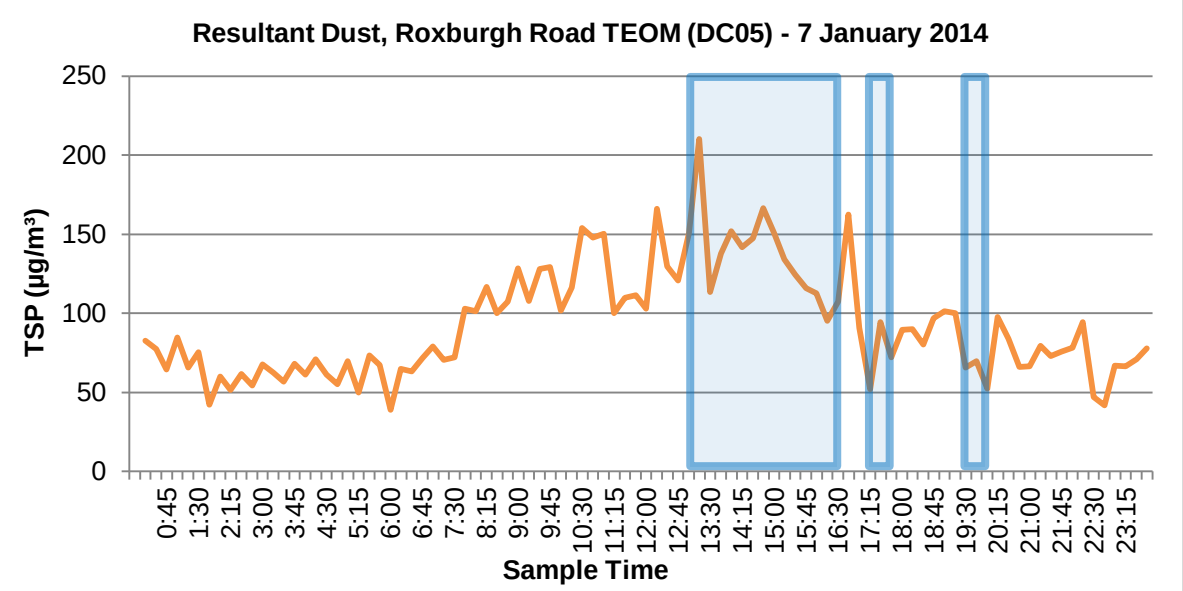
Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
7 Jan 2014 #1	4.46	13,547	7.83	0.0062	83.5
7 Jan 2014 #2	N/A^	N/A^	7.69	0.0060	N/A^
7 Jan 2014 #3	N/A^	N/A^	7.17	0.0055	N/A^

^ Operations had been modified by this time to re-route trucks to non-critical locations, hence no unloading operations were occurring in critical locations that required cessation.

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Date: 8 January 2014

AWC Period Time and Duration
AWC period #1: 15:00 to 15:15 (0.25hrs)
AWC period #2: 17:15 to 20:00 (2.75hrs)
AWC period #3: 22:15 to 22:30 (0.25hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line

Dust TARP Dust Response Line Log

Time Logged	Response
11:18	REDUCE GRADING & MOVE TO LOWER LEVELS WHERE POSSIBLE. . ., MT ARTHUR NORTH 11.15, NO
15:33	CLOSED CLAY RAMP NA NA, WINDMILL NORTH 1520HRS, NO NA
19:22	SHUT DOWN OPERATIONS IN REDROCK AND WINDMILL , REDROCK AND WINDMILL 1915, CONTINUING TO MONITOR OPERATIONS
20:00	RESUMED OPERATIONS IN RED ROCK CONTINUING TO MONITOR OPERATIONS , RED ROCK 2000, NO

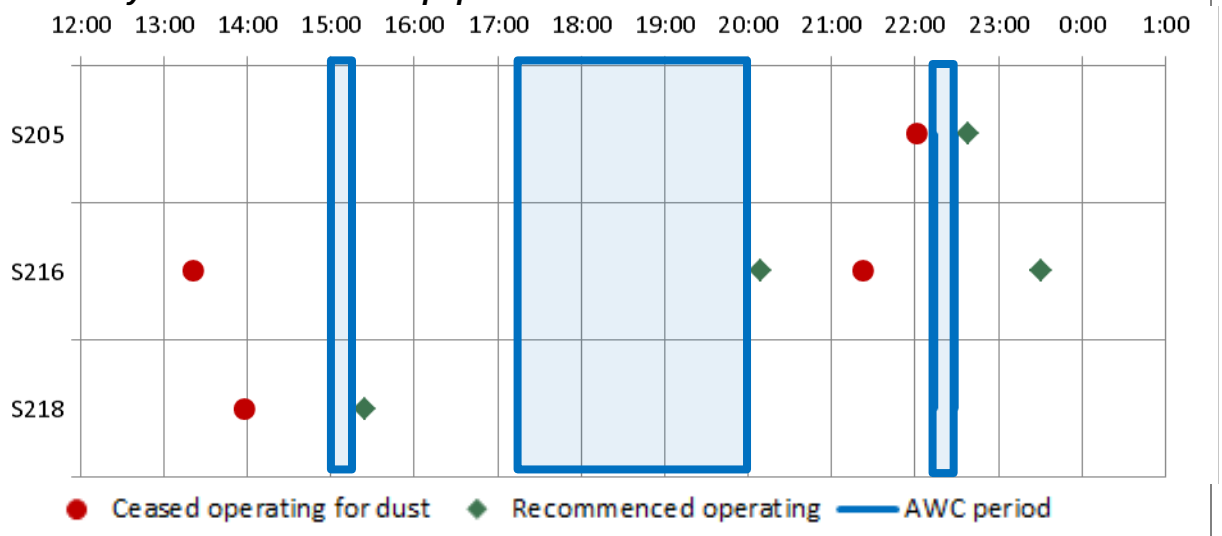
Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	All trucks routed to CD2 280 all day	No, but no trucks dumped at CD2 280 between 22:02 and 22:37
S216	CD2 280	Unloading	Virtually all trucks to CD2 280 all day	Yes
S218	CD2 280	Unloading	Virtually all trucks to CD2 280 all day	Yes
DZ386	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ386 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Date: 8 January 2014

Dust Delay Plot for Relevant Equipment

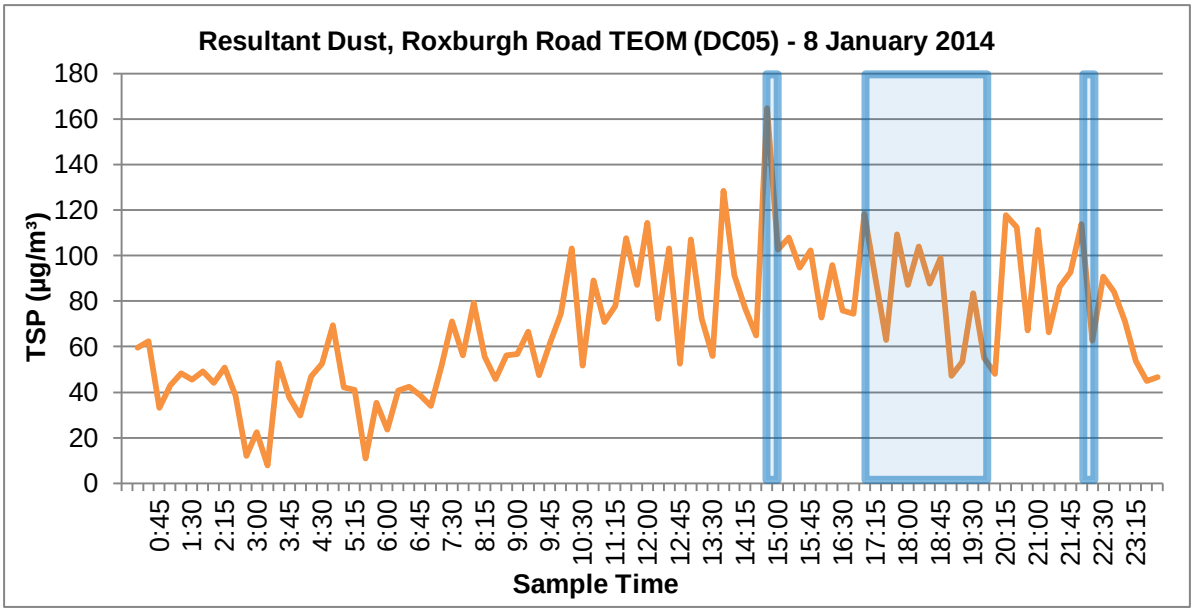


Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
8 Jan 2014 #1	0.50	1,592	7.02	0.0054	8.5
8 Jan 2014 #2	2.75	9,455	7.51	0.0058	55.2
8 Jan 2014 #3	0.50	2,256	7.05	0.0054	12.1

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Date: 12 January 2014

AWC Period Time and Duration
19:30 to 21:00 (1.50hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: No, mine supervisors did call the Dust Response Line but alterations made were not to overburden operations in critical locations and no dust delays logged on equipment

Dust TARP Dust Response Line Log

Time Logged	Response
12:42	SHUTDOWN 219 IN SNAKE GULLY AND 210 AT SADLERS NA NA, SNAKE GULLY AND SADLERS 12:20AM*, NA NA

** Note: This is meant to be PM*

Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
S216	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
DZ386	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ386 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

