PRELIMINARY SUBMISSION

NSW Chief Scientist and Engineer

Review of rail coal dust emissions management practices in the NSW coal chain

November 2015

NSW MINERALS COUNCIL

NSW MINING

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Executive Summary

The NSW coal industry welcomes the review of coal train dust scientific evidence and management practices by the NSW Chief Scientist and Engineer.

This preliminary submission has been prepared to outline background information about the Hunter Valley coal chain and the industry's understanding of the scientific evidence regarding coal dust emissions from trains and air quality around the rail corridor.

The Hunter Valley Coal Chain is the world's largest coal export network. Coal is transported by rail from mines in the Gunnedah Basin, Central West (near Mudgee), Hunter Valley and Central Coast regions to Newcastle, where the trains are unloaded at coal export terminals before being shipped internationally.

Concerns have been raised by some members of the community regarding the potential impact of coal dust emissions from coal trains operating in the Hunter Valley, with particular concerns about air quality around the rail corridor in the Lower Hunter and Newcastle area. The industry takes these concerns seriously and has been working to understand the effect coal trains have on air quality and the adequacy of management practices that are in place.

Research shows that coal trains do not have significant impact on air quality around the rail corridor

Multiple pieces of research indicate that air quality around the rail corridor is good and that coal trains do not have a significant impact on air quality. Some facts about air quality include:

- Air quality meets national air quality standards – Australia has some of the most stringent air quality standards in the world. Air quality monitoring shows these standards are met the vast majority of the time near the rail corridor and in the Newcastle region more broadly.

- Evidence shows coal trains are not significant sources of dust – Trackside monitoring has shown that coal trains and freight trains (carrying general goods and shipping containers) both generate the same, small, temporary increase in particulate matter as trains pass and that the likely cause of the increase is dust being stirred up from within the rail corridor.

- Coal dust is a small proportion of overall particulate matter – Dust deposition studies and particle characterisation studies indicate that on average, coal is a relatively small proportion of overall particulate levels.

- Air quality has remained stable while coal exports have increased – While coal exports grew 40% between 2010 and 2014, annual average particulate levels in the Lower Hunter remained stable, indicating no relationship between train movements and air quality trends in the region.

- Wind tunnel testing indicates a low risk of dust emissions – Wind tunnel research indicates that the coal properties and moisture content of the NSW coal types tested is likely to minimise the risk of dust emissions from the surface of loaded coal wagons under typical NSW operating conditions.

While the evidence indicates coal dust from trains does not have a significant impact, the industry is reviewing and refining management practices and conducting further investigations into coal dust emissions

There is a range of infrastructure design measures and management practices already in place throughout the coal chain to minimise potential coal dust emissions from trains. There are also several processes underway to review and refine the industry's management practices, which are being driven by industry and by the NSW Environment Protection Authority. The industry will summarise the range of management practices and further studies underway in a second submission. Some important factors to consider when assessing the potential for any new management controls include:

- Controls must be targeted and evidence based – There are many varying perceptions about coal dust emissions from trains including their significance and source. Controls should be directed toward sources that will deliver a tangible reduction in coal dust emissions from trains, based on appropriate investigations and data.

- Controls used in other jurisdictions are not always appropriate to NSW – There are many factors that influence potential coal dust emissions from trains, which vary between different jurisdictions both within Australia and internationally (e.g. infrastructure, travel distances, climate, coal types). Appropriate controls need to be considered based on local factors and the scientific evidence to support them.

- Any costs must be justified – Given that air quality evidence indicates coal trains are not having a significant impact on air quality, costly management controls will not be balanced by corresponding improvements in air quality. Costs include the direct costs of the management control itself, as well as any impacts to the efficiency of the rail network.

- Potential to create new environmental issues – Some controls will create new environmental issues. For example, washing wagons with water uses water resources and creates a wastewater stream with fine coal material that can be difficult to manage. These must be balanced against any potential air quality improvements.

1. Introduction

1.1. About the NSW Minerals Council

The NSW Minerals Council (NSWMC) is the peak industry association representing the State's $21 billion minerals industry. NSWMC has 80 member companies that include operators from each part of the Hunter Valley coal chain: coal producers, the track manager, rolling stock operators and coal export terminals.

