METALLURGICAL COAL

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Secretary Senate Standing Committees on Community Affairs,
PO Box 6100
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Canberra ACT 26

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Dear Sir/Madam

Senate Community Affairs Committee Inquiry - Submission

In response to the Federal Senate inquiry into the impacts on health of air quality in Australia, Anglo American Metallurgical Coal appreciates the invitation to provide comment. We recognise that air quality and health are important and sensitive issues and we continue to support research into air quality and health and choose to work collaboratively with government and communities to better understand the issues and improve air quality in the areas we operate.

Anglo American is one of the world's largest mining companies, headquartered in the UK and listed on the London and Johannesburg stock exchanges. Anglo American's portfolio of mining businesses spans bulk commodities – iron ore and manganese, metallurgical coal and thermal coal; base metals – copper and nickel; and precious metals and minerals – in which it is a global leader in both platinum and diamonds. Anglo American is committed to the highest standards of safety and responsibility across all its businesses and geographies and to making a sustainable difference in the development of the communities around its operations. The company's mining operations, extensive pipeline of growth projects and exploration activities span southern Africa, South America, Australia, North America, Asia and Europe.

Anglo American's Metallurgical Coal business is the second largest Australian and third largest global export metallurgical coal producer. We operate both underground and open cut mines and have extensive coal mining interests in Queensland and New South Wales, Australia, British Columbia, Canada and Tete, Mozambique. We create value from coal safely and responsibly, invest in our local communities and are growing our business through the most attractive project pipeline in the industry. Our growth is underpinned by our multi-billion dollar projects in Australia and our investment in new technology.

Our commitment to safety and sustainable development includes ensuring that we act consistently across the operations in relation to safety, health, social development and the environment. We adopt a systematic approach to managing these issues to ensure compliance and to achieve continuous improvement.

We remain firmly committed to sustainable development. Operating safely and responsibly is embedded in everything we do, and we continue to assess the economic, social and environmental risks and benefits of every decision.

Particulate matter and effects

The key air quality issue for the coal mining industry is emissions of particulate matter (PM). In exploration and mining, PM is generated from various physical processes used to expose and extract material and from the operation of diesel equipment at mine sites.

PM can be defined by its size, chemical composition and source. Particle size is an important factor influencing its dispersion and transport in the atmosphere and its potential effects on human health. Suspended particles are often described by the aerodynamic diameter of the particle (i.e. the size of the particle measured in micrometres (µm)).

The size of particles determines their behaviour in the respiratory system, including how far the particles are able to penetrate and where they deposit within the body and the body's ability to remove them. Additionally, particle size is an important parameter in determining how long the particles stay in the ambient air and how far the particles travel from source. These are key considerations in assessing exposure.

The PM size ranges are commonly described as:

- TSP – total suspended particulate matter refers to all suspended particles in the air. In practice, the upper size range is typically 30 µm – 50 µm.
- PM_{10} –refers to all particles with equivalent aerodynamic diameters of less than 10 µm, that is, all particles that behave aerodynamically in the same way as spherical particles with a unit density.
- $PM_{2.5}$ – refers to all particles with equivalent aerodynamic diameters of less than 2.5 µm diameter (a subset of PM_{10}). Often referred to as the fine particles.
- $PM_{2.5-10}$ – defined as the difference between PM_{10} and $PM_{2.5}$ mass concentrations. Often referred to as the coarse particles.

Previous studies have indicated that health effects from exposure to airborne particulate matter are predominantly related to the respiratory and cardiovascular systems. The human respiratory system has in-built defensive systems that prevent larger particles from reaching the more sensitive parts of the respiratory system. Particles larger than 10 µm, while not able to affect health, can result in deposition on surfaces and result in soiling of materials (e.g. cars, clothes on the washing line). For this reason, air quality goals make reference to measures of the total mass of all particles suspended in the air; this is referred to as TSP. In practice particles larger than 30 to 50 µm settle out of the atmosphere too quickly to be regarded as air pollutants. The upper size range for TSP is usually taken to be 30 µm.