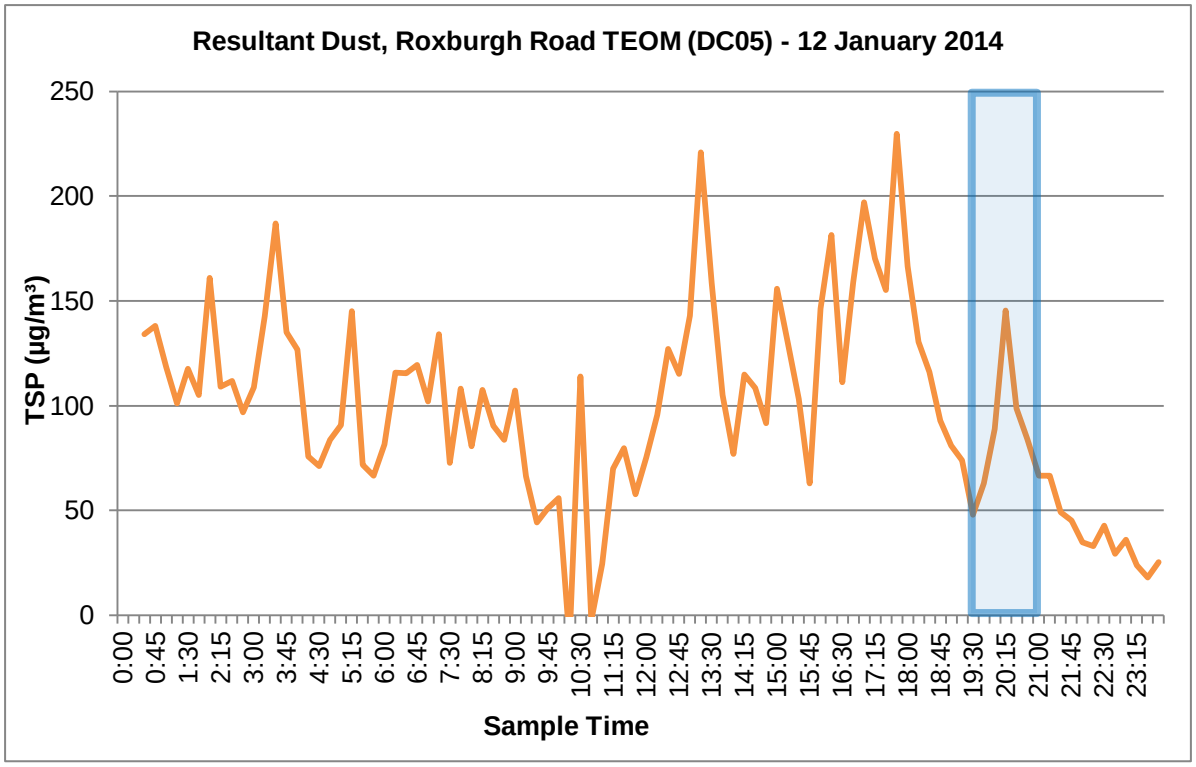
**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Dust Delay Plot for Relevant Equipment
N/A – no dust delays logged

Dust Abatement Calculations and Results
N/A – no equipment ceased operating

Date: 12 January 2014

Resultant Dust Levels



Date: 19 January 2014

AWC Period Time and Duration
AWC period #1: 17:30 to 18:15 (0.75hrs)
AWC period #2: 21:15 to 22:00 (0.75hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line

Dust TARP Dust Response Line Log

Time Logged	Response
0:43	00:40, CONTINUE TO MONITOR OPERATIONS N/A
13:02	RESTRICTED GRADING MOVED TO LOWER DUMPS & CLOSED THE WINDMILL TIP , MT ARTHUR NORTH 12.30PM 19/01/14, CONTINUE MONITORING
15:36	ALL WORK AREAS TO STOP WORK AS REQUIRED AND WAIT FOR WATER CARTS . ., MT ARTHUR NORTH 15:00, CONTINUE TO MONITOR DUST .
17:01	STOPPED ALL WORK ABOVE 200RL , MT ARTHUR NORTH 16:50, CONTINUED MONITORING FOR DUST
23:14	SHUTDOWN 216 AND 209. REST OF PIT IS RUNNING. CONTINUE OPERATIONS FOR ALL AREA. USING LOW DUMP OPTIONS. MINIMISE GRADING AND CONTINUING TOMO OROW

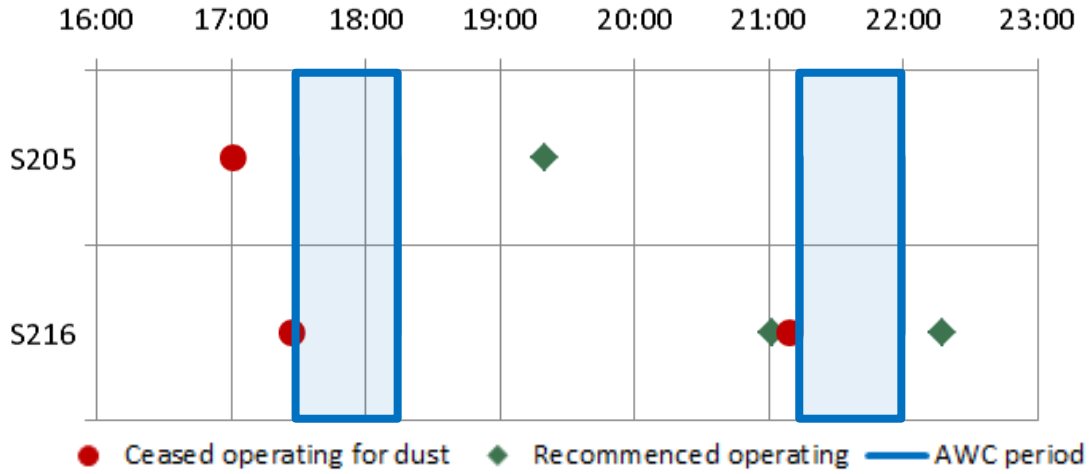
Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	All trucks to CD2 280 all day	Yes
S216	CD2 280	Unloading	All trucks to CD2 280 all day	Yes
DZ153	VD1 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ153 was scheduled to be operating on VD1 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)
DZ386	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ386 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Date: 19 January 2014

Dust Delay Plot for Relevant Equipment

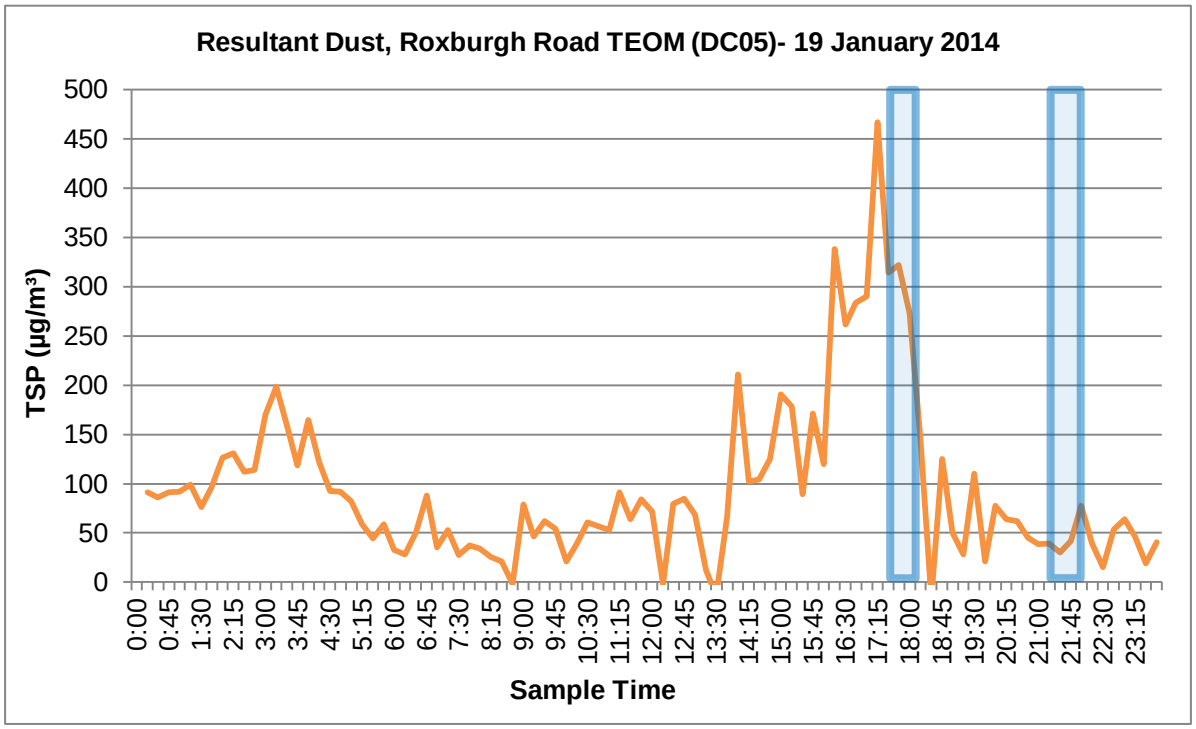


Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
19 Jan 2014 #1	1.50	6,769	7.79	0.0061	41.5
19 Jan 2014 #2	0.75	2,579	7.30	0.0056	14.5

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Date: 20 January 2014

AWC Period Time and Duration
17:30 to 18:30 (1hr)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line

Dust TARP Dust Response Line Log

Time Logged	Response
13:08	CEASED OPERATIONS IN SNAKE GULLY . ., SNAKE GULLY 1PM, NO
14:11	1.45PM, (DECLINED FURTHER DETAILS) (DECLINED FURTHER DETAILS)*
17:14	SHUT DOWN 219 221 216 AND 209 CIRCUITS . ., MT ARTHUR WINDMILL ROXBURGH & SNAKE GULLY 5 PM, NO .
18:10	C STALL MODIFIED OPS , C STALL MT ARTHUR 1800, N/A
21/1/2014 7:19	CEASED OPERATIONS , ALL AREAS OF PIT 1830 MON, NA
21/1/2014 7:20	830PM, DECLINED DECLINED*