1.2. Coal industry investigations and action on coal dust from trains

Some members of the community have expressed concerns about coal dust being emitted from coal trains and the potential impact this has on air quality around the rail corridor, particularly in the Lower Hunter and Newcastle region.

The industry has carefully considered these issues. The industry conducted a review of the available evidence relating to the effect coal trains are having on ambient air quality. This review has led the industry to conclude that there is no evidence to suggest that coal dust emissions from coal trains are having a significant impact on ambient air quality.

The industry has also been reviewing existing management practices throughout the coal chain and identifying where they can be improved to minimise potential coal dust emissions. This work is ongoing, with some changes underway and some further investigations planned.

The industry is in the process of compiling a summary of the work that has been completed or is underway.

1.3. Purpose of this submission

This preliminary submission to the NSW Chief Scientist and Engineer's review of coal dust emissions[1] has been prepared to provide an overview of the Hunter Valley coal chain and the range of air quality evidence that the industry has reviewed. The submission is intended to inform the preliminary report that the NSW Chief Scientist and Engineer is required to deliver to the NSW Government by 30 November 2016, in accordance with the Terms of Reference.

Some preliminary discussions on management practices and the factors that need to be considered when assessing potential new controls is also included. A subsequent submission will be prepared summarising the industry's management practices and further investigations that are underway.

[1] The Terms of Reference for the review are contained in Appendix A

2. The Hunter Valley Coal Chain

2.1. Hunter Valley coal chain capacity and infrastructure

Rail transport is acknowledged as the most efficient way of moving large quantities of coal from mine to port. The Hunter Valley Coal Chain is the world's largest coal export infrastructure network, with exports totalling 159 million tonnes in 2014[2]. Coal is transported by rail from mines in the Hunter Valley, Gunnedah Basin, Western Coalfield (near Mudgee) and Central Coast to the Port of Newcastle, where Port Waratah Coal Services operates two export terminals at Kooragang Island and Carrington, and Newcastle Coal Infrastructure Group operates a third at Kooragang Island.

There are four main train operators that haul coal in the Hunter Valley Coal Chain: Pacific National, Aurizon, Freightliner and Southern Shorhaul Railroad. Australian Rail Track Corporation manages the track.

There are around 28 train loading points that load coal for transport to Newcastle. Different facilities use different loading techniques. 27 facilities use overhead loading infrastructure, where coal is loaded from an overhead bin into the coal wagon. For some mines this is a fully automated loading process while at other mines it semi-automated or manually controlled.

One mine that transports coal to Newcastle by rail uses front end loaders to load the trains, however a very small proportion of the total coal transported to Newcastle is loaded this way and the travel distance is short.

Table 1: Hunter Valley coal loading facilities

Region	Loading facilities total	Overhead loading facilities	Front end loading facilities	Travel distance to Newcastle ports	Approximate travel time to Newcastle port
Newcastle/ Central Coast	4	3	1	30-70km	1-2 hours
Upper Hunter/ Gloucester	16	16	0	80-150km	2-5 hours
Western Coalfield	3	3	0	150-280km	5-9 hours
Gunnedah	5	5	0	250-360km	8-13 hours
Total	**28**	**27**	**1**		

A total of 198 million tonnes of saleable coal was produced in NSW in 2014. 159 million tonnes was exported through the Port of Newcastle, 13 million tonnes was exported from Port Kembla[3] (from mines located in the Southern Coalfield and Lithgow regions), while around 23 million tonnes was used in domestic power generation and 3 million tonnes in domestic steel production.

[2] Coal Services Pty Ltd
[3] Coal Services Pty Ltd

Table 2: 2014 saleable coal production by coalfield[4]

Coalfield	Saleable coal production (Mt)
Gunnedah	16
Hunter	111
Newcastle	18
Western	40
Southern	13
Total NSW	198

The approved and installed capacity of the Newcastle coal export terminals is 211 million tonnes per annum. Current exports (159 Mt in 2014) are below this approved capacity so there is room for exports to grow under existing approvals. Port Waratah Coal Services has a proposal to expand its Kooragang Island operations that if fully implemented can add a further 70 million tonnes of capacity, bringing the total capacity of all Newcastle coal export terminals to 281 million tonnes. However, a decision to proceed with the construction of this project will only be made if demand forecasts indicate it is required.