Both natural and anthropogenic processes contribute to the atmospheric load of particulate matter. Coarse particles ($PM_{2.5-10}$) are derived primarily from mechanical processes resulting in the suspension of dust, soil, or other crustal[1] materials from roads, farming, mining and dust storms. Coarse particles also include sea salts, pollen, mould, spores and other plant parts.

Fine particles or $PM_{2.5}$ are derived primarily from man-made combustion processes, such as vehicle emissions, wood burning, coal burning for power generation and natural combustion processes such as bush fires. Evidence suggests that particles in this size range are more harmful than the coarser component of PM_{10} due to their ability to penetrate deeper into the respiratory tract.

Particulate emissions from mining operations consist predominantly of coarse PM (and larger) from physical processes (e.g. excavation, loading operations). Fine PM is also generated to a lesser extent during physical processes and from diesel use on-site. Data from the NSW EPA Greater Metropolitan

[1] Crustal dust refers to dust generated from materials derived from the earth's crust.

Area (GMR) Emission Inventory for 2008 indicates that PM emissions from mining are dominated by the coarse fraction (approximately 84%).

In the recent Pollution Reduction Program for Anglo American's Drayton coal mine in NSW, the percentage of $PM_{2.5}$ emissions to PM_{10} emissions is approximately 13% based on assessment of operations in 2011 and relevant dust controls (**Drayton, 2012**[2]).

Standards and Guidelines

In the recent review of the US National Ambient Air Quality Standards (NAAQS) by the US Environmental Protection Agency (US EPA) (**US EPA, 2012**[3]), it was indicated that:

> *"An extensive body of scientific evidence indicates that breathing in $PM_{2.5}$ over the course of hours to days (short-term exposure) and months to years (long-term exposure) can cause serious public health effects that include premature death and adverse cardiovascular effects. The evidence also links $PM_{2.5}$ exposure to harmful respiratory effects."*

and:

> "*Scientific evidence also indicates that breathing in larger sizes of particulate matter, coarse particles (PM_{10}), may also have public health consequences. Studies suggest that short-term exposure to coarse particles may be linked to premature death and hospital admissions and emergency department visits for heart- and lung-related diseases."*

The World Health Organisation (WHO) developed their annual average guideline for PM_{10} based on the $PM_{2.5}$ guideline value with the application of a $PM_{2.5}/PM_{10}$ ratio of 50% (**WHO, 2006**[4]). The rationale for this is:

> "*…the quantitative evidence on coarse PM is considered insufficient to derive separate guidelines. In contrast, there is a large body of literature on effects of short-term exposures to PM_{10}, which has been used as a basis for the development of WHO AQGs and interim targets for 24-hour concentrations of PM."*

A summary of the US EPA and WHO guidelines for PM_{10} and $PM_{2.5}$ is shown in Table 1.

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[2] Drayton (2012) "Drayton Coal Mine Pollution Reduction Program – Assessment and Best Practice" June 2012

[3] US EPA (2013). "Federal Register, Vol. 78, No. 10 January 15, 2013 – Part II – Environmental Protection Agency – 40 CFR Parts 50,51,52 et al. National Ambient Air Quality Standards for Particulate Matter; Final Rule", United States Environmental Protection Agency, January 2013.

[4] World Health Organisation (WHO) (2006) "WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005" WHO, 2006.

Table 1: International Air Quality Criteria for Particulate Matter Concentrations

Pollutant	Averaging period	Standard / Criteria	Comment	Location
PM_{10}	24-hour maximum	50 $\mu g/m^3$	Not to be exceeded more than 3 times per year	International (WHO[1])
	Annual mean	20 $\mu g/m^3$	-	
$PM_{2.5}$	24-hour maximum	25 $\mu g/m^3$	Not to be exceeded more than 3 times per year	
	Annual mean	10 $\mu g/m^3$	-	
PM_{10}	24-hour maximum	150 $\mu g/m^3$	not to be exceeded more than once per year on average over a three year period	US (US EPA[2])
$PM_{2.5}$	24-hour maximum	35 $\mu g/m^3$	98th percentile averaged over three years is less than or equal to 35 μg/m3	
	Annual mean	12 $\mu g/m^3$	not to be exceeded more than once per year on average over a three year period	
PM_{10}	24-hour maximum	50 $\mu g/m^3$	35 permitted exceedances per year	Europe (EU[3])
	Annual mean	40 $\mu g/m^3$	-	
$PM_{2.5}$	Annual mean	25 $\mu g/m^3$	-	

