FACT SHEET

New South Wales Minerals Council Ltd
Miningenuity™

APRIL 2011

Developed in conjunction with
NSW HEALTH

Mine Dust and You

People living near mine sites often ask about the effects of dust emissions in the air as a result of mining activities. This brochure has been prepared in conjunction with NSW Health to explain the type of dust that is generated from mine sites, the potential risks from mine dust to health and amenity (how pleasant a place is) and the controls the mining operator puts in place to reduce dust emissions.

What is particulate matter?

Commonly called "dust", scientists and regulators refer to the term ***particulate matter*** (or PM) to describe the range of particles that exist in the air we breathe.

PM exists naturally in the atmosphere, e.g. sea-salt spray and pollens. PM can be increased due to human activities such as vehicle exhausts, industrial processes, power stations, mining, farming and wood heaters, or smoke from bushfires.

Exposure to PM can be associated with health and amenity impacts. The likely risk of these impacts depends on a range of factors including the size, structure and composition of the PM and the general health of the person.

Sizes of particulate matter

Just as the size of sporting balls ranges from marbles to basketballs, PM can be thought of as microscopic balls of varying sizes. Instead of measuring PM in centimetres as we do with balls, scientists use micrometres (sometimes called "microns") to measure the diameter of particles. A micrometre is one-millionth of a metre and its symbol is μm.

For environmental health purposes, particles are usually described by their size:

Particle Size	
TSP	Total Suspended Particle 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 10μm in diameter and greater.
PM_{10}	Also a subset