** Note: This indicates full operations were resumed*

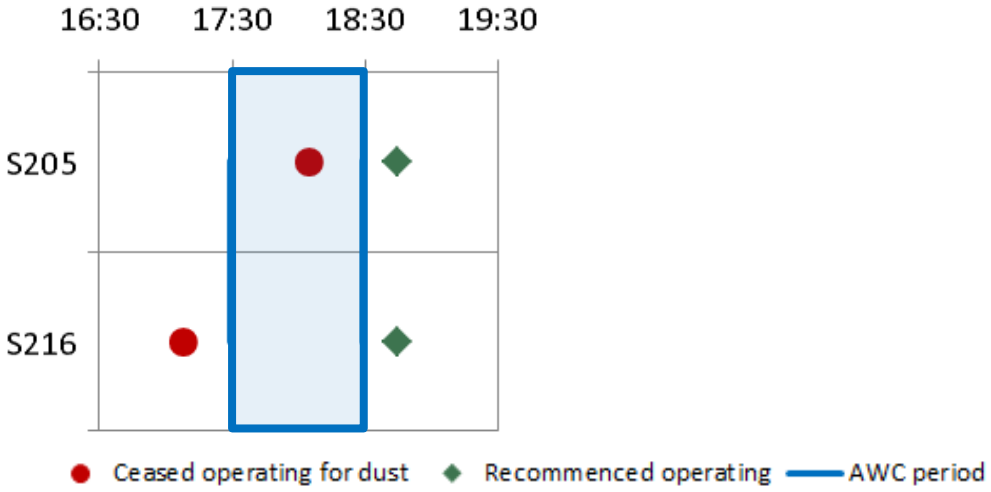
Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	Yes
S216	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC period	Yes
DZ153	VD1 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ153 was scheduled to be operating on VD1 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)
DZ386	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ386 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Date: 20 January 2014

Dust Delay Plot for Relevant Equipment

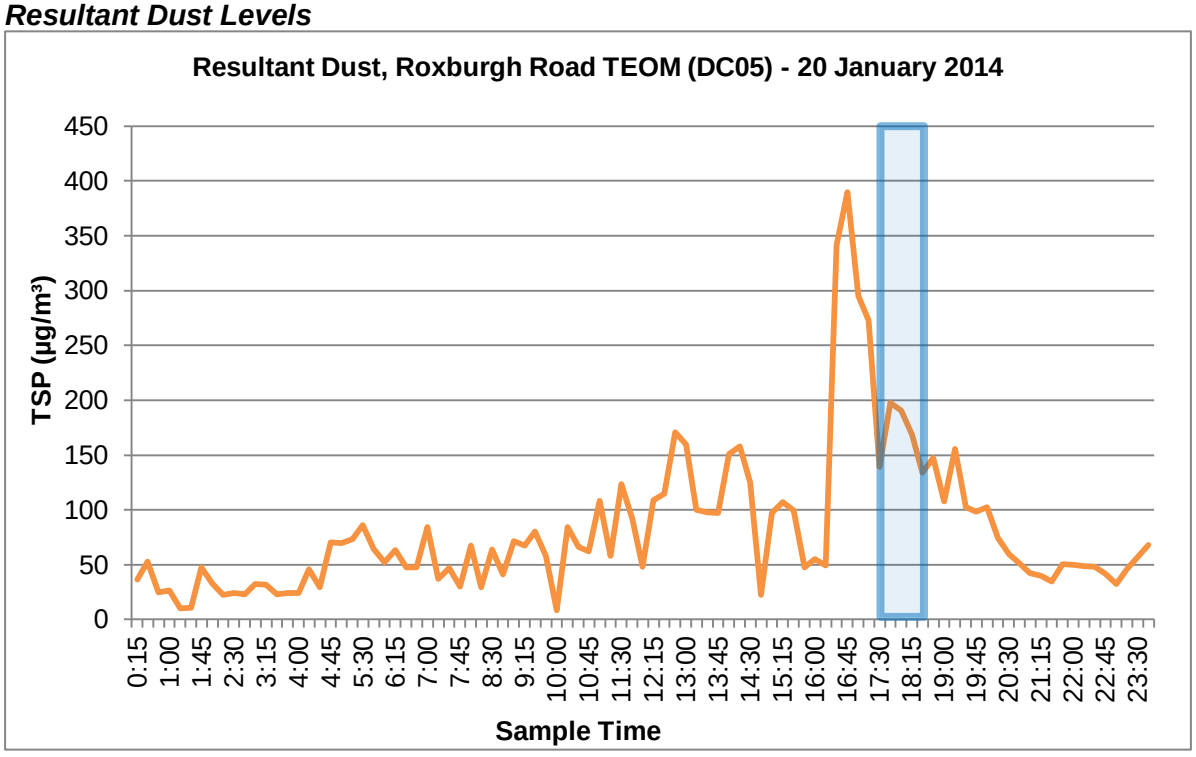


Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
20 Jan 2014	1.41	5,707	7.75	0.0061	34.7

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Date: 22 January 2014

AWC Period Time and Duration
13:45 to 14:15 (0.5hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment

Dust TARP Dust Response Line Log

Time Logged	Response
12:57	SHUTDOWN OPERATION IN WINDMILL SHUTDOWN CD3 260 NORTH DUMP MINIMISE GR ADING CONTINUING MONITOR OPERATION NA, WINDMILL AND RED ROCK 12.40PM, NA N
23/1/2014 4:16	2030 22/01/14, DECLINED .*

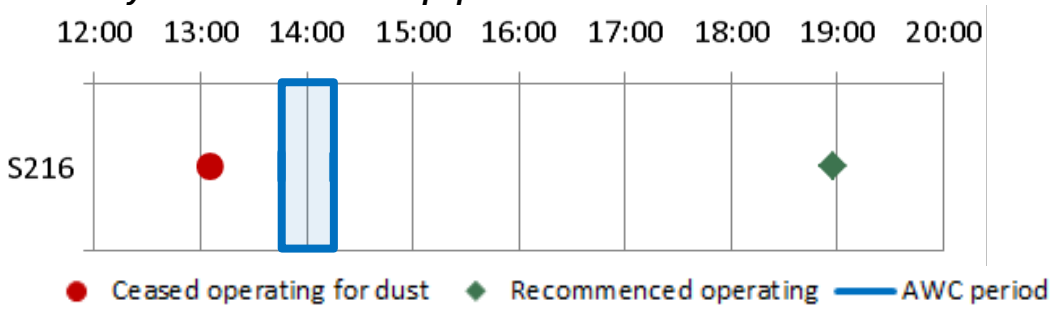
** Note: This indicates full operations were resumed*

Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC period	No
S216	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC period	Yes
DZ153	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ153 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Dust Delay Plot for Relevant Equipment



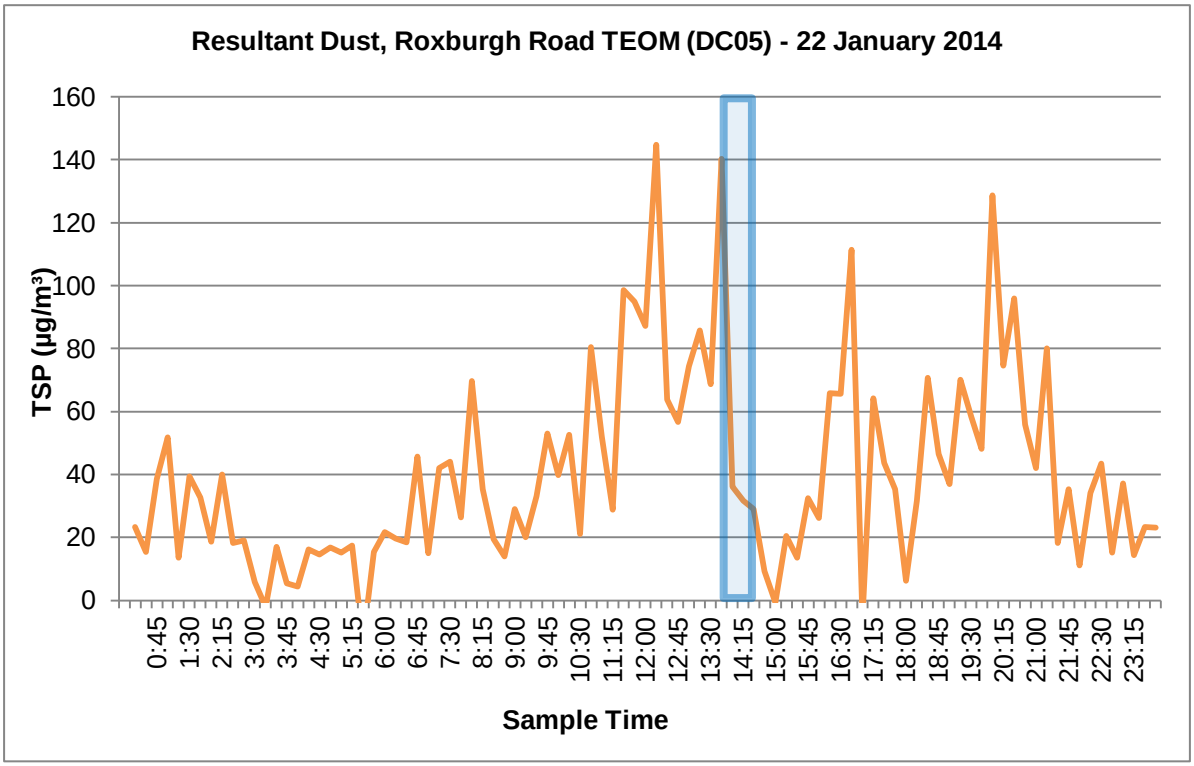
Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
22 Jan 2014	0.50	1,719	7.10	0.0054	9.3

Date: 22 January 2014

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Date: 25 January 2014

AWC Period Time and Duration
AWC period #1: 16:15 to 20:00 (3.75hrs)
AWC period #2: 21:15 to 22:00 (0.75hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line