Notes: $\mu g/m^3$ – micrograms per cubic metre

[1] World Health Organisation, "WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005" (WHO, 2006)

[2] US Environmental Protection Agency, "National Ambient Air Quality Standards for Particulate Matter; Final Rule" (US EPA, 2013)

[3] European Union, "Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe" (EC, 2008)

In 1998, Australia adopted an Ambient Air Quality National Environment Protection Measure (AAQ NEPM) (**National Environment Protection Council** [**NEPC**], **1998a**[5]) that established national standards for criteria pollutants, including PM_{10}. The health-based assessment criteria used have, to a large extent, been developed by reference to epidemiological studies undertaken in urban areas with large populations where the primary pollutants are the products of combustion (**NEPC**, **1998a**[5]; **NEPC**, **1998b**[6]). In May 2003, the NEPC released a variation to the Ambient Air-NEPM (**NEPC, 2003**) to include advisory reporting standards for $PM_{2.5}$.

Australia has one of the most stringent criteria for PM_{10} and $PM_{2.5}$ compared to international values. A summary of the air quality standard in Australia is shown in the table below.

Compared to the recently revised US EPA standards, the 24-hour average standard for PM_{10} is 3 times higher and the 24-hour average standard for $PM_{2.5}$ is 50% higher. The annual average Australian standard for $PM_{2.5}$ is 40% higher in comparison to US EPA. It is noted that there is no annual average PM_{10} standard applied by US EPA.

[5] NEPC (1998a) "National Environment Protection (Ambient Air Quality) Measure".

[6] NEPC (1998b) "National Environmental Protection Measure and Impact Statement for Ambient Air Quality".

At Port Hedland, Western Australia a health study to investigate the effects of inhalation exposure to particulate matter rich in crustal materials (in particular iron oxides) indicated that the NEPM standard for 24-hour average PM_{10} based on an urban environment is not appropriate for the Port Hedland area (**LIWA & IOM, 2007**[7]). The study noted that:

> *"…….. a departure from the Air NEPM for particulate matter (an increase from 50 µg/m^3 to 70 µg/m^3) may be justified on compositional grounds because dust in Port Hedland is largely composed of coarse particles rich in iron oxides (93%) generated from mining related activities. In contrast, dust found in urban centres is largely composed of fine and ultra fine particles rich in combustion products, plus there is no direct evidence that iron oxide in air poses a significant health hazard."*

Therefore, an interim guideline value of 70 µg/m^3 for 24-hour average PM_{10} (with a maximum of 10 exceedances per year) was adopted.

Table 2: Australian Air Quality Criteria for Particulate Matter Concentrations

Pollutant	Averaging period	Standard/Goal	Agency
TSP	Annual mean	90 µg/m^3	National Health and Medical Research Council
PM_{10}	24-hour maximum	50 µg/m^3	Allows five exceedances per year for bushfires and dust storms
	Annual Mean	30 µg/m^3	NSW Environment Protection Authority
$PM_{2.5}$	24-hour average	25 µg/m^3	Ambient Air-NEPM Advisory Reporting Standard
	Annual Mean	8 µg/m^3	

[7] LIWA & IOM (2007) "Literature Review and Report on Potential Health Impacts of Exposure to Crustal Material in Port Hedland" Lung Institute of Western Australia Inc. & Institute of Occupational Medicine for the Department of Health, Perth.

Ambient Air Quality Monitoring

Monitoring networks have been established by each state to monitor air quality impacts and ensure compliance with the NEPM. In accordance with the objectives of the NEPM, monitoring locations are generally in more densely populated areas or where there are high concentrations of industry.