Table 3: Train unloading facilities at the Port of Newcastle

Port	Nameplate capacity p.a. (Mt)	2014 exports (Mt)
PWCS – Kooragang Island	120	92
PWCS – Terminal 4*	70	n/a
PWCS - Carrington	25	20
NCIG – Kooragang Island	66	47
Total	**281**	**159**

*PWCS Terminal 4 still requires Commonwealth approval and will only be constructed if demand forecasts indicated additional capacity is needed

There are more than 50 coal trains operating in the Hunter Valley Coal Chain. Most trains have between 82 and 96 wagons with a gross capacity of 120 tonnes per wagon, resulting in up to 9,300 tonnes of coal being transported per train. A small number of trains have fewer carriages and/or smaller wagon capacities. In total, there are more than 4,200 wagons operating in the Hunter Valley coal chain.

Coal train speed limits and average train speeds vary depending on whether the trains are loaded or unloaded. Average speeds tend to be significantly less than posted track speed limits, and trains tend to go slower in the Newcastle area where the train line is more congested.

Table 4: Maximum and average coal train speeds in the Hunter Valley (Muswellbrook to Port sections)

Train Speeds	km/h
Speed limit (loaded)	60
Speed limit (unloaded)	80
Average speed (loaded)	35-40
Average speed (unloaded)	45-50

[4] Coal Services Pty Ltd

3. Coal dust and air quality

3.1. Particulate matter size

Small particles of coal can become airborne and contribute to a form of air pollution known as particulate matter, or PM. Airborne particulate matter includes all types of airborne particles from sources such as vehicle exhausts, bushfires, power stations, domestic wood heaters, mining, agriculture, industrial furnaces, sea spray and windblown dust.

Health research indicates that it is the size of particulate matter that is of primary importance from a human health perspective, with the smaller particles having greater health impacts since they can be inhaled deep into the lungs and absorbed into the bloodstream. The size of airborne particulate matter is classified as shown in Table 5, with the smallest category of particles – $PM_{2.5}$ – having the greatest health impact, which are mainly produced by combustion processes.
Figure 3.1 demonstrates the relative size of different particles.

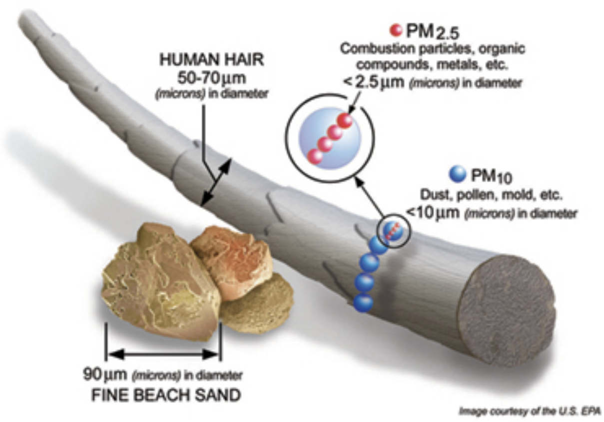
Because coal is derived from mechanical (i.e. crushing) rather than combustion processes, coal is unlikely to contribute significantly to the $PM_{2.5}$ fraction.

Product coal can contain pieces of coal up to 50 millimetres in diameter. The finer fraction of the product coal has a relatively high moisture content due to the collectively larger surface area compared to the same mass of larger particles.

Table 5: Particle size classifications and descriptions[5]

Particle Size	Description
TSP	Total Suspended Particulate Matter (TSP) refers to the total of all particles suspended in the air. Even the largest of these particles is barely half the width of a human hair.
"Larger than"PM_{10}	A subset of TSP, and refers to all particles of size 10 µm in diameter and greater.
PM_{10}	Also a subset of TSP, and includes all particles smaller than 10 µm in diameter (smaller than 1/7th of a hair width). Particles in the size range 2.5 µm to 10 µm in diameter are referred to as coarse particles ($PM_{2.5-10}$).
$PM_{2.5}$	A subset of both PM_{10} and TSP categories and refers to all particles less than 2.5µm in diameter. $PM_{2.5}$ is referred to as fine particles and is mainly produced from combustion processes such as vehicle exhaust.