Dust TARP Dust Response Line Log

Time Logged	Response
13:33	REDUCED VEHICLE SPEEDS AND MINIMISED GRADING AND UTILISED WATER CARTS IN PRIORITY AREAS , ALL AREAS OF THE PIT 1130AM, NONE
16:51	CEASE OPERATIONS NA NA, ALL AREAS OF THE PIT 1620, NA NA
20:11	8PM, N/A N/A *[Note: This indicates full operations were resumed]*
20:10	213 MOVED TO LOWER DUMP 623 LOADED WET REHANDLED MATERIAL SHUT DOWN RE DROCK SHUTDOWN SNAKE GULLY AND SHUT DOWN CD3 260 NORTH DUMPS N/A, MT ARTH
22:59	213 SHUTDOWN , ROXBOURG 10PM, DECLINED

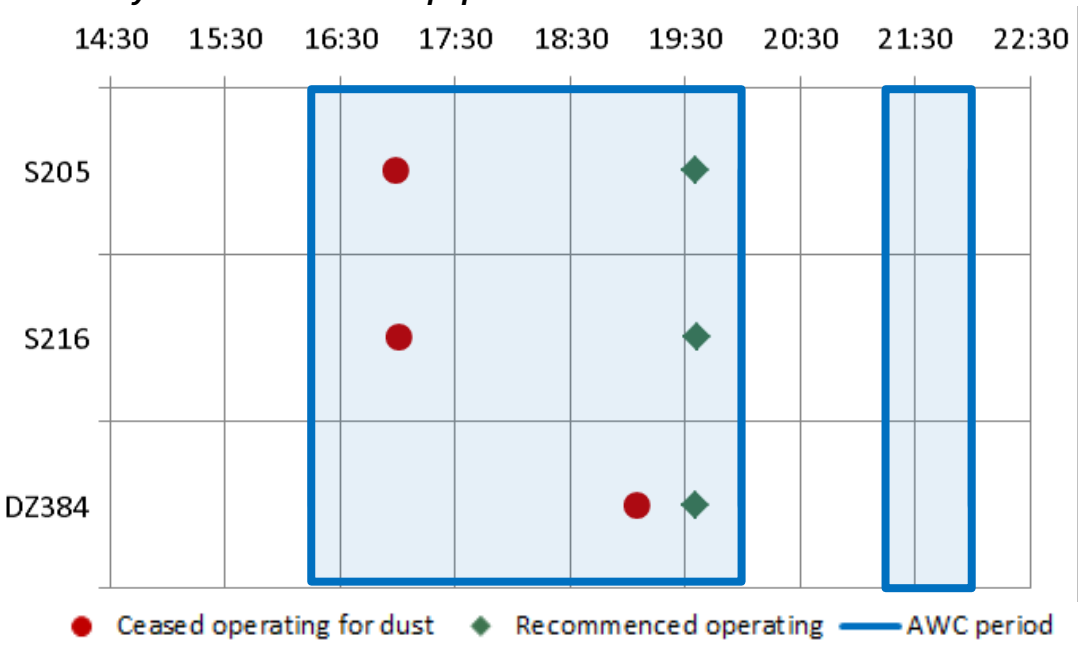
Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC periods	Yes
S216	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC periods	Yes
DZ151	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ151 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)
DZ377	CD2 280	Bulldozer operation	DZ377, which has GPS, started working on CD2 280 approximately 21:52, where it remained until the end of the second AWC period on this day. DZ377 was not operating on any critical dump locations during the first AWC period on this day	N/A for AWC #1 and no for AWC #2
DZ384	CD2 280	Bulldozer operation	DZ384, which has GPS, was working on CD2 280 until approximately 18:13 when it moved out of the area and parked up for shift changeover. The equipment logged a dust delay, then moved onto VD1 280 at approximately 19:42, where it remained until the end of the first AWC period. DZ384 was not operating on any critical dump locations during the second AWC period on this day	Yes

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Date: 25 January 2014

Dust Delay Plot for Relevant Equipment



Dust Abatement Calculations and Results

Loading/unloading:

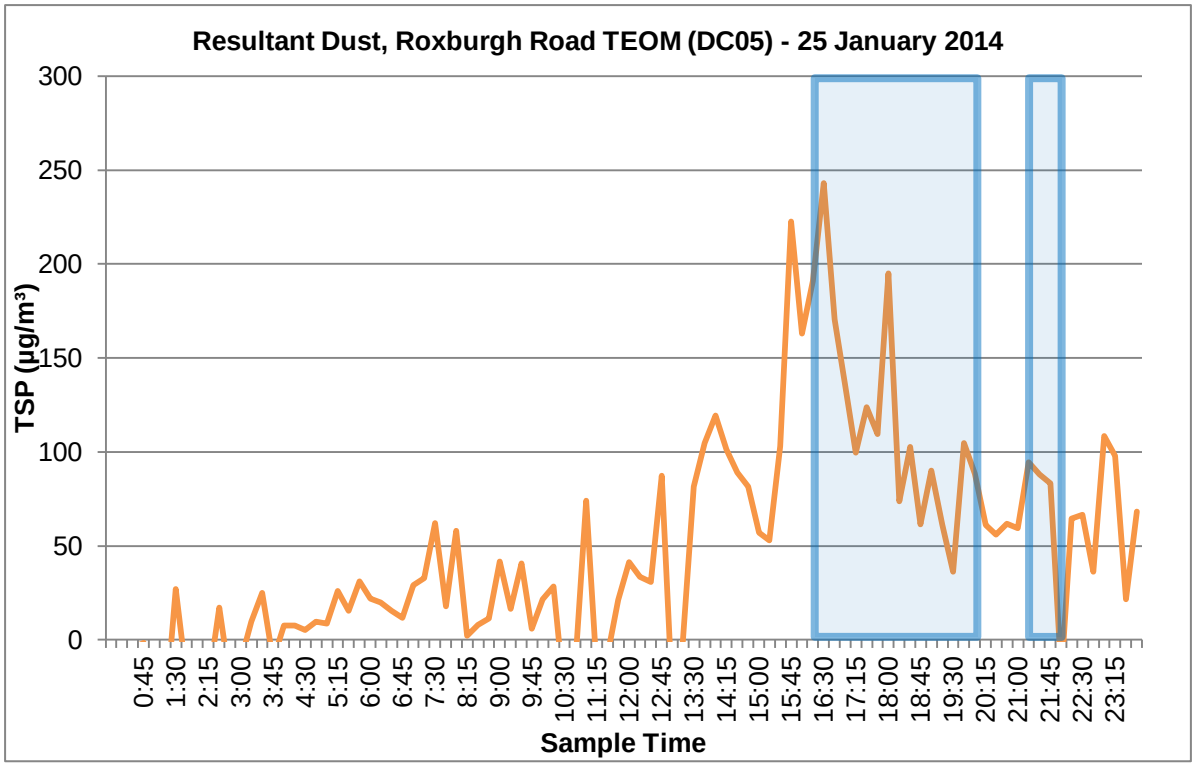
AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Dust abatement from unloading (kg)
25 Jan 2014 #1	5.19	23,447	8.14	0.0065	152.1
25 Jan 2014 #2	0.00	0	7.12	0.0055	0.0

Bulldozers:

AWC periods	Hours bulldozer operations at critical locations ceased	TSP emissions (kg/hr)	Dust abatement from bulldozer operations(kg)
25 Jan 2014 #1	0.44	16.74	7.4
25 Jan 2014 #2	0.00	16.74	0.0

Date: 25 January 2014

Resultant Dust Levels



Date: 26 January 2014

AWC Period Time and Duration
16:45 to 18:15 (1.5hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: No, mine supervisors did call the Dust Response Line but alterations made were not to operations in critical locations and no dust delays logged on equipment

Dust TARP Dust Response Line Log

Time Logged	Response
11:57	REDUCED VEHICLE SPEEDS MINIMISED GRADING UTILISE WATER CART IN PRIORIT Y AREA , ALL AREAS OF THE PIT 1135AM, DECLINED
20:23	SHUTDOWN ESCAVATOR 209 , WINDMILL 8.10 PM, (DECLINED FURTHER DETAILS)

Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S205	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
S216	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
DZ151	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ151 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)
DZ384	CD2 280	Bulldozer operation	DZ384, which has GPS, was working on CD2 280 from the start of the AWC period until approximately 17:03, when it moved out of the critical dump location work area	No