Various methods are used to measure PM_{10} and $PM_{2.5}$, and these vary by state. The inconsistency in instrumentation across each state and for difference size fractions, can introduce complications in the interpretation and analysis of the data. The reference method for monitoring $PM_{2.5}$ in Australia is the manual gravimetric method as described in the technical paper by NEPC (**NEPC, 2003**[8]). The method is a non-continuous (batch), 1-day-in-3 technique that requires pre- and post-laboratory weighing. This introduces a significant time delay in data acquisition. There has been new reference and equivalent methods from the US EPA since the NEPC technical paper including specific types of Tapered-Element Oscillating Microbalance (TEOM) and the Beta Attenuation Mass (BAM) monitor[9].

The most common method for measuring and reporting PM_{10} and $PM_{2.5}$ concentrations in Australia is the TEOM. BAMS are also used for measuring and reporting $PM_{2.5}$. The main advantage of the TEOM and BAM is that concentrations are reported on a continuous basis.

The NSW EPA currently operates 37 monitoring sites for PM_{10} sites and 11 monitoring sites for $PM_{2.5}$. The monitoring stations operated by NSW EPA predominantly use TEOMs, with a number of BAMs for $PM_{2.5}$ near mines. The NSW EPA has also recently extended their network by establishing the Upper Hunter Air Quality Monitoring Network (UHAQMN), consisting of 14 monitoring sites in strategic locations, including the major population centres of Singleton and Muswellbrook.

In Queensland, monitoring networks are set up by the Department of Environment and Heritage Protection in southeast Queensland, Mackay, Townsville, Mt Isa and Gladstone. The monitoring networks consist of 21 PM_{10} TEOM monitors and 10 $PM_{2.5}$ TEOM monitors setup to monitor the effects of local industry (including coal mining and port services on the local community).

In Australia, there are currently more sites measuring PM_{10} than $PM_{2.5}$.

In addition to state regulator operated monitoring sites, extensive industry operated compliance monitoring sites exist. Additional air quality monitoring is also completed by industry, as part of their commitment to manage and reduce PM. For example, Anglo American's Drayton Coal Mine in the Hunter Valley operates one HVAS measuring PM_{10} (Lot 9) only and two HVASs measuring 24-hour average concentrations of PM_{10} (HV2a and HV5) operated by nearby industry located in the vicinity of the Drayton Coal Mine. In late 2009, Lot 9 was replaced with a TEOM to provide continuous PM_{10} data.

Examples of PM Monitoring Data

An overview of the measured PM_{10} concentration in NSW by EPA and at the Drayton Coal Mine for the past 10 years is shown in Table 3[10]. Data are presented as annual average concentrations (µg/m^3) and compared with the goal of 30 µg/m^3. A colour gradient is also applied to the data with the darker colour indicating encroachment to the air quality goal.

[8] National Environment Protection Council (2003) "Technical Paper on Monitoring for Particles as $PM_{2.5}$" March 2003

[9] US EPA (2012) "List of Designated Reference and Equivalent Methods" December 2012

[10] Office of Environment & Heritage, http://www.environment.nsw.gov.au/air/ (accessed March 2013)

What is immediately clear is 2009 was a consistently high year across the entire state. This year was the warmest year on record for the state of NSW and annual average rainfall for the state was low at 484 mm (annual average is 553 mm) (**BOM, 2013**[11]). There were also a number of significant regional dust storms in 2009.

It is noted that in 2002 to 2006 the annual average PM_{10} concentrations at HV2a were above the criteria. This monitor was located near a cultivated farming paddock and has since been moved to a more suitable location.

The recently extended UHAQMN allows a comparison to be made (for the most recent year) between mining areas and the rest of the state. During 2012, of the nine sites that measured PM_{10} concentrations greater than 20 $\mu g/m^3$, seven were in the Upper Hunter Valley while the other two were Beresfield and Newcastle. Other comparably high sites were Liverpool, in western Sydney, Earlwood, in south-western Sydney and Wagga Wagga, in western NSW.

An overview of the measured $PM_{2.5}$ concentration in NSW for the past 10 years is shown in Table 4. Data are again presented with a colour gradient applied and compared with the NEPM advisory reporting standard of 8 $\mu g/m^3$.

