Appendix 7

AIR QUALITY ASSESSMENT
Whitehaven Coal Mine
Canyon Extension
Air Quality Impact Assessment

Prepared for
Whitehaven Coal Mining Ltd
Ground Floor
895 Anne Street
PO Box 2440
FORTITUDE VALLEY BC QLD 4006

17 December 2004
Whitehaven Coal Mine
Canyon Extension
Air Quality Impact Assessment

Richard Heggie Associates Pty Ltd operates under a Quality System which has been certified by Quality Assurance Services Pty Limited to comply with all the requirements of ISO 9001:2000 "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing" (Licence No 3236).

This document has been prepared in accordance with the requirements of that System.

Richard Heggie Associates Pty Ltd is a Member Firm of the Association of Australian Acoustical Consultants.

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<td>Debbie Peel</td>
<td>Jason Watson</td>
<td>Jason Watson</td>
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<td>Debbie Peel</td>
<td>Jason Watson</td>
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Enquiries should be addressed to Richard Heggie Associates
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1 INTRODUCTION

Richard Heggie Associates Pty Ltd (Heggies) has been commissioned by Whitehaven Coal Mining Ltd (WCML) to undertake an Air Quality Impact Assessment for the proposed extension of the existing Whitehaven Coal Mine (referenced herein as “Canyon Extension site”).

The Whitehaven Coal Mine (WCM) located some 16 km east-southeast of Boggabri NSW, commenced operations in 2000 and has an approved production rate of 1.25 Mtpa. Most open-cut mining activities are approved to occur between 7.00 am to 10.00 pm Monday to Saturday and are generally undertaken from 7.00 am to 6.00 pm. Limited activities are permitted between 10.00 pm to about 2.00 am. The approved mine has a projected remaining life of approximately 1 year.

This letter report assesses the air quality impacts associated with the Canyon Extension of the Whitehaven Coal Mine only, and does not consider the current mining activities at the site.

2 EXISTING AIR QUALITY ENVIRONMENT

For the purposes of assessing the potential air quality impacts of the Canyon Extension site, an estimate of background particulate levels is required. For each criteria pollutant, the maximum background concentration has been selected, for each relevant averaging period. **Table 1** outlines the background air quality concentrations relevant to this project.

<table>
<thead>
<tr>
<th>Air Quality Parameter</th>
<th>Averaging Period</th>
<th>Assumed Background Ambient Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24-hour</td>
<td>Varies$^1$</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>14 µg/m$^3$</td>
</tr>
<tr>
<td>Dust</td>
<td>Annual</td>
<td>1.5 g/m$^2$/month$^2$</td>
</tr>
</tbody>
</table>

**Note 1** Daily-varying 24-hour average PM$_{10}$ concentrations sourced from the Tamworth DEC air quality monitoring site (2001) have been used within the PM$_{10}$ modelling.

**Note 2** Dust deposition values have been sourced from monitoring undertaken by Whitehaven Coal Mining Ltd, between January 2001 and December 2001, around the existing Whitehaven Coal Mine, NSW.
3  AIR QUALITY CRITERIA

The air quality goals adopted in this report are those specified in the NSW DEC document “Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales”.

In summary, the specific goals being applied to the Canyon Extension site, which conform to current DEC air quality targets, are as follows:

- **PM$_{10}$**: A 24-hour maximum of 50 µg/m$^3$
  An annual average of 30 µg/m$^3$

- **PM$_{2.5}$**: A 24-hour maximum of 25 µg/m$^3$
  An annual average of 8 µg/m$^3$

- **Dust**: Nuisance expected to impact on residential areas when annual average dust deposition levels exceed 3.5 g/m$^2$/month.

4  DISPERSION MODELLING

4.1  Methodology

The pollutant dispersion modelling carried out in the present assessment utilises the Ausplume Gaussian Plume Dispersion Model software developed by EPA (Victoria).

Ausplume is the approved dispersion model for use in the majority of applications in New South Wales. Default options specified in the Technical Users Manual (EPA Victoria, 2000) have been used, as per “Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales”.