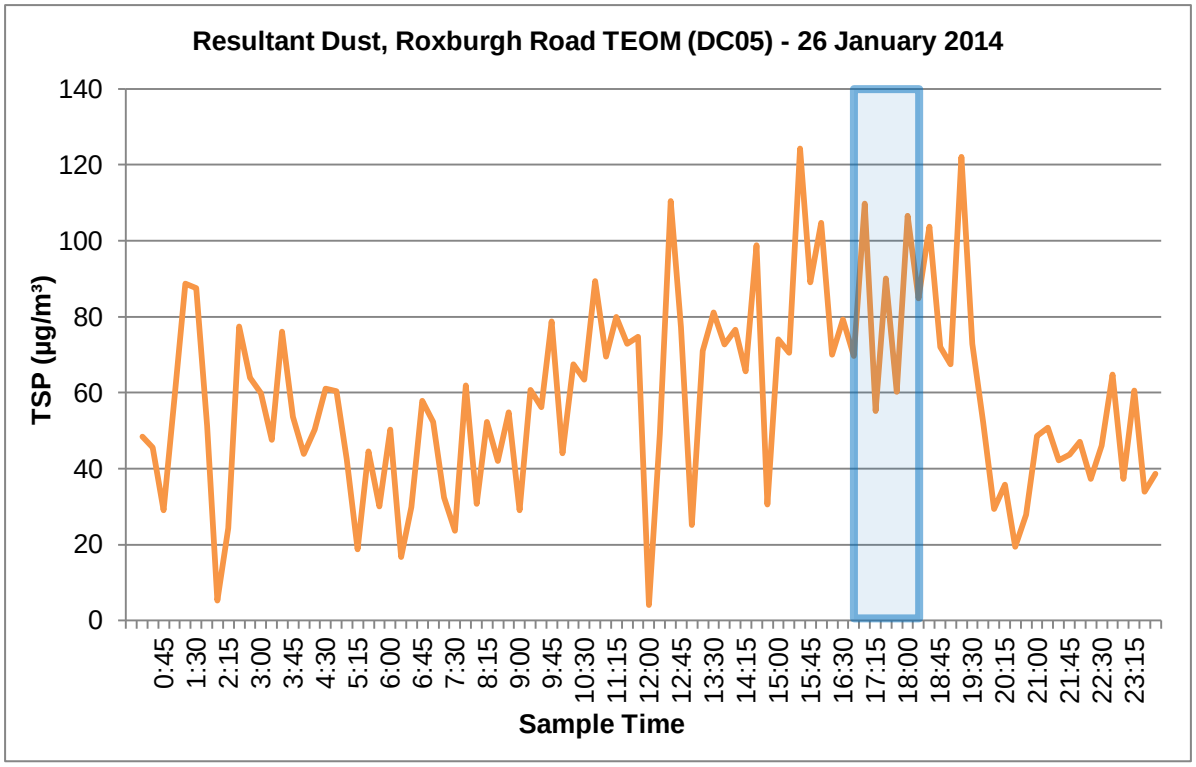
**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Dust Delay Plot for Relevant Equipment
N/A – no dust delays logged

Dust Abatement Calculations and Results
N/A – no equipment ceased operating

Date: 26 January 2014

Resultant Dust Levels



Date: 4 February 2014

AWC Period Time and Duration
14:15 to 15:30 (1.25hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line

Dust TARP Dust Response Line Log

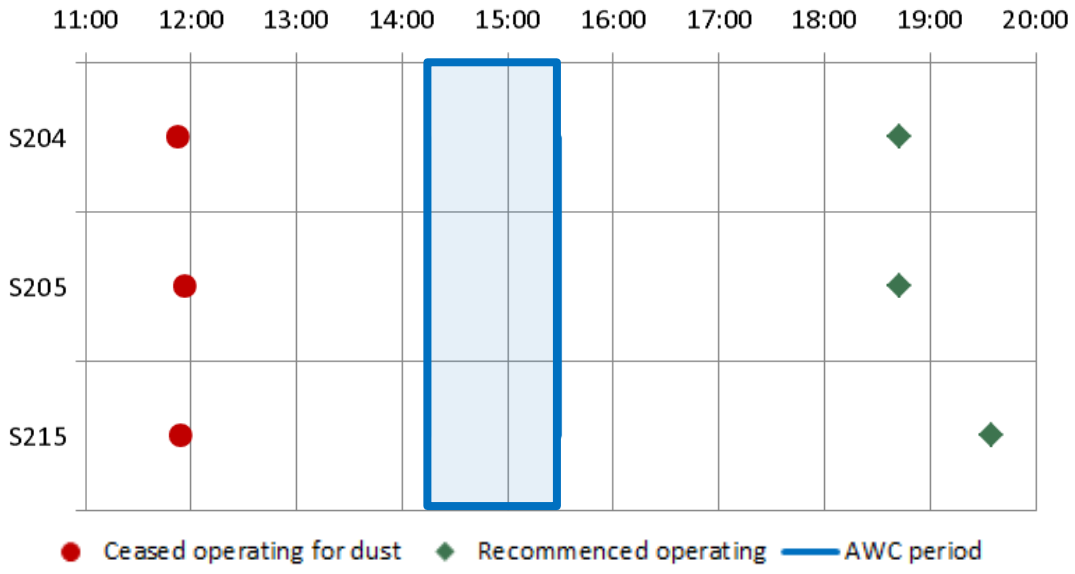
Time Logged	Response
11:49	CEASED OPERATION AND UTILISED WATER CARTS IN PRIORITY AREAS , SUPER BRIDGE 1140AM, NA NA
11:59	CEASED OPERATIONS , WINDMILL 1155AM, NA NA
12:42	UTILIZE LOWER LEVEL DUMPS . ., RED ROCK AND SNAKE GULLY 1210PM, . .
15:26	SEIZED ALL OPERATIONS , ALL AREAS OF PIT 2:40PM, DECLINED
18:08	18:30PM, DECLINED *[Note: This indicates full operations were resumed]*
19:05	SHUT DOWN ALL OPERATIONS. , MT ARTHUR PITT 6:40PM, .
19:57	745PM, DECLINED DECLINED *[Note: This indicates full operations were resumed]*

Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S204	VD1 280	Unloading	Virtually all trucks to VD1 280 leading up to the AWC period	Yes
S205	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	Yes
S215	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	Yes

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Dust Delay Plot for Relevant Equipment



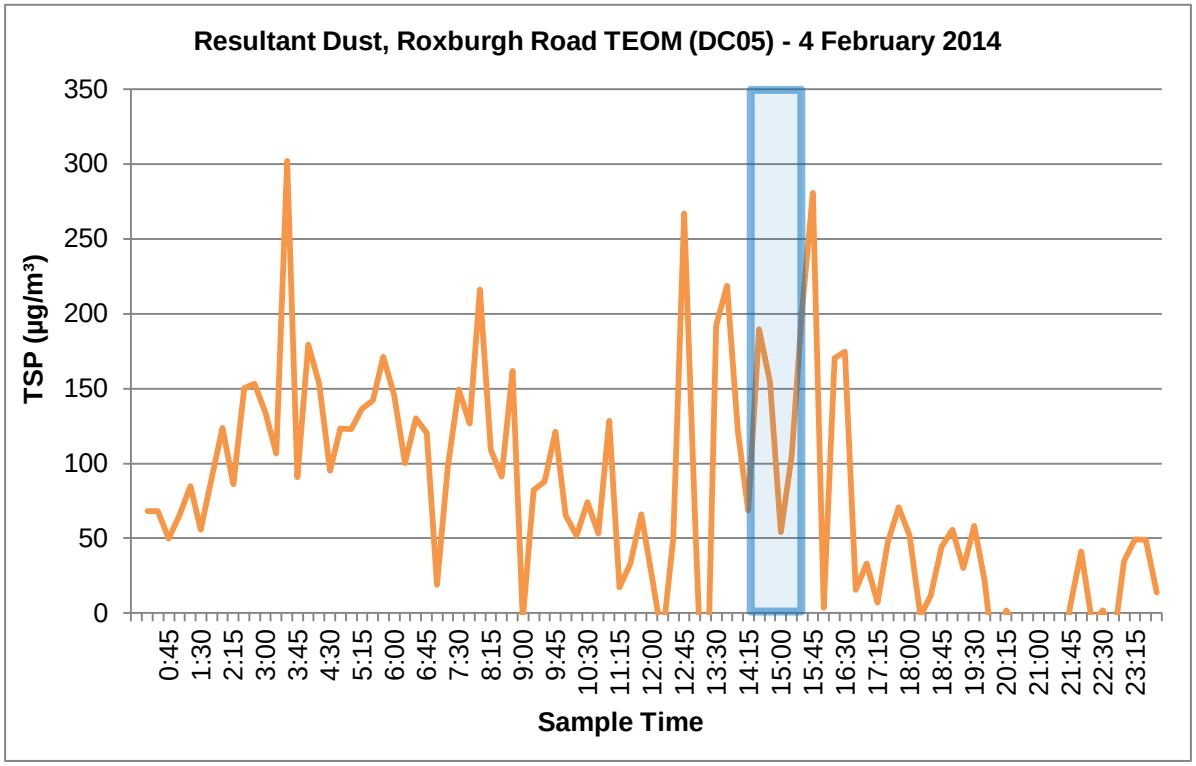
Date: 4 February 2014

Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
4 Feb 2014	3.75	18,097	8.18	0.0065	118.1

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Date: 21 February 2014

AWC Period Time and Duration
20:15 to 21:00 (0.75hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: No, mine supervisors did not call the Dust Response Line and no dust delays logged on equipment

Dust TARP Dust Response Line Log
N/A – no calls made to Dust Response Line

Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S215	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
S216	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC period	No
DZ330	VD1 260	Bulldozer operation	DZ330, which has GPS, was working on VD1 260 for the duration of the AWC period	No
DZ387	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ387 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

