Appendix 5

UNIVERSITY OF WOLLONGONG

Witness	Question	Hansard reference
University of Wollongong	**Senator CAMERON:** Do you have any specific recommendations on how you should improve regulation on dust exposure? **Dr Ren:** We do. There are very specific recommendation on some of the practices, from the short term to the medium term to the longer term, including monitoring practices. So we do have lots of so-called good practices. **Senator CAMERON:** Could you give us those recommendations in a concise form that might be practical for implementation? **Dr Ren:** I would be happy to draw up some dot points based on some of my experience and see how some of the practice can be used in the industry. I am more than happy to do that. **Senator CAMERON:** Thanks very much.	p. 44

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April 2016

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MAJOR DUST SOURCES ON LONGWALLS

- **Outbye beltroad (and travel road):** Dusts can be generated by outbye conveyor belt systems, vehicle movements and roadway repair or maintenance work. These dust clouds can be carried by intake ventilation to inbye working places.
- **BSL crusher/transfer point:** dust pickups by incoming ventilation as the BSL sections/transfer points were not properly covered or the dust suppression systems in place (if any) were not working effectively.
- **Face AFC:** Coals falling onto the face AFC from shearer cutting or face spalling along the LW face.
- **L/W Shearer Cutting and Spalling:** A major source of dust on LW. Shearer cutting also induces coal spalling/sloughing ahead of the cutting drum which in turn can produce large amount of dust.
- **Face spalling/fracturing:** Coal spalling and fracturing of coal seam, particularly for high (thick) seams, could contribute to significant dust generation along the face as the coal falls on the moving AFC. Face spalling is linked to in-seam gas drainage, the geo-stress direction, as well as the chock support/alignment.
- **Chock movements:** Significant amount of fractured/crushed coals/roof chippings can be generated during chocking and these (dusts) will drop off during chock movements into the airflow traveling along the face, contaminating anything on its way.
- **Goaf falls and chock movements:** dusts can be brought back to longwall face during longwall goaf caving and high goaf ventilation loss from MG entering the goaf.

CONTROLS FOR DUST MITIGATION

Outbye beltroad (and travel road):

- Belt maintenance - Missing rollers, belt slippage, and worn belts can cause belt misalignment and create spillage
- Wetting of the coal product - rewetting of the coal may be necessary along the belt
- Regular wetting of the inbye travel road (at least the section close to the longwall) and the (last) open c/t linking the beltroad
- Full cone spray on top surface of non-conveying side belt followed by material to wipe belt and remove dust fines
- Belt cleaning –

    - The top and bottom of the belt should be cleaned with spring-loaded or counter-weight scrapers
    - Slightly moisten belt with low quantity sprays to complement the scrapers
    - Waters sprays in conjunction with scrapers have the potential to reduce dust level along the belt
- Rotary brush: Clean the conveying side of the belt.

BSL crusher/transfer point

- Stageloader/crusher are fully enclosed
- Imperative that seals and skirts be maintained
- Installation of sprays or spray bars (span the width) at
    - Entrance
    - Above crusher hammer
    - Discharge area
    - Belt transfer area

and cover these spray locations and other exposed BSL sections as much as possible (using durable poly plate)

- Where possible, seal any gaps of BSL (from BSL/AFC transfer point to belt Bootend) to minimise dust escaping and ventilation pickups
- Installation of BLS scrubber(s) with due consideration of airflow patterns to avoid additional flow turbulence.