Figure 3.1: Relative size of particle matter



[5] NSW Health, Mine Dust and You Fact Sheet, http://www.health.nsw.gov.au/environment/factsheets/Pages/mine-dust.aspx

3.2. Particulate matter air quality standards

There is a range of air quality standards that apply in NSW. Standards are designed to protect either population health or to provide acceptable levels of amenity. Different standards apply to different size particles and different averaging periods (i.e. 24 hours, a month or annually). The range of air quality standards for particulate matter that apply in NSW are outlined in Table 6.

Table 6: Air quality standards for particulate matter that apply in NSW[6]

Pollutant	Averaging period	Concentration standard	Source of standard
TSP	Annual	90 µg/m3	NSW EPA
PM10	1 day (24h)	50 µg/m3	National standard (5 days' exceedance per year permitted)
	Annual	30 µg/m3	NSW EPA
PM2.5	1 day (24h)	25 µg/m3	National advisory standard
	Annual	8 µg/m3	National advisory standard
Dust deposition	Month (total)	$4 g/m^2$	NSW EPA
	Month (increase)	$2 g/m^2$	NSW EPA

Australia has some of the most stringent ambient air quality standards in the world. For comparison, the most recent revision to ambient air quality standards for particulate matter internationally occurred in the United States. In comparison to the updated US EPA standards:

- Australia's PM_{10} 24 hour health standard is three times as strict (50 $\mu g/m^3$ vs 150 $\mu g/m^3$)
- Australia's $PM_{2.5}$ 24 hour advisory health standard is 40% more strict (25 $\mu g/m^3$ vs 35 $\mu g/m^3$)
- Australia's $PM_{2.5}$ annual average advisory health standard is 50% more strict (8 $\mu g/m^3$ vs 12 $\mu g/m^3$).

[6] NSW Health, *Mine Dust and You Fact Sheet*

4. Air quality around the rail corridor

The potential for coal dust emissions from trains depends on factors such as the coal characteristics and moisture content, train speeds, temperature, humidity and wind speeds, combined with any operational practices that influence potential emissions. These factors vary between different mines, seasons and regions.

There has been a range of air quality monitoring and other research conducted that has focused on the Hunter Valley rail corridor in NSW. The scientific evidence indicates that coal trains do not have a significant impact on ambient air quality and that air quality around the rail corridor and the Lower Hunter more broadly is good. This is a view supported by several agencies including:

- The NSW Planning Assessment Commission – *"There is little or no evidence that uncovered wagons contribute significantly to particulate air quality in the Newcastle area …"*[7]

- The NSW Office of Environment and Heritage – *"Overall air quality in the Lower Hunter is as good – or better than – air quality in Sydney and the Illawarra."*[8]

4.1. Trackside particulate monitoring

Trackside particulate monitoring indicates that loaded coal trains, unloaded coal trains and freight trains all generate a small, temporary increase in dust levels as they pass.

Australian Rail Track Corporation

A statistical expert, Professor Louise Ryan, analysed 61 days of air quality, weather and train data collected on behalf of the Australian Rail Track Corporation at a trackside monitoring location at Mayfield in the Newcastle region.[9]

Professor Ryan's analysis found that loaded coal trains, unloaded coal trains and freight trains all increase particulate levels across all sizes by approximately 10% on average.

This is a relatively minor, temporary increase in particulate matter levels within the rail corridor as coal and freight trains pass by, akin to a vehicle travelling on a road. The monitoring was undertaken within the rail corridor approximately 3 metres from the tracks, and therefore the temporary increase in particulate levels is greater than what would be experienced outside the rail corridor. It does not indicate that coal trains are having a significant impact on ambient air quality levels around the rail corridor.

Further analysis of the data, including correlation with local rainfall data, found that dust generation by trains was significantly influenced by whether it had rained the previous day. Professor Ryan concluded that the analysis *"suggests that a key mechanism for the increased particulate levels was stirring up by passing trains of dust particles that had settled previously on the tracks."*[10] This finding indicates that coal wagons themselves are not a source of significant dust or particulate generation.