4.2  Dispersion Meteorology

Meteorological data for the year 2001, from the on-site Whitehaven monitoring station, has been used for this assessment.

A summary of the 2001 annual wind behaviour for the Canyon Extension site is presented as a wind rose is included in **Appendix A**. This wind rose is representative of the meteorological input file used in the assessment, and displays occurrences of winds from all quadrants.

The seasonal variation in wind behaviour at the Canyon Extension site is also presented in **Appendix A**. The seasonal wind roses indicate that:

- In spring, south-easterly and west-north-west winds dominate.
- In winter, winds originate from all quadrants.
- In summer, the predominant wind direction is south-easterly.
- In autumn, the predominant wind direction is south-easterly.
Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Gifford-Turner assignment scheme identifies six (6) Stability Classes, “A” to “F”, to categorise the degree of atmospheric stability. These classes indicate the characteristics of the prevailing meteorological conditions.

Stability Class “A” represents highly unstable conditions that are typically found during summer, categorised by strong winds and convective conditions. Conversely, Stability Class “F” relates to highly stable conditions, typically associated with clear skies, light winds and the presence of a temperature inversion. Classes “B” through to “E” represent conditions intermediate to these extremes.

The frequency of occurrence of each Stability Class for 2001 are presented in Figure 1. The results indicate a high frequency (39%) of conditions typical to Stability Class “A” throughout the year at the project site. This is indicative of highly unstable conditions, conducive to a high level of pollutant dispersion due to mechanical mixing.

It is noted that the Noise Impact Assessment undertaken by Richard Heggie Associates Pty Ltd (Heggies) for the Canyon Extension Site used stability class data for the period January 2001 to December 2002, only analysing stability class for 6pm to 7am in accordance with the Industrial Noise Policy (INP). The stability class used in this assessment presents both the annual and seasonal averages for 2001, as outlined in “Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales”.

Figure 1: Annual Stability Class Distribution for the Canyon Extension site

Appendix B illustrates the seasonal variation in atmospheric stability class at the subject site. The frequency distribution of stability class varies relatively little with season, with Stability Class “A” dominating in all seasons.
4.3 Nearest Sensitive Receptors

The details of the four closest (non project related) sensitive air quality receptors (residential) are presented in Table 2.

Table 2 Details of Representative Sensitive Air Quality Receptors

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Easting</th>
<th>Northing</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Willgai”</td>
<td>224822</td>
<td>167688</td>
</tr>
<tr>
<td>“Broadwater”</td>
<td>219398</td>
<td>164326</td>
</tr>
<tr>
<td>“Woodlands”</td>
<td>225884</td>
<td>168241</td>
</tr>
<tr>
<td>“Gundawarra”</td>
<td>224564</td>
<td>169543</td>
</tr>
</tbody>
</table>

4.4 Modelling Scenarios

For this air quality impact assessment, the worst case scenario (Scenario 2, illustrated in Appendix C) has been modelled. This scenario corresponds (as reported in the “Heggies” report 10-1863R4D2 “Whitehaven Coal Mine, Canyon Extension, Noise Impact Assessment”) to mining operations that are proposed to occur during the period February 2007 to November 2007. This scenario has been selected for modelling considering the following factors:

- The quantity of waste (overburden) and run-of-mine (ROM) coal that is set to be extracted and processed during this time. To simulate this worst case scenario, the waste and ROM coal quantities that have been established for the period February 2007 to November 2007 have been used, these being 7,333,705 bank cubic metres (bcm) and 1,000,500 tonnes, respectively.

- Location of coal extraction and emplacement activities.

- The area of the mine exposed to open cut activities (approximately 0.4 km²).

- Location of major particulate generating plant.

- The proximity of the proposed mining operations in this scenario to the closest non-mine related residential receivers, particularly Willgai and Broadwater.

Most open-cut mining activities are approved to occur between 7.00 am to 10.00 pm Monday to Saturday and are generally undertaken from 7.00 am to 6.00 pm at the Canyon Extension site. Limited activities are permitted between 10.00 pm to about 2.00 am. This is explored further in Section 4.6 of the report.