In contrast to PM_{10}, the generally dryer conditions during 2009 do not appear to have resulted in significantly higher annual $PM_{2.5}$ concentrations to the same extent as PM_{10}. This is expected given the increase in crustal dust during dryer conditions and extreme dust events.

Sites that are greater than the NEPM advisory reporting standard during 2012 are Muswellbrook, Wagga Wagga, Liverpool, Beresfield and Singleton, suggest factors other than mining are having an influence on high $PM_{2.5}$.

[11] Bureau of Meteorology (2013), http://www.bom.gov.au/climate/current/annual/nsw/archive/ (accessed March 2013)

Table 3: Annual Average PM_{10} ($\mu g/m^3$) 2002 - 2012 NSW

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Goal
Aberdeen	-	-	-	-	-	-	-	-	-	-	17	30
Albion Park South	-	-	-	-	17	16	15	22	14	14	14	30
Albury	19	31	16	17	22	21	17	19	13	12	14	30
Bargo	-	-	-	-	-	-	-	-	13	13	14	30
Bathurst	21	18	18	15	18	16	14	23	9	11	13	30
Beresfield	27	19	21	20	21	20	19	29	17	17	21	30
Bringelly	22	19	20	20	20	19	16	25	15	16	16	30
Bulga	-	-	-	-	-	-	-	-	-	-	19	30
Camberwell	-	-	-	-	-	-	-	-	-	-	27	30
Chullora	-	24	23	22	22	20	20	26	18	20	18	30
Earlwood	24	22	22	23	23	21	19	27	18	18	20	30
Jerrys Plains	-	-	-	-	-	-	-	-	-	-	11	30
Kembla Grange	-	-	-	19	21	19	19	24	18	17	18	30
Lindfield	19	17	-	-	-	-	14	22	14	13	14	30
Liverpool	24	22	22	22	22	19	18	26	17	-	20	30
Macarthur	-	-	-	20	17	16	15	21	14	13	-	30
Maison Dieu	-	-	-	-	-	-	-	-	-	-	26	30
Merriwa	-	-	-	-	-	-	-	-	-	-	14	30
Mount Thorley	-	-	-	-	-	-	-	-	-	-	25	30
Muswellbrook	-	-	-	-	-	-	-	-	-	19	22	30
Muswellbrook NW	-	-	-	-	-	-	-	-	-	-	19	30
Newcastle	-	-	-	22	21	-	21	31	19	19	21	30
Oakdale	-	-	-	13	14	13	12	20	11	11	12	30
Prospect	-	-	-	-	-	18	18	26	15	16	17	30
Randwick	21	20	20	19	19	18	17	26	16	16	18	30
Richmond	22	18	18	17	17	15	13	21	13	13	15	30
Rozelle	-	-	20	20	20	18	17	25	16	17	17	30
Singleton	-	-	-	-	-	-	-	-	-	20	22	30
Singleton Nw	-	-	-	-	-	-	-	-	-	-	26	30
Singleton South	-	-	-	-	-	-	-	-	-	-	19	30
St Marys	21	18	17	19	20	17	15	23	15	15	14	30
Tamworth	21	18	21	-	17	-	16	27	12	13	16	30
Vineyard	22	18	18	17	19	17	15	24	15	14	14	30
Wagga Wagga	29	30	26	25	29	26	25	27	17	-	-	30
Wagga Wagga North	-	-	-	-	-	-	-	-	-	-	19	30
Wallsend	21	18	19	18	19	17	15	27	15	14	15	30
Warkworth	-	-	-	-	-	-	-	-	-	-	21	30
Wollongong	22	19	19	19	20	20	18	24	18	17	18	30
Wybong	-	-	-	-	-	-	-	-	-	-	15	30
Industry (HV2a)	39	31	32	37	42	20	16	24	14	12	-	30
Industry (HV5)	22	31	25	14	15	18	17	15	15	13	-	30
Drayton (Lot 9)	-	-	-	21	27	31	23	26	13	15	-	30

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Table 4: Annual Average $PM_{2.5}$ ($\mu g/m^3$) 2002 - 2012 NSW