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[7] NSW Planning Assessment Commission (2014), Port Waratah Coal Services Terminal 4 Project Review Report, 1 December 2014, Sydney.
[8] Office of Environment and Heritage (2012), An Assessment of Three Reports Concerning Air Quality in the Lower Hunter Region, April 2012 http://www.epa.nsw.gov.au/resources/NCCCE/120298AirQualLH.pdf
[9] Ryan, L. (2014), Re-analysis of ARTC Data on Particulate Emissions from Coal Trains, accessUTS, Sydney.
[10] Ryan, L. and Malecki, A. (2015) Additional Analysis of ARTC Data on Particulate Emissions in the Rail Corridor, accessUTS, Sydney.

Office of Environment and Heritage Beresfield Monitoring Station

The Office of Environment and Heritage operates an air quality monitoring station at Beresfield in the Lower Hunter, monitoring both PM_{10} and $PM_{2.5}$. The monitor is located less than 400m from the rail line and provides a good indication of long term air quality in the vicinity of the rail corridor including the contribution from trains and other local and regional sources.

The monitoring shows that national air quality standards for PM_{10} have been met 9 of the last 10 years (i.e. there have been 5 or less exceedances of the 24 hour criterion in the calendar year).[11] The only year when standards were exceeded was 2009, when significant dust storms affected ambient air quality across the state.

The national $PM_{2.5}$ annual average advisory reporting standard has been exceeded at the Beresfield monitor in two of the last 10 years. Given the relatively larger size of coal dust it is unlikely that coal dust makes a significant contribution to $PM_{2.5}$ at the Beresfield monitor. This is supported by regional $PM_{2.5}$ particulate characterisation studies.

4.2. Trackside dust deposition studies

Dust deposition monitoring around the rail corridor shows that dust levels are well within amenity criteria and that coal makes a small contribution to deposited dust.

Deposited dust is made up of larger particles that have a nuisance effect rather than health implications. Coal dust is one of many potential sources of visible dust that can deposit on surfaces such as windowsills and outdoor furniture.

While black dust is often attributed to coal, there are several other sources of black dust and the presence of black dust isn't unique to areas around coal mines and infrastructure. Other sources of black dust include mould, soot and rubber tyre particles, while some dust derived from soil can appear black in colour.

Nuisance dust is measured using dust deposition monitors, in which dust settles and can then be weighed and compared against amenity criteria. Analysis of the dust may also be conducted to understand potential sources. There have been several trackside dust deposition monitoring programs around rail corridors in NSW and Queensland, all of which show that nuisance dust impact assessment criterion of 4 g/m^2/month is rarely exceeded and is generally well below the criterion.

Bloomfield Collieries dust deposition gauges at Thornton

Bloomfield Collieries has operated two dust deposition gauges at two different locations in Thornton in the lower Hunter Valley since January 1997. One site is within the main Hunter Valley rail corridor and the other site is 1.2 kilometres away next to the New England Highway.

During more than 15 years of monitoring there have only been two months at each monitor that have exceeded the amenity standard of $4g/m^2$/month for deposited dust. On average, more dust settles at the monitor next to the highway than at the monitor next to the rail corridor, with 59% of months recording a higher reading at the monitor next to the highway and 32% recording a higher reading next to the rail corridor (9% of months showed equal readings).

[11] Data accessed from Office of Environment and Heritage Website
http://www.environment.nsw.gov.au/AQMS/search.htm

These monitoring results show that the deposited dust levels around the New England Highway are greater than they are around the rail corridor, and that average deposited dust levels in the rail corridor are less than half the amenity standard.

Table 7: Summary dust deposition data, Thornton, 1997-2014 ($g/m^2/month$) [12]

Gauge ID	D7	D8
Location	New England Hwy, Thornton	Main North Rail Line, Thornton
Min	0.40	0.20
Mean	1.74	1.51
Median	1.60	1.40
99th percentile	3.93	4.08
Maximum	4.9	5.68
Exceedances (by month)	2	2
Total readings	188	185

Figure 4.1 - Proximity of Thornton dust deposition gauge (on fence to the right) to the Main North Rail Line

Whitehaven Coal dust deposition gauge at Quirindi

Whitehaven Coal has conducted trackside dust deposition monitoring near Quirindi since 2011. Three dust deposition gauges are positioned on each side of the rail line, at distances of 13m, 20m and 30m from the rail line. The deposited material has been analysed to determine the relative proportions of coal, vegetable/insect matter and dirt that make up each monthly sample.