4.5 Emission Factors

A review has been carried out of particulate generating activities expected at the Canyon Extension site. For the chosen worst case scenario, the following activities (where applicable) have been included in the particulate emissions inventory.

- Mining activities (excavators, dozers, scraper and grader).
- Blasting activities (including the use of a drill rig).
- Dumping of materials within the project site (overburden / coal).
Coal Processing Area activities (crushing, front end loader).
- Wind erosion of open pit and stockpiles.
- Load-out facility activities (front end loader, handling, transfer, conveyor, loading to trucks).
- General movement of heavy vehicles on unsealed roads within the site (haul truck wheel dust).

General movement of heavy vehicles on unsealed roads between the processing area and the site boundary (semi-trailer wheel dust). Table 3 presents the emission factors used for the key atmospheric pollutants used in the dispersion modelling carried out for this report. These relate to emissions expected under normal operating conditions. The ratio of the PM$_{10}$ fraction of the TSP ranges from 50% (eg wind erosion) down to 25% (eg wheel generated dust). The proportion of the PM$_{10}$ fraction for each activity was derived primarily from Environment Australia (2001), “Emission Estimation Technique Manual for Mining” (EETM for mining).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Dust Deposition Emission Factor</th>
<th>PM$_{10}$ Emission Factor</th>
<th>Emission Factor Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blasting</td>
<td>311.55</td>
<td>162.01</td>
<td>kg/blast</td>
</tr>
<tr>
<td>Excavator (on overburden)</td>
<td>0.0003</td>
<td>0.0001</td>
<td>kg/t</td>
</tr>
<tr>
<td>Excavator / Front End Loader (on coal)</td>
<td>0.0273</td>
<td>0.0131</td>
<td>kg/t</td>
</tr>
<tr>
<td>Bulldozer (on overburden)</td>
<td>0.5739</td>
<td>1.4054</td>
<td>kg/hr</td>
</tr>
<tr>
<td>Bulldozer (on coal)</td>
<td>10.72</td>
<td>2.27</td>
<td>kg/hr</td>
</tr>
<tr>
<td>Grader</td>
<td>0.5238</td>
<td>0.1913</td>
<td>kg/VKT</td>
</tr>
<tr>
<td>Scraper</td>
<td>0.0108</td>
<td>0.0026</td>
<td>kg/VKT</td>
</tr>
<tr>
<td>Stockpile and Open Pit Wind Erosion</td>
<td>0.4000</td>
<td>0.2000</td>
<td>kg/ha/hr</td>
</tr>
<tr>
<td>Drilling</td>
<td>0.5900</td>
<td>0.3100</td>
<td>kg/hole</td>
</tr>
<tr>
<td>Coal Dumping</td>
<td>0.0100</td>
<td>0.0042</td>
<td>kg/t</td>
</tr>
<tr>
<td>Overburden Dumping</td>
<td>0.0120</td>
<td>0.0043</td>
<td>kg/t</td>
</tr>
<tr>
<td>Haul Truck Movement (on overburden)</td>
<td>0.4740</td>
<td>0.1388</td>
<td>kg/VKT</td>
</tr>
<tr>
<td>Haul Truck Movement (on coal)</td>
<td>0.4351</td>
<td>0.1288</td>
<td>kg/VKT</td>
</tr>
<tr>
<td>Crusher</td>
<td>0.0100</td>
<td>0.0040</td>
<td>kg/t</td>
</tr>
<tr>
<td>Handling, transfer and conveying</td>
<td>0.0050</td>
<td>0.0020</td>
<td>kg/t</td>
</tr>
<tr>
<td>Loading to Trucks</td>
<td>0.0050</td>
<td>0.0020</td>
<td>kg/t</td>
</tr>
</tbody>
</table>

In general, default emission factors have been used as contained in Table 1 of the EETM for Mining, or in some instances such as crushing operations and handling, transferring and conveying activities, default emission factors have been used as contained in Table 2 of the EETM for Mining.
However, in some instances, the moisture content of materials at the site is not adequately reflected within the default emission factors contained in the EETM for Mining, and the equations given in Table 1 of the document were therefore used to derive representative emission factors. The following emission factors were derived using this method:

- Excavator on overburden / coal
- Dozer on overburden / coal
- Grader
- Scraper
- Front end loader
- Handling, transfer and conveying
- Blasting
- Haul truck generated wheel dust from movement both within and out of the site

The following parameters, which were utilised for a previous Heggies assessment of a similar open-cut coal mine, the Werris Creek Coal Mine (found in “Heggies” report 30-1307R2D4 “The Proposed Werris Creek Coal Mine, Air Quality Impact Assessment”), were used in deriving the above emission factors:

- A mean average of 3.9% moisture content of coal
- A mean average of 5.5% moisture content of overburden
- 1.8% silt content

A summary of the calculations made in deriving these emission factors is given in Appendix D.

### 4.6 Emission Inventory for the Proposed Operation

Appendix D provides details of the emission inventory associated with the chosen model scenario for the Canyon Extension site using the emission factors given in Table 3.

The emission inventory has been derived to reflect the worst-case scenario for airborne emissions over a 24-hour period, and mean average operational conditions for annual assessments. As such, all equipment stated in the proposed equipment list provided by Whitehaven Coal Mining Ltd is assumed to be operational for their respective hours of operation.

The following assumptions have been made in deriving the emission inventory for the model:

- The working days available is based on six and a half (6 ½) days a week, for 50 weeks per annum.
- Blasting activities are proposed to occur once a week, for 50 weeks per annum.
Most open-cut mining activities are approved to occur between 7.00 am to 10.00 pm Monday to Saturday and are generally undertaken from 7.00 am to 6.00 pm. Limited activities are permitted between 10.00 pm to about 2.00 am which includes the following: mining activities (the use of the Hitachi 3600 excavator, dozers, grader), dumping of overburden materials within the project site and wheel generated dust from unpaved roads within the project site on overburden.

Haul Trucks have been represented as simulated line sources using the 'volume source' Ausplume input. Each volume source is located along the centreline of the real line source with separations less than one quarter of the distance to the nearest residential receptor (in this case, at 500 m intervals). The above is in accordance with Section 2.5.3 of the Ausplume Technical User Manual. Hauling on unpaved roads will employ water spraying, and as such, a 50% emission reduction has been applied to this activity.

A 'Pit retention' control factor has been applied to emission rates / fluxes corresponding to activities occurring within the limit of mining, based on 50% control for TSP and 5% for PM₁₀, as per Table 3 of the EETM for Mining.

One (1) blasting event is assumed to occur in the middle of the working day. The average area of blast, the moisture content, and the depth of the blast hole are used to determine the blasting Emission Factor. This has been assumed to be 6000 m², 3.9% and 15 m respectively based on information supplied by Whitehaven Coal Mining Ltd.

Stockpiles are to be watered as required. Accordingly, a 50% reduction to the stockpile wind erosion emission factor due to water spraying has been applied, as per Table 3 of EETM for Mining.

Average wind speeds are used for conveying and excavator/front end loader emission factors. This has been calculated using the site specific meteorological file as 2 m/s.

In the absence of an emission factor corresponding to the loading of the coal hopper, an emission factor equivalent to the loading of the stockpiles has been assumed.

Percentage silt content is used to derive an emission factor for the scraper. This has been assumed to be 1.8% based on an assessment conducted at a similar open-cut coal mine, Werris Creek.

Mean vehicle speed is used to derive an emission factor for the grader. This is assumed to be 7.5 km/h based on an assessment conducted at a similar open-cut coal mine, Werris Creek.

In the absence of a specific emission factor, the truck loading coal bin located at the processing plant is assumed to have a similar emission factor to the handling, transferring and conveying of coal.

The front end loader is assumed to be working in the processing area for a 15 hour period daily.