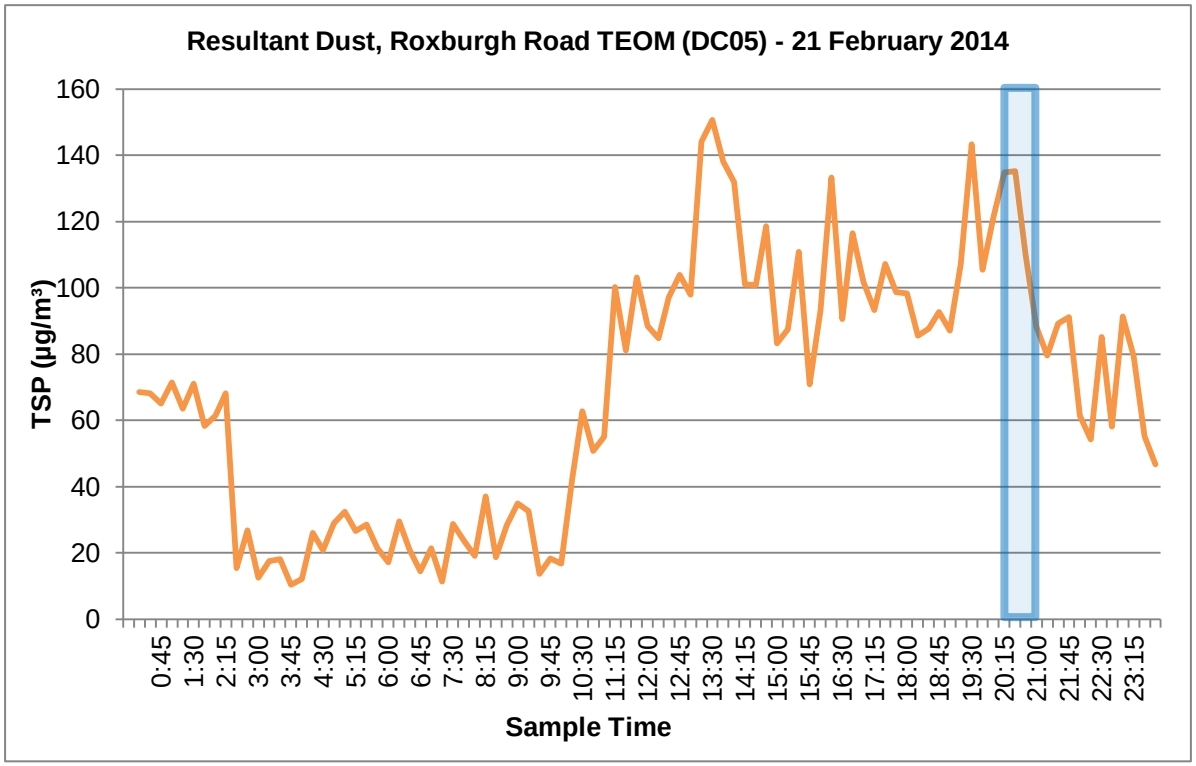
**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Dust Delay Plot for Relevant Equipment
N/A – no dust delays logged

Dust Abatement Calculations and Results
N/A – no equipment ceased operating

Date: 21 February 2014

Resultant Dust Levels



Date: 22 February 2014

AWC Period Time and Duration
20:30 to 20:45 (0.25hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: No, mine supervisors did not call the Dust Response Line and no dust delays logged on equipment

Dust TARP Dust Response Line Log
N/A – no calls made to Dust Response Line

Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S215	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
S216	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	No
DZ330	VD1 270	Bulldozer operation	DZ330, which has GPS, was working on VD1 270 for the duration of the AWC period	No
DZ387	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ387 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

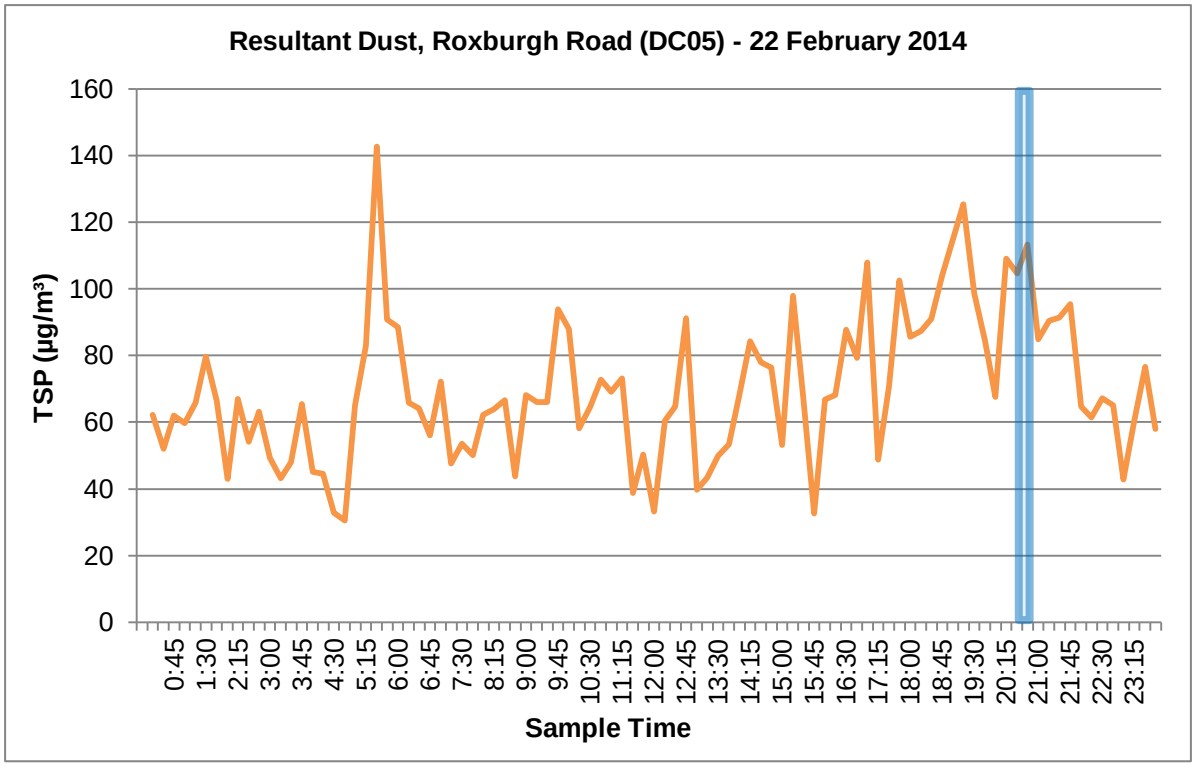
**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Dust Delay Plot for Relevant Equipment
N/A – no dust delays logged

Dust Abatement Calculations and Results
N/A – no equipment ceased operating

Date: 22 February 2014

Resultant Dust Levels



Date: 27 February 2014

AWC Period Time and Duration
16:15 to 18:00 (1.75hrs)

Execute Dust TARP – KPI Result
Dust TARP executed for overburden handling activities in critical locations: Yes, dust delays logged on equipment and mine supervisors called the Dust Response Line

Dust TARP Dust Response Line Log

Time Logged	Response
6:51	CONTINUED OPERATIONS: 0630, JUST CONTINUE TO MONITOR .
10:14	MODIFIED OPERATIONS: DISPATCHED WATER CARTS TO PRIORITY AREAS , HOLE PIT OPERATIONS 0950, WE WILL CONTINUE TO MONITOR CONDITIONS
15:39	MODIFIED OPERATIONS: MODIFIED THE TERMINATOR TRUCKS TO A LOWER DUMP AND THAT AREA IS THE SU PERRIDGE AREA CONTINING TO MONITOR OPERATIONS AND H
16:40	MODIFIED OPERATIONS: MODIFIED SUPER BRIDGE TRAFFIC. MOVED 211 TRUCKS TO LOWER DUMP LOCATION S. CD2-280 DUMP ., SUPERBRIDGE AREA 4:30PM, WILL C
17:16	MODIFIED OPERATIONS: SHUT DOWN 211 215 216 221 DIG UNITS AND 105 107 DRILLS . ., ACCROSS THE SUPERBRIDGE 5PM, WILL CONTINUE TO MONITOR DUST AN

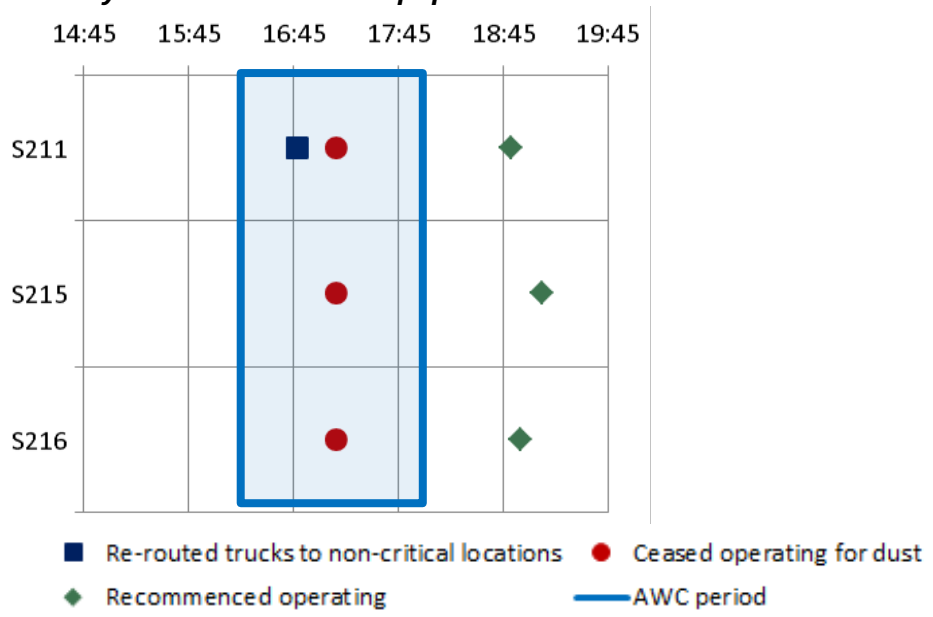
Relevant Equipment Handling Overburden at Critical Locations

Equipment. ID*	Critical Location	Type of Overburden Handling	Comment	Dust Delay Logged
S211	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC period. During the AWC period trucks were re-routed to non-critical locations for a short period from 16:48 until ceasing operations for dust at 17:10	Yes
S215	CD2 280	Unloading	All trucks to CD2 280 leading up to the AWC period	Yes
S216	CD2 280	Unloading	Virtually all trucks to CD2 280 leading up to the AWC period	Yes
DZ373	VD1 260	Bulldozer operation	DZ373, which has GPS, moved onto VD1 260 at approximately 17:11, where it remained for the duration of the AWC period	No
DZ386	CD2 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ386 was scheduled to be operating on CD2 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)
DZ387	VD1 280	Bulldozer operation	According to the day and night shift 24 hour production plans DZ387 was scheduled to be operating on VD1 280. This bulldozer does not have GPS, so it cannot be confirmed retrospectively in the Modular mine planning system that this bulldozer was indeed operating as planned or if it ceased operating for dust	N/A (no Modular system installed)