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Goal
Beresfield	10.3	6.2	7.8	6.8	6.8	6.3	6	8.6	6	5.5	8	8
Camberwell	-	-	-	-	-	-	-	-	-	-	7.5	8
Chullora	-	-	8.7	7.6	7.1	6.4	5.9	7.1	5.8	6	6.1	8
Earlwood	9.5	7.8	7.6	7.1	6.9	5.9	5.5	-	5.7	5.4	5.6	8
Liverpool	11.9	-	9.2	8.4	8.9	7.2	6.4	8.3	6.4	5.9	8.5	8
Muswellbrook	-	-	-	-	-	-	-	-	-	9.1	10	8
Richmond	8.3	6.5	6.5	5.7	5.8	-	7.3	5.6	4.2	4.6	5.3	8
Singleton	-	-	-	-	-	-	-	-	-	7.6	8	8
Wagga Wagga North	-	-	-	-	-	-	-	-	-	-	8.6	8
Wallsend	8.1	6.6	6.7	6.5	6.4	5.8	5.9	8	4.7	4.8	5.1	8
Wollongong	8.3	7.3	6.7	6.3	6.4	6	5.3	7.1	5.1	4.6	4.6	8

Particulate Emission at Coal Mines

Particulate emissions and effectiveness of dust controls from individual coal mines cannot be determined by monitoring alone due to influences from other factors (e.g. agricultural, background, other industries). The potential impacts from individual coal mines are often determined by the use of emission factors and air dispersion modelling, and the cumulative impact of the operations with all other PM sources confirmed with monitoring.

The National Pollution Inventory (NPI) manual for mining is often used as a source of emission factors for Australian mines (**NPI, 2012**[12]). However, the manual states that:

> *"Most of the work in developing emission factors for fugitive emissions has been undertaken in the United States (see USEPA (1985) and USEPA (1998)). Some work has also been undertaken in Australia (see State Pollution Control Commission (SPCC) (1983) and National Energy Research and Demonstration Council (NERDDC) (1988))."*

The NPI does not contain $PM_{2.5}$ emission factors for mining except for combustion sources. Therefore, $PM_{2.5}$ emission factors for mining industries are sourced from the US EPA and are often provided as a fraction of TSP or PM_{10}.

The use of US EPA emission factors for Australian mining operations fails to take into account the differences in mining methods and climatic conditions.

The Australian Coal Association Research Program (ACARP) is currently funding a number of major research projects, aimed at better understanding dust emissions and the effectiveness of best practice control measures on Australian coal mines.

Best Practice Management by Anglo American

Anglo American is committed to leading practice dust management and control. This includes the application of dust controls in accordance with leading practice and the operation of real-time monitoring and a proactive dust management system. Environmental management plans are in place across all operations outlining the steps to be taken to minimise environmental impacts from our mining activities.

[12] NPI (2012) "National Pollutant Inventory Emission Estimation Technique Manual for Mining V3.1", January 2012

At the Anglo American owned Drayton Coal Mine in NSW, best practice measures for minimisation and management of dust emissions are documented in the Drayton Air Quality Management Plan (Drayton AQMP) (**Drayton, 2011**[13]) and summarised in Table 5.

Table 5: Existing Drayton Mine Air quality control measures (AQMP Table 5)

Measure	Current Status
Implement available measures to keep visible dust as low as possible from offsite at all times	Implemented and ongoing
Topsoil clearing restricted to a single strip ahead of mining, where practical. Application of water during pre-strip	Implemented and ongoing
Overburden drills are equipped with equipment to minimise dust generation (water injections facilities or dust collection facility)	Drills fitted with dust suppression
Water tankers to be utilised at all times to minimise dust emissions from roads and work areas	Water trucks in use Volumes of water applied collected monthly and reported in Annual Environment Management Report (AEMR)
Overburden is dumped in low level lifts, with outer berms maintained by dozers	Implemented and ongoing
Dragline operations are conducted to minimise dumping height so there is minimal free-fall of material	Implemented and ongoing
Blasting is carried out using gravel stemming or crushed coal, which contains blast within the ground and minimises dust	Implemented and ongoing
Application of water at transfer points for conveyors	Implemented and ongoing
The CHPP is operated with dust suppression sprays at the dump hopper and transfer points as well as coal stockpiles	Implemented and ongoing Volumes applied are reported in the AEMR
Rehabilitation of mined areas is progressively achieved	Rehabilitation targets set annually based on MOP and internal requirements. Areas reported in AEMR
In known or suspected high dust areas, production processes are modified to ensure effective management of visible dust levels	Implemented and ongoing. Mining Coordinators actively manage air quality emissions daily.
Monitoring of air quality emissions	Monitoring program underway Data and analysis reported in AEMR

Anglo American has recently installed the EnviroSuite proactive dust and blast fume management system at Drayton Mine. The real-time monitoring and proactive dust management system will enable Anglo American to manage the impacts from operations and minimise dust impacts at sensitive receptors to the greatest practical extent. The Anglo American Dawson Mine in Qld has also implemented this system to manage blast fumes.

[13] Drayton (2011) “Drayton Management System Standard - Air Quality and Management Plan”, May 2011

Real-Time Dust Monitoring

A broad overview of the EnviroSuite real-time monitoring and proactive dust management system is provided below:

Continuous monitors for PM_{10} are installed in locations around the Drayton mining operations. The dust management system uses data from these monitors to indicate the dust contribution from mining activities. A link could also be established with at least one of the Upper Hunter Air Quality Monitoring Network sites.

Drayton has installed a new on-site meteorological monitoring station to add to the existing meteorological monitoring station. Data from the meteorological monitoring stations are used in conjunction with the real-time dust monitors to identify the potential locations of sources that may be contributing to dust emissions. The meteorological monitoring stations also help initiate response to adverse weather conditions.

The continuous PM_{10} monitors allow recorded concentrations to be relayed, in (near) real time, and dust emissions from the site will be visually assessed on a continuous basis. The system assesses monitored PM_{10} concentrations at the continuous monitoring site and determines if pre-defined trigger levels have been breached and when alerts are required. SMS and email notifications are sent to relevant personnel when defined trigger levels are breached.

The real-time monitoring and proactive dust management system allows relevant personnel to react when short term trigger levels are breached. The short term triggers are set at a level that allows proactive dust management to protect longer term impacts (24-hour) and ultimately annual averages.

Predictive Meteorological Forecasting System

A meteorological forecasting system will also be used as part of the EnviroSuite real-time monitoring and proactive dust management system. EnviroSuite predicts meteorological conditions at the local scale for the next 2 days to determine in advance, where the risk of dust emissions may occur (e.g. based on wind speed, direction, rainfall and atmospheric stability).

Triggers can also be set based on the predictive meteorological forecasting data to alert the appropriate personnel in advance to review the real-time data and manage the intensity of activities for that day, increase controls or limit activity to various areas of the site.

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Recommendations and Conclusions

- Australia has one of the most stringent air quality criteria in the world when compared to international values. In particular, Australian particulate standards are 40% – 300% more stringent than US EPA values.
- The application of particulate standards should be appropriate to how and where they are applied - urban vs. remote rural areas, sources of crustal vs. combustion derived particles.
- Best practice dust controls are already implemented at Anglo American's mining operations in Queensland and NSW. The implementation of the EnviroSuite real-time monitoring and proactive dust management system approach enables Anglo American to pro-actively manage dust impacts from day-to-day operations.
- Ongoing monitoring and research is recommended to better understand particles (composition, size) emitted by the mining industry, as well as further knowledge of dust control. This would facilitate more robust evaluations of the cost-effectiveness of control measures versus their respective contribution to health outcomes.
- More $PM_{2.5}$ monitoring by Government is required to better quantify emissions from different areas (e.g. urban, rural and industrial).
- Consistency across the States on equipment and standards for particulates monitoring is required.

Anglo American Metallurgical Coal would be happy to provide additional information or provide clarification at the request of the Committee.

Yours sincerely

Dr Carl Grant
Regional Manager, Environment

www.angloamerican.com.au