For modelling of annual emissions, emission rates have been adjusted to reflect six and a half (6 ½) days of operation per week.
5 EMISSIONS ASSESSMENT

5.1 Dust Deposition

Table 4 shows the results of the Ausplume predictions for dust deposition using the emission rates calculated in Appendix D, at the sensitive air quality receptors adopted in Section 4.3.

The results show the mean average monthly deposition experienced by the receptors surrounding the site over a one-year time frame. It has been assumed that background levels of dust deposition are of the order of 1.5 g/m²/month for the nearest receptors. The background values were sourced from monitoring undertaken by Whitehaven Coal Mining Ltd between January 2001 and December 2001 around the existing Whitehaven Coal Mine. A contour plot of the modelled dust deposition values obtained around the Canyon Extension site is presented in Appendix E.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Dust – Annual Average g/m²/month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Background</td>
</tr>
<tr>
<td>“Willgai”</td>
<td>1.5</td>
</tr>
<tr>
<td>“Broadwater”</td>
<td>1.5</td>
</tr>
<tr>
<td>“Woodlands”</td>
<td>1.5</td>
</tr>
<tr>
<td>“Gundawarra”</td>
<td>1.5</td>
</tr>
</tbody>
</table>

At all of the nearest sensitive receptors, total mean monthly dust deposition (background plus increment) rates associated with the Canyon Extension site operation are predicted to be:

- Less than 1.7 g/m²/month at all nearest residential receptors.

As such, levels of dust deposition are expected to satisfy the dust deposition criterion (3.5 g/m²/month).

5.2 PM₁₀ (24-Hour Average)

Table 7 shows the results of the Ausplume predictions for 24-hour PM₁₀ using the emission rates calculated in Appendix D, at the sensitive air quality receptors adopted in Section 4.3.
The results show the maximum 24-hour average concentration of PM$_{10}$ experienced by the receptors surrounding the site applying the analysis over a one-year time frame. It has been assumed that background levels of PM$_{10}$ vary on a daily basis. These background levels, sourced from the Tamworth DEC air quality monitoring site, have been incorporated into the model and associated contour plots. A contour plot of the modelled 24-hour PM$_{10}$ values obtained around the Canyon Extension site is presented in Appendix F.

### Table 5  Background and Incremental PM$_{10}$ Concentrations at Nearest Sensitive Receptors

<table>
<thead>
<tr>
<th>Receptor</th>
<th>PM$_{10}$ – 24-hour Average µg/m$^3$</th>
<th>Background</th>
<th>Increment</th>
<th>Background + Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Willgai”</td>
<td>20.6</td>
<td>15.1</td>
<td></td>
<td>35.7</td>
</tr>
<tr>
<td>“Broadwater”</td>
<td>18.3</td>
<td>22.2</td>
<td></td>
<td>40.5</td>
</tr>
<tr>
<td>“Woodlands”</td>
<td>34.6</td>
<td>0.1</td>
<td></td>
<td>34.7</td>
</tr>
<tr>
<td>“Gundawarra”</td>
<td>34.6</td>
<td>0.1</td>
<td></td>
<td>34.7</td>
</tr>
</tbody>
</table>

At the nearest residential receptors, the maximum annual 24-hour average concentration of PM$_{10}$ for the modelled year (background plus increment) associated with the Canyon Extension site is predicted to be:

- Less than 40.6 µg/m$^3$ at all nearest residential receptors.

As such, concentrations of 24-hour PM$_{10}$ are expected to satisfy the project goal (50 µg/m$^3$).

#### 5.3 PM$_{10}$ (Annual Average)

Table 6 shows the results of the Ausplume predictions for annual average PM$_{10}$ using the emission rates calculated in Appendix D, at the sensitive air quality receptors adopted in Section 4.3.

It has been assumed that background annual average levels of PM$_{10}$ are of the order of 14 µg/m$^3$ for the nearest receptors.