**Note: 'S' in the equipment ID denotes a shovel/excavator and 'DZ' denotes a bulldozer.*

Date: 27 February 2014

Dust Delay Plot for Relevant Equipment

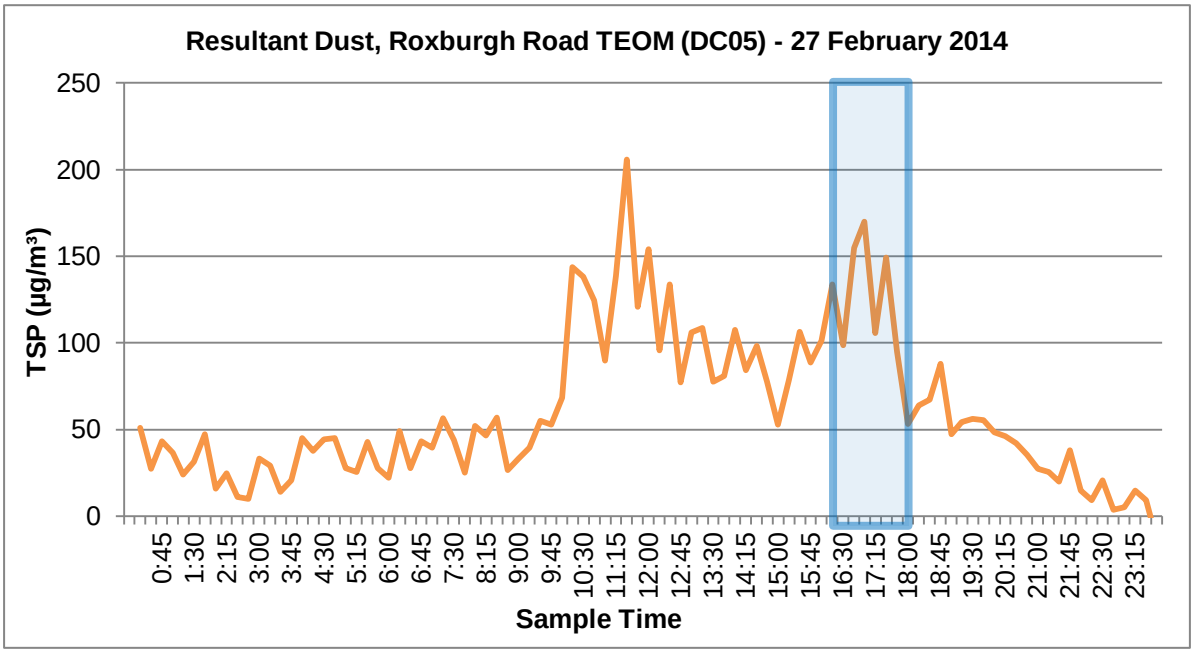


Dust Abatement Calculations and Results

AWC periods	Hours unloading at critical locations ceased	Tonnes not unloaded due to cessation	Ave wind speed (m/s)	TSP emissions (kg/t)	Total dust abatement (kg)
27 Feb 2014	2.48	8,146	7.77	0.0061	49.7

Note: No dust abatement can be confirmed from bulldozers operating on overburden.

Resultant Dust Levels



Appendix 3: Meteorological Conditions during Adverse Weather Periods

Notes:

- Shading indicates an adverse weather condition period for calculation purposes.
- ^ indicates adverse meteorological condition trigger criteria were met, however a second consecutive sample also meeting the criteria is required to trigger a Dust TARP alert and commence the adverse weather condition period (following an in-field visual dust assessment) for calculation purposes.

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
7 January 2014 #1, #2 and #3							
7/01/2014 13:00^	23.0	21.8	0.0	56.0	126.9	8.1	1332
7/01/2014 13:15	23.3	21.9	0.0	55.6	132.9	7.7	1449
7/01/2014 13:30	23.4	21.9	0.0	55.3	125.6	7.6	1558
7/01/2014 13:45	23.1	21.8	0.0	55.0	130.4	8.4	1237
7/01/2014 14:00	22.7	21.4	0.0	56.7	121.9	8.4	1287
7/01/2014 14:15	23.0	21.6	0.0	55.8	122.0	7.8	1501
7/01/2014 14:30	22.7	21.4	0.0	56.0	122.5	8.7	1435
7/01/2014 14:45	22.9	21.5	0.0	55.5	127.7	7.7	1356
7/01/2014 15:00	23.5	22.1	0.0	53.2	120.8	6.7	1379
7/01/2014 15:15	23.0	21.8	0.0	53.6	125.2	8.1	1209
7/01/2014 15:30	22.9	21.6	0.0	54.7	124.3	7.7	1059
7/01/2014 15:45	22.5	21.3	0.0	55.6	128.0	7.6	680
7/01/2014 16:00	22.1	21.1	0.0	56.1	125.3	7.9	468
7/01/2014 16:15	22.1	20.9	0.0	56.3	122.4	7.8	306

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
7/01/2014 16:30	22.0	20.9	0.0	56.4	121.2	7.5	426
7/01/2014 16:45	22.1	21.0	0.0	56.8	124.7	6.1	290
7/01/2014 17:00	21.6	20.6	0.0	56.7	115.5	6.8	207
7/01/2014 17:15^	21.4	20.4	0.0	56.7	122.7	7.8	151
7/01/2014 17:30	21.4	20.3	0.0	56.7	124.7	7.7	119
7/01/2014 17:45	21.4	20.3	0.0	56.7	126.8	7.7	119
7/01/2014 18:00	21.5	20.6	0.0	56.4	114.4	6.5	114
7/01/2014 18:15	21.2	20.4	0.0	56.5	125.2	6.7	116
7/01/2014 18:30^	20.7	20.0	0.0	57.2	128.5	7.6	134
7/01/2014 18:45	20.6	19.9	0.0	58.2	126.2	6.9	120
7/01/2014 19:00^	20.1	19.6	0.0	59.0	123.2	8.2	92
7/01/2014 19:15	19.7	19.3	0.0	61.7	124.3	6.9	83
7/01/2014 19:30^	19.3	19.0	0.0	63.2	125.1	7.2	51
7/01/2014 19:45	18.9	18.6	0.0	64.6	128.4	7.1	32
7/01/2014 20:00	18.7	18.4	0.0	66.0	127.1	7.3	16
7/01/2014 20:15	18.6	18.3	0.0	66.3	126.6	6.1	5
7/01/2014 20:30	18.3	18.1	0.0	68.5	116.3	5.0	1
8 January 2014 #1, #2 and #3							
8/01/2014 14:45^	24.5	23.1	0.0	46.6	131.7	7.1	1356
8/01/2014 15:00	24.5	23.0	0.0	46.8	126.5	7.0	1286
8/01/2014 15:15	24.1	22.7	0.0	47.7	123.8	6.7	1343
8/01/2014 15:30	24.1	22.7	0.0	48.3	125.3	6.6	1228
8/01/2014 15:45	24.1	22.8	0.0	47.7	126.5	6.1	1015
8/01/2014 16:00	24.2	22.9	0.0	46.9	131.3	6.3	373

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
8/01/2014 16:15	24.1	22.9	0.0	46.5	127.9	7.0	144
8/01/2014 16:30	23.6	22.5	0.0	47.0	122.9	7.0	164
8/01/2014 16:45	23.3	22.2	0.0	47.9	127.7	6.9	190
8/01/2014 17:00^	23.3	22.1	0.0	48.6	122.2	7.7	138
8/01/2014 17:15	23.0	21.9	0.0	49.5	126.3	7.6	133
8/01/2014 17:30	22.9	21.8	0.0	49.9	131.8	7.8	174
8/01/2014 17:45	22.5	21.5	0.0	51.5	126.1	6.6	107
8/01/2014 18:00	22.2	21.3	0.0	51.7	129.9	7.5	86
8/01/2014 18:15	21.4	20.7	0.0	54.2	126.3	8.1	82
8/01/2014 18:30	21.0	20.4	0.0	55.2	124.3	8.2	73
8/01/2014 18:45	20.9	20.3	0.0	55.4	123.1	7.4	68
8/01/2014 19:00	20.7	20.2	0.0	55.1	128.2	7.3	64
8/01/2014 19:15	20.4	20.0	0.0	55.4	131.2	7.7	65
8/01/2014 19:30	20.1	19.7	0.0	56.1	126.5	7.1	59
8/01/2014 19:45	19.7	19.4	0.0	57.0	125.1	7.2	34
8/01/2014 20:00	19.5	19.2	0.0	58.2	123.5	6.6	16
8/01/2014 20:15	19.4	19.1	0.0	59.1	119.8	5.7	5
8/01/2014 20:30	19.3	19.0	0.0	58.6	124.3	5.6	1
8/01/2014 20:45	19.3	18.9	0.0	58.5	122.2	6.3	0
8/01/2014 21:00	19.2	18.9	0.0	58.5	121.2	6.1	0
8/01/2014 21:15^	19.1	18.8	0.0	56.4	125.7	7.6	0
8/01/2014 21:30	19.1	18.7	0.0	56.1	126.1	7.0	0
8/01/2014 21:45	19.0	18.7	0.0	55.9	126.2	7.0	0
8/01/2014 22:00^	19.0	18.6	0.0	55.3	124.8	7.1	0
8/01/2014 22:15	18.8	18.5	0.0	56.0	128.7	7.0	0