A summary of 18 months of monitoring data from the Quirindi trackside monitoring program (October 2011 – March 2013) is presented below. The following conclusions can be drawn from the data:

[12] Data summary provided in Bloomfield Collieries Annual Environmental Management Report http://www.bloomcoll.com.au/Portals/5/Files/Bloomfield%20AEMR%202014_v2_web%20version.pdf

- The rolling annual average at all sites was below the nuisance dust impact assessment criterion of 4 g/m^2/month for the entire period.

- The rolling annual average of the contribution of coal to deposition at all monitors (maximum of 0.33 g/m^2/month) was well below the NSW EPA assessment criteria for incremental increase in dust deposition of 2 g/m^2/month.

- The highest coal contribution recorded at any of the monitors was 1 g/m^2/month; half the NSW EPA assessment criteria for incremental increase in dust deposition of 2 g/m^2/month.

Table 8: Dust deposition monitoring at Quirindi October 2012-March 2013 (g/m^2/month)

Parameter	West			East		
	30m	20m	13m	30m	20m	13m
Average deposited material	1.04	0.92	1.08	0.80	1.14	1.36
Maximum deposited material	1.80	1.60	3.40	2.40	3.80	3.60
Average coal contribution	0.23	0.20	0.31	0.18	0.13	0.18
Maximum coal contribution	0.75	0.40	1.02	0.44	0.38	0.41
Maximum – rolling annual average – deposited material	1.11	0.94	1.10	0.91	1.20	1.53
Maximum – rolling annual average – coal	0.28	0.24	0.33	0.21	0.15	0.21

NSW Environment Protection Authority – Lower Hunter Dust Deposition Study

The NSW Environment Protection Authority has commissioned a dust deposition monitoring program focusing on the rail corridor between Hexham and Port Waratah, which will provide further insights into the levels and composition of dust deposited around the rail corridor by measuring the rate of dust deposition and analysing the type of material present in the samples collected.

An interim report was released in July 2015[13] outlining the results of analysis completed on 29 samples (11 brush samples, 6 dust deposition gauge samples and 12 petri dish samples). Given the results are interim, no conclusions have been drawn from the data.

Coal was detected in measurable amounts in 22 of the 29 samples analysed to date, comprising an average of 6.2% of the samples. The NSW EPA noted in its media release that *"It is also pleasing to see that the overall levels of dust deposited were below guideline levels. The six-month rolling averages for data collected at the 12 monitoring sites were all well below 4 grams per square metre per month, which is the EPA guideline value for the acceptable annual average amount of deposited dust."*[14]

4.3. Regional particulate monitoring

Long term regional air quality monitoring in the Lower Hunter and Newcastle area shows that air quality is good and meets national air quality standards.

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[13] AECOM (2015), *Lower Hunter Dust Deposition Study- Interim Report. October 2014-April 2015 Results Summary*
[14] NSW EPA (2015), *First Lower Hunter Dust Study Findings Released Today,* Media Release, http://www.epa.nsw.gov.au/epamedia/EPAMedia15072301.htm

NSW Office of Environment and Heritage – Lower Hunter and Newcastle Monitoring Stations

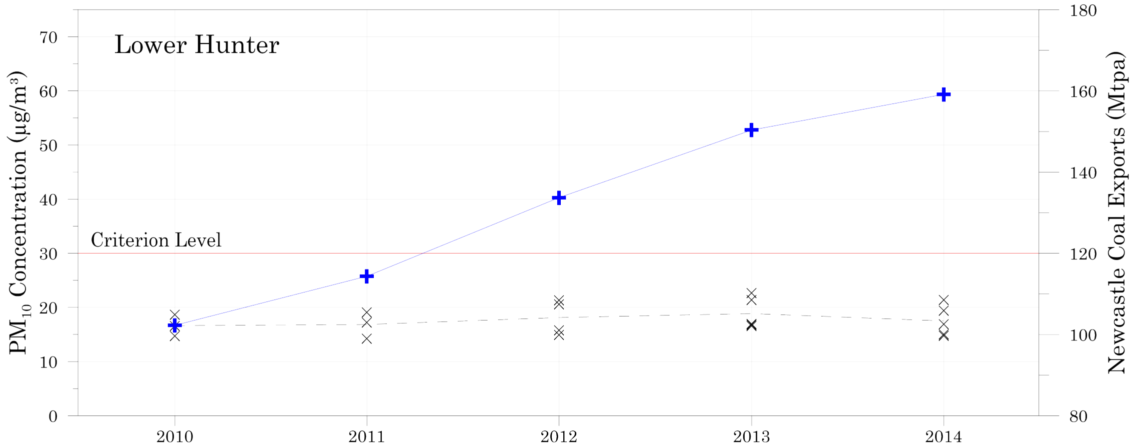
Long term air quality data for the Lower Hunter and Newcastle region is available from three air quality monitors operated by the Office of Environment and Heritage at Beresfield, Wallsend and Newcastle.