### Table 6  Background and Incremental Annual PM$_{10}$ Concentrations at Nearest Sensitive Receptors

<table>
<thead>
<tr>
<th>Receptor</th>
<th>PM$_{10}$ – Annual Average µg/m$^3$</th>
<th>Background</th>
<th>Increment</th>
<th>Background + Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Willgai”</td>
<td>14</td>
<td>1.7</td>
<td></td>
<td>15.7</td>
</tr>
<tr>
<td>“Broadwater”</td>
<td>14</td>
<td>0.9</td>
<td></td>
<td>14.9</td>
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<tr>
<td>“Woodlands”</td>
<td>14</td>
<td>0.9</td>
<td></td>
<td>14.9</td>
</tr>
<tr>
<td>“Gundawarra”</td>
<td>14</td>
<td>0.6</td>
<td></td>
<td>14.6</td>
</tr>
</tbody>
</table>
At all of the nearest residential receptors, total annual average PM$_{10}$ concentrations (background plus increment) associated with the Canyon Extension site are predicted to be:

- Less than 15.8 µg/m$^3$ at all nearest residential receptors for all scenario stages modelled.

As such, annual concentrations of PM$_{10}$ are expected to satisfy the project goal (30 µg/m$^3$).

### 5.4 PM$_{2.5}$

Generalised particle size distributions are available in Appendix B.2 of the USEPA AP-42 document. Size distributions from industries covering material handling and processing of aggregate and unprocessed ore (typical of particulate generating activities likely to contribute to the air quality surrounding the study area) are quoted as the following:

- Approximately 30% of the PM$_{10}$ particle size fraction will constitute PM$_{2.5}$.

A simple calculation based on the above assumption, combined with the highest predicted PM$_{10}$ concentrations in Table 5 and Table 6 above, indicates that:

- Worst case 24-hour average PM$_{2.5}$ may be expected to be of the order of 12.2 µg/m$^3$.
- Annual average PM$_{2.5}$ may be expected to be of the order of 4.7 µg/m$^3$.

Therefore the 24-hour average PM$_{2.5}$ criterion of 25 µg/m$^3$ will be satisfied when the 24-hour average PM$_{10}$ criterion of 50 µg/m$^3$ is achieved.

Additionally, the annual average criterion of 8 µg/m$^3$ PM$_{2.5}$ is also anticipated to be achieved.

### 6 CONCLUSION

Richard Heggie Associates (Heggies) has been commissioned by Whitehaven Coal Mining Ltd (WCML) to assess the operation of the proposed Canyon Extension phase of the existing Whitehaven Coal Mine on local air quality.

Modelling of fugitive dust emissions and an assessment of combustion emissions was undertaken to determine the resulting air quality impacts of the proposed operation.

Computer predictions of fugitive emissions from the site were undertaken using the Ausplume Gaussian Plume Dispersion Model software developed by EPA (Victoria).

These predictions indicate that particulate matter emissions and dust deposition attributable to the proposed operation will be within current NSW DEC (and NEPM) air quality goals at all surrounding residences.
REFERENCES

The following documents and resources have been used in the production of this report:

Regarding Air Quality Standards

- National Health and Medical Research Council, 92nd Session, 1981.

Regarding Existing Air Quality

- Background dust deposition monitoring undertaken by Whitehaven Coal Mining Ltd, between January 2001 and December 2001, around the existing Whitehaven Coal Mine, NSW.
- NSW DEC, PM$_{10}$ data as measured by TEOM at the DEC’s Tamworth monitoring site, 2001.

Regarding Site Meteorology

- Site specific meteorology file (hourly observations for the year 2001) for the existing Whitehaven Coal Mine site.

Regarding Site Emission Factors

APPENDICES

Appendix A  Annual and Seasonal Wind Roses for Whitehaven Coal Mine, Canyon Extension

Appendix B  Seasonal Stability Classes for Whitehaven Coal Mine, Canyon Extension

Appendix C  Site Plan of Scenario 2 – Whitehaven Coal Mine, Canyon Extension

Appendix D  Atmospheric Emissions Inventory

Appendix E  Predicted Annual Average Dust Deposition Contours, Scenario 2, Whitehaven Coal Mine, Canyon Extension

Appendix F  Predicted 24-Hour Average PM10 Contours, Scenario 2, Whitehaven Coal Mine, Canyon Extension
APPENDIX A