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
8/01/2014 22:30	18.6	18.3	0.0	56.9	128.3	6.5	0
8/01/2014 22:45	18.4	18.2	0.0	58.1	129.3	6.8	0
12 January 2014							
12/01/2014 19:15^	26.6	26.3	0.0	38.7	134.6	7.5	58
12/01/2014 19:30	25.9	25.6	0.0	41.0	134.0	7.6	44
12/01/2014 19:45	25.4	25.2	0.0	45.1	136.4	7.2	29
12/01/2014 20:00	24.7	24.5	0.0	49.7	134.7	7.4	16
12/01/2014 20:15	24.2	24.1	0.0	54.0	135.6	7.1	5
12/01/2014 20:30	23.9	23.7	0.0	57.3	133.1	6.7	1
12/01/2014 20:45	23.5	23.4	0.0	60.2	130.0	7.1	0
12/01/2014 21:00	23.2	23.0	0.0	62.8	134.1	7.0	0
12/01/2014 21:15	22.9	22.8	0.0	65.0	134.3	6.3	0
19 January 2014 #1 and #2							
19/01/2014 17:15^	31.1	30.6	0.0	40.0	126.3	8.1	183
19/01/2014 17:30	30.3	29.8	0.0	41.9	134.2	7.7	172
19/01/2014 17:45	29.7	29.2	0.0	42.0	134.4	8.1	156
19/01/2014 18:00	29.3	28.7	0.0	42.2	129.7	7.5	134
19/01/2014 18:15	28.5	28.0	0.0	41.1	139.1	8.7	120
19/01/2014 18:30	27.9	27.5	0.0	41.0	135.5	7.7	103
19/01/2014 18:45	27.2	26.9	0.0	45.2	140.6	8.6	82
19/01/2014 19:00	26.3	26.2	0.0	48.6	144.3	8.7	55
19/01/2014 19:15	25.9	25.8	0.0	51.4	144.3	8.2	28
19/01/2014 19:30	25.2	25.1	0.0	54.1	141.2	8.6	17
19/01/2014 19:45	24.7	24.6	0.0	55.8	142.6	7.3	10

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
19/01/2014 20:00	24.3	24.2	0.0	58.6	145.4	7.3	6
19/01/2014 20:15	24.0	23.9	0.0	61.5	134.2	6.4	2
19/01/2014 20:30	23.7	23.6	0.0	63.5	141.3	7.2	0
19/01/2014 20:45	23.4	23.3	0.0	64.2	138.6	7.0	0
19/01/2014 21:00^	23.2	23.1	0.0	65.8	129.5	7.5	0
19/01/2014 21:15	23.0	22.9	0.0	67.7	131.3	7.1	0
19/01/2014 21:30	22.9	22.8	0.0	69.0	130.8	7.7	0
19/01/2014 21:45	22.7	22.6	0.0	70.7	135.0	7.1	0
19/01/2014 22:00	22.6	22.6	0.0	71.6	140.0	6.1	0
19/01/2014 22:15	22.5	22.4	0.0	73.4	141.6	6.5	0
20 January 2014							
20/01/2014 17:15^	30.2	29.4	0.0	47.8	125.3	7.1	98
20/01/2014 17:30	29.8	29.1	0.0	48.7	129.6	7.3	95
20/01/2014 17:45	29.6	28.9	0.0	48.9	133.7	7.5	93
20/01/2014 18:00	28.9	28.3	0.0	50.3	132.5	8.1	91
20/01/2014 18:15	28.2	27.7	0.0	51.9	134.4	8.2	87
20/01/2014 18:30	28.0	27.5	0.0	52.2	137.1	7.7	84
20/01/2014 18:45	27.2	26.8	0.0	54.2	136.8	8.4	77
22 January 2014							
22/01/2014 13:30^	22.8	22.1	0.0	71.0	124.3	7.2	403
22/01/2014 13:45	21.7	21.0	0.0	78.2	125.1	7.1	505
22/01/2014 14:00	21.9	21.0	0.0	77.0	124.7	7.1	481
22/01/2014 14:15	21.0	20.5	0.0	79.9	129.5	6.7	177
22/01/2014 14:30	20.5	20.0	0.0	83.7	138.4	6.1	299

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
25 January 2014 #1 and #2							
25/01/2014 16:00^	26.4	25.3	0.0	47.8	122.5	8.1	1102
25/01/2014 16:15	26.1	25.0	0.0	48.1	124.2	7.5	1095
25/01/2014 16:30	25.5	24.5	0.0	48.7	125.9	7.9	574
25/01/2014 16:45	24.8	23.8	0.0	49.3	130.2	8.0	132
25/01/2014 17:00	24.1	23.2	0.0	49.9	126.3	9.1	128
25/01/2014 17:15	23.6	22.6	0.0	50.4	129.7	9.2	124
25/01/2014 17:30	23.5	22.5	0.0	49.7	133.2	8.1	118
25/01/2014 17:45	23.3	22.4	0.0	49.7	131.9	8.2	111
25/01/2014 18:00	22.7	21.8	0.0	51.9	130.7	8.2	104
25/01/2014 18:15	22.0	21.1	0.0	52.1	130.3	8.8	97
25/01/2014 18:30	21.7	20.9	0.0	51.6	131.1	8.5	91
25/01/2014 18:45	21.2	20.6	0.0	52.7	126.7	8.3	87
25/01/2014 19:00	20.8	20.1	0.0	54.2	134.3	8.0	79
25/01/2014 19:15	20.3	19.7	0.0	54.3	129.5	8.3	62
25/01/2014 19:30	20.1	19.6	0.0	54.7	129.4	7.0	50
25/01/2014 19:45	19.8	19.4	0.0	55.2	124.7	7.1	30
25/01/2014 20:00	19.7	19.3	0.0	55.1	135.0	6.2	14
25/01/2014 20:15	19.6	19.2	0.0	56.2	131.4	6.7	3
25/01/2014 20:30^	19.5	19.1	0.0	57.7	129.8	7.6	0
25/01/2014 20:45	19.4	19.0	0.0	59.2	129.4	6.9	0
25/01/2014 21:00^	19.3	18.9	0.0	59.7	124.9	7.7	0
25/01/2014 21:15	19.3	18.9	0.0	61.3	129.8	7.1	0
25/01/2014 21:30	19.3	18.8	0.0	62.5	129.4	7.1	0

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
25/01/2014 21:45	19.3	18.9	0.0	62.4	128.9	7.1	0
25/01/2014 22:00	19.3	18.9	0.0	57.6	131.2	6.4	0
25/01/2014 22:15	19.3	18.8	0.0	58.8	133.1	6.0	0
26 January 2014							
26/01/2014 16:30^	24.4	23.3	0.0	42.1	128.9	7.1	679
26/01/2014 16:45	24.0	22.9	0.0	43.3	130.9	7.1	126
26/01/2014 17:00	23.8	22.7	0.0	44.0	130.4	7.3	119
26/01/2014 17:15	23.8	22.7	0.0	43.9	128.9	6.9	121
26/01/2014 17:30	23.5	22.6	0.0	44.1	126.6	7.1	100
26/01/2014 17:45	23.3	22.4	0.0	44.3	121.5	6.6	105
26/01/2014 18:00	22.8	22.1	0.0	44.7	127.4	7.4	104
26/01/2014 18:15	23.0	22.2	0.0	44.3	129.4	6.4	130
26/01/2014 18:30	22.5	21.8	0.0	44.7	128.0	6.7	128
4 February 2014							
4/02/2014 14:00^	29.8	28.7	0.0	36.3	128.9	7.3	1390
4/02/2014 14:15	29.7	28.6	0.0	36.0	132.6	8.4	1300
4/02/2014 14:30	29.8	28.6	0.0	36.4	133.9	8.1	1491
4/02/2014 14:45	29.6	28.5	0.0	36.0	135.3	8.2	1172
4/02/2014 15:00	28.7	27.9	0.0	36.6	131.9	7.7	818
4/02/2014 15:15	29.0	28.0	0.0	36.5	133.6	8.5	1307
4/02/2014 15:30	29.3	28.2	0.0	36.7	140.0	9.1	1222
4/02/2014 15:45	28.3	27.5	0.0	40.6	142.5	9.3	760
21 February 2014							
21/02/2014 20:00^	21.4	21.2	0.0	53.9	131.7	7.0	2

Adverse Meteorological Condition (Date/Time)	Temperature at 2m (°C)	Temperature at 10m (°C)	Rainfall (mm)	Humidity (%)	Wind Direction (degrees)	Wind Speed (m/s)	Solar Radiation (W/m³)
21/02/2014 20:15	21.0	20.8	0.0	57.8	131.1	7.1	0
21/02/2014 20:30	20.6	20.4	0.0	59.8	129.0	7.8	0
21/02/2014 20:45	20.5	20.3	0.0	60.6	129.3	7.2	0
21/02/2014 21:00	20.3	20.1	0.0	61.2	128.6	6.6	0
21/02/2014 21:15	20.2	20.0	0.0	62.9	127.3	6.0	0
22 February 2014							
22/02/2014 20:15^	20.5	20.3	0.0	64.9	127.4	7.5	0
22/02/2014 20:30	20.1	20.0	0.0	66.9	130.0	7.3	0
22/02/2014 20:45	19.8	19.8	0.0	68.7	129.9	6.8	0
22/02/2014 21:00	19.6	19.5	0.0	70.0	127.5	6.7	0
27 February 2014							
27/02/2014 16:00^	26.7	26.2	0.0	58.3	125.8	8.0	473
27/02/2014 16:15	26.3	25.8	0.0	60.1	128.0	7.5	499
27/02/2014 16:30	26.2	25.7	0.0	60.3	126.8	8.0	530
27/02/2014 16:45	25.8	25.3	0.0	61.9	127.6	7.8	404
27/02/2014 17:00	25.9	25.3	0.0	61.5	122.8	8.1	614
27/02/2014 17:15	25.4	25.0	0.0	62.6	125.8	8.1	310
27/02/2014 17:30	25.4	24.8	0.0	61.8	131.0	7.9	399
27/02/2014 17:45	25.1	24.7	0.0	61.6	126.3	7.0	179
27/02/2014 18:00	25.0	24.6	0.0	62.1	134.2	6.4	141
27/02/2014 18:15	25.1	24.6	0.0	63.3	134.3	6.4	152