National annual air quality standards for PM_{10} have been met at the three NSW Office of Environment and Heritage monitors in the Lower Hunter region for the last 10 years[15] (i.e. there have been 5 or less exceedances of the 24 hour criterion in the calendar year), except for 2009 when dust storms affected ambient air quality across NSW.

A report prepared by the Office of Environment and Heritage in 2012 concluded that *"Overall air quality in the Lower Hunter is as good – or better than – air quality in Sydney and the Illawarra."*[16]

Analysis of trends in annual average particulate levels and coal exports through the Port of Newcastle do not show any relationship between coal production levels and air quality in the region.

Figure 4.2: Lower Hunter regional annual average PM10 concentrations and Newcastle coal export volumes[17]



Australian Nuclear Science and Technology Organisation (ANSTO) Particulate characterisation

Independent sampling and analysis at Mayfield of $PM_{2.5}$ - the smallest particles of greatest health concern - by the Australian Nuclear Science and Technology Organisation (ANSTO) between 1998-2009 has shown that automobiles (27%), secondary sources (23%), smoke (20%) and sea salt spray (16%) are the major sources of PM2.5. Industry and soil combined make up 14%, of which coal dust is a proportion along with industrial facilities, agriculture and other windblown dust[18].

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[15] Data accessed from Office of Environment and Heritage Website http://www.environment.nsw.gov.au/AQMS/search.htm

[16] Office of Environment and Heritage, An Assessment of Three Reports Concerning Air Quality in the Lower Hunter Region, April 2012 http://www.epa.nsw.gov.au/resources/NCCCE/120298AirQualLH.pdf

[17] Data obtained from NSW Office of Environment and Heritage; Coal Services Ltd

[18] http://www.ansto.gov.au/cs/groups/corporate/documents/webcontent/mdaw/mday/~edisp/acstest_040327.pdf

4.4. Wind tunnel testing of NSW coal types

Wind tunnel testing provides an indication of the risk of dust emissions from the surface of loaded coal wagons, which informs whether there are circumstances in which mines may need to investigate additional management controls because of their coal properties and travel distance.

The results of two initial wind tunnel testing programs indicate that for the coal types tested there is a low risk of dust emissions from the surface of loaded wagons during transport from mines to ports.[19][20] The testing indicated that mass moisture content of the coal was sufficient to minimise any dust emissions even under high wind speeds that would be rarely experienced in NSW.

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[19] TUNRA (2012), Dust Emission Investigation of 6 Xstrata Coal Samples, Report# 7761-2, TUNRA Bulk Solids Handling Research Associates, Newcastle

[20] Introspec (2015), Risk of coal dust emission from loaded coal wagons during rail transport for NSW coal types, Report prepared for the NSW Minerals Council, Sydney.

5. Management controls

5.1. Industry actions to improve management controls and investigate coal dust sources

A range of infrastructure design features and management practices are in place to minimise potential coal dust emissions from trains during their journey from mines to ports. Many of these practices have been detailed in the reports prepared by the NSW Environment Protection Authority following the audits conducted of loading and unloading facilities in 2014.[21]

While the evidence suggests that these existing management practices are effective and that coal trains are not having a significant impact on air quality, the industry has been working to review existing management practices, identify where they can be improved and where further work is needed to better understand potential coal dust emissions from coal trains.

In December 2014, the industry made several commitments to improve coal train dust management practices. The implementation of these commitments is ongoing, and the industry is developing mechanisms to monitor implementation in consultation with the NSW Environment Protection Authority.