Maingate entry:

- Installation of a wing or cut-out curtain between the panel-side rib and the stageloader; Considering the use of perforated ventilation wings around BSL/AFC enclosure to slightly slow down and streamline the ventilation towards the face
- Installation and maintenance of a goaf curtain to reduce ventilation leakage into the goaf. The goaf curtain should be extended towards the roof (and floor) and close to the rib
- Installation of sprays or venturi units around Maingate and AFC transfer point (crusher entrance)

LW Chock:

- Installation of canopy-mounted sprays systems on all chocks (automatically activated by the position of the shearer) with proper on/off sequencing
- Sprays to be aligned toward the face and airflow to enhance the envelope of clean air created by the shearer’s directional spray system
- Installation of extra venturi units on the first 5 MG chocks close to maingate to streamline ventilation (dust flow) towards face and with airflow

LW Shearer:

- Shearer mounted sprays oriented downwind (not against face ventilation)
- Drum mounted water spray using full cone or solid stream spray pattern
- Crescent sprays on the top and end of ranging arms and oriented towards face and with airflow
- Directional spray manifolds between the drum (on top and face side of the shearer) oriented towards face with airflow
- Installation of shearer clearer (to cover the full length of the shearer drum) on both side of the shearer drums. Spray (Venturi) directions need to be orientated slightly inwards (towards the face) and with face ventilation (not facing the drum or against the ventilation direction).
- Considering the installation of shearer dust scrubber(s) for cutting drum(s)
- Practise of Uni-di cutting and good personnel positioning while chocking

Coal spalling and AFC

- Practise tight roof control by timely advancing chocks to minimise roof falls and the fracturing of coal seam. This practice will not only improve roof control but also minimise coal spalling due to coal seam fracturing/shearing
- Installation of pan (full corn) spray bars at an interval of every 10 chocks along the Bretby handler, with due consideration of its direction (towards face with airflow), droplet size and thrust distance; These sprays should be on when the shearer is cutting (AFC is moving)

Ventilation optimisation:

Whilst sufficient ventilation is essential for dust (and gas) dilution, too much of ventilation may promote the pickup of dust, dry-up exposed (fine) coals quickly and exaggerate dust contaminations. A ventilation volume no more than 45 m^3/s is recommended subject to gas emission levels and climate control.

CRITICAL REVIEW OF CURRENT DUST MONITORING AND CONTROL PRACTICES

- A need to critically examine the practice and validity of current dust monitoring practices and regulatory limits (NSW and QLD). This may involve the procedures of dust monitoring on mine site and dust sample measurement and reporting, the obligation of mine operators in response to dust monitoring results and implementation of dust controls

- An independent monthly (if not weekly) dust monitoring program should be established and implemented to identify exposure levels during normal cutting shift, and dust loads at independent sources of dust generation on the longwall and assess the effectiveness of installed controls for the mitigation of produced dust
- Whilst a wide range of dust controls exist in the industry, the effectiveness or success of their applications varies due to different site conditions and implementation strategies. There is a need to critically examine current dust control practices in Australia and internationally with the aim of establishing the Best Practices that can be applied at individual coal mines in Australia.

RESEARCH FOR PROACTIVE DUST CONTROL METHODS

Most of the above mentioned dust control methods are passive, i.e, they are aimed to suppress already air-borne dust particles. A major contributor to the dust problems, particularly in QLD, is the use of surface in-seam (SIS) and underground in-seam (UIS) gas drainage boreholes to drain gas before mining. Whist offering benefits of reducing gas emission during mining, this process has to deplete water contents in coal seams before coal seam gas can desorb and be collected by these boreholes. As a result, coal seams that have been extensively drained are becoming drier, more fragile and water repelling when they are mined by longwall mining, producing more fine coals and dusts.

A proactive dust control method – water infusion via in-seam boreholes, should be investigated and if successful, implemented at all mines prior to longwall extraction. Extensive work has been done in this area in Europe, the US, and more recently China. Although this type of work has been conducted in Australia over 10 years ago and only limited success has been claimed, it is strongly recommended to look into this technology again and conduct a field trial using existing gas drainage boreholes (SIS) or even a few underground in-seam boreholes that can be drilled parallel to the longwall face. There is a need to conduct more fundamental study into the mechanism of water infusion into post-drainage seam factures and the use of possible agent to enhance the infusion process and extent around the borehole(s). This work should be combined with detailed assessment of all available dust control options on longwall face as well as a robust dust monitoring strategy.

There is a need to establish a dust control Task Force led by the government to jointly address the issue of coal mine dust and associated black lung disease.