Annual and Seasonal Wind Roses for Whitehaven Coal Mine, Canyon Extension
APPENDIX B

Seasonal Stability Classes for Whitehaven Coal Mine, Canyon Extension
APPENDIX C

Site Plan of Scenario 2 – Whitehaven Coal Mine, Canyon Extension
Site Plan of Scenario 2 – Whitehaven Coal Mine, Canyon Extension

**Appendix C**

Report 10-5785-R1D1
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APPENDIX D

Atmospheric Emissions Inventory
## Statement of Environmental Effects

### Whitehaven Coal Mining Limited

#### Proposed Canyon Extension

**Richard Heggie Associates Pty Ltd**

**Report 61901/Heggies - Air Quality**

### T. Extraction

<table>
<thead>
<tr>
<th>Activity</th>
<th>Type</th>
<th>PME Emission Factor</th>
<th>Emission Factor Units</th>
<th>Emission Factor</th>
<th>Number of Vehicles</th>
<th>Emission Factor (kg/veh)</th>
<th>Emission Factor (kg/hr)</th>
<th>Emission Factor (kg/hm)</th>
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<tbody>
<tr>
<td>Blasting</td>
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<td>311.55</td>
<td>152.01</td>
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<td>N/A</td>
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<td>Excavator A - Hitachi 8500</td>
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<td>Scraper (topped, elevated)</td>
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<td>N/A</td>
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<td>0.0043</td>
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<td>0.1280</td>
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<td>0.1280</td>
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<td>15</td>
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<td>0.1289</td>
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<td>N/A</td>
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<td>0.1289</td>
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<td>N/A</td>
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Appendix D. Atmospheric Emissions Inventory

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Richard Heggie Associates Pty Ltd

Consulting Engineers

Level 2, 2 Lambert Street
Lane Cove NSW 2066 Australia
Phone: +61 2 9427 6100 Fax: +61 2 9427 6200
Email: sydney@heggies.com.au

Dee Why, Sydney, NSW 2080 Australia
Phone: +61 2 9970 6688 Fax: +61 2 9970 6689
Email: melbourne@heggies.com.au

Appendix D. Atmospheric Emissions Inventory

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STATEMENT OF ENVIRONMENTAL EFFECTS

- Air Quality

WHITEHAVEN COAL MINING LIMITED

Proposed Canyon Extension
## STATEMENT OF ENVIRONMENTAL EFFECTS

### Proposed Canyon Extension

#### Air Quality Impact Assessment

- **Company:** WHITEHAVEN COAL MINING LIMITED
- **Report:** Richard Heggie Associates Pty Ltd
- **Report Number:** Rpt 61901/Heggies - Air Quality

## Table: Emission Inventories

<table>
<thead>
<tr>
<th>Activity</th>
<th>TSP Emission Factor</th>
<th>PM_10 Emission Factor</th>
<th>Emission Factors</th>
<th>Emission Emissions [kgt/hr]</th>
<th>10m Wind Speed [m/s]</th>
<th>Average Emissions</th>
<th>TSP Emission Rate [mg/h]</th>
<th>PM_10 Emission Rate [mg/h]</th>
<th>PM_2.5 Emission Rate [mg/h]</th>
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<tr>
<td><strong>2. Crushing/Processing</strong></td>
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<td></td>
<td></td>
<td></td>
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<td>Crusher</td>
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<td>0.0040</td>
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<td>Unloading feedstock to ROM</td>
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<td>15</td>
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<tr>
<td>Crushing &amp; Screening</td>
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<td>0.0020</td>
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<td><strong>3. Handling Offsite</strong></td>
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<td>15</td>
<td>10.4</td>
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</table>

### Appendix D: Atmospheric Emissions Inventory
APPENDIX E

Predicted Annual Average Dust Deposition Contours, Scenario 2, Whitehaven Coal Mine, Canyon Extension
APPENDIX F

Predicted 24-Hour Average PM10 Contours, Scenario 2, Whitehaven Coal Mine, Canyon Extension