While identifying a wide range of good practices already in place, the NSW Environment Protection Authority audits in 2014 also identified areas for improvement. The audited sites have been responding to the audits findings and have been making changes as a result, and the industry more broadly has reviewed the findings.

There are also further studies that are planned, such as the work that Australian Rail Track Corporation initiated relating to coal loss on the rail tracks, which has recently been formalised into a licence condition on its Environment Protection Licence[22]. In addition, rolling stock operators are working with the NSW Environment Protection Authority to provide information regarding wagon design, inspection and maintenance regimes in place to prevent potential loss of coal from wagons.

NSWMC will summarise the coal chain's management practices and the further work that is underway in a second submission to the review.

5.2. Factors to consider when assessing potential management controls

Some factors to consider when assessing potential changes to management controls include:

- Controls must be targeted and evidence based – There are many varying perceptions about coal dust emissions from trains including their significance and source. Some issues are more related to perceptions about coal dust emissions from trains (e.g. residual coal in unloaded wagons that remains in the wagon during the return journey rather than being emitted). Any additional controls should be directed toward sources that will deliver a tangible reduction in coal dust emissions from trains, based on appropriate investigations and data.

- Controls used in other jurisdictions are not always appropriate to NSW – There are many factors that influence potential coal dust emissions from trains, which vary between different jurisdictions both within Australia and internationally. Different jurisdictions have different coal types, infrastructure, travel distances, travel speeds and ambient weather conditions. The

[21] NSW EPA (2014), Compliance audit of coal train loading and unloading facilities, December 2014, Sydney http://www.epa.nsw.gov.au/resources/epa/148597-comp-audit-coal-train.pdf
[22] http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=61870&SYSUID=1&LICID=3142

practices applied in other jurisdictions may not be relevant to NSW and investigations specific to a particular region are required.

- Any costs must be justified – The costs of some potential management controls are significant. Given that air quality evidence indicates coal trains are not having a significant impact on air quality, costly management controls will not be balanced by corresponding improvements in air quality. Costs can be broken into two categories:

    - Direct costs of the control itself – The costs of infrastructure upgrades, operational costs (labour and other inputs) and maintenance. Due to the large number of assets, a small cost applied to every piece of equipment results in significant overall costs.

    - Impacts on the efficiency of the network – The Hunter Valley coal chain is an extremely complex freight network that is carefully planned to achieve maximum efficiency. Measures that slow the loading or unloading process, reduce the capacity of wagons, impact train reliability or require additional track shutdowns will lead to significant costs. For example, a 5% increase in train cycle time or wagon capacity is notionally equivalent to a 5% reduction in system capacity, which would require further capital investment (and additional train movements) to make up the reduction.

- Potential to create new environmental issues – Some controls will create new environmental impacts. For example, potential options to remove parasitic coal or residual coal from wagons include water sprays and high pressure air sprays. Both of these options creates other environmental issues including use of water resources (potentially town water supplies), management of contaminated wastewater that would include fine coal material, and the creation of dust and noise by high pressure air. These impacts, as well as the costs of the controls, need to be carefully considered to determine whether they are outweighed by the likely benefits.

Appendix A – Terms of Reference

Review of rail coal dust emissions management practices in the NSW coal chain

The Government response to Recommendation 7 of the Inquiry into the Performance of the NSW Environment Protection Authority was that "The Chief Scientist & Engineer has agreed to undertake a review of rail coal dust emissions management practices. This will include a review of the work the EPA has undertaken in relation to coal dust emissions along the rail corridor in the Hunter Valley, as well as review of environmental monitoring, the literature, and the environmental management practices of operators using the rail network."

In undertaking the review the Chief Scientist & Engineer will provide advice on coal dust and related emissions in the rail corridor, in particular:

1. identify, describe and comment on:
   a. key issues, including current scientific knowledge and matters of expressed public concern
   b. initiatives in NSW and other jurisdictions to address issues, including measurements, prevention and management practices
   c. any gaps or issues arising

2. describe advances in technology for sampling and monitoring air emissions from the coal chain in the rail corridor

The review report will also include contextual information on air quality including dust and particulate emissions across the coal supply chain, and approaches used by NSW and other jurisdictions to measure, access and manage these.

In undertaking the review the Chief Scientist & Engineer will provide to the Minister for the Environment an initial report by 30 November 2015 and a final report by 31 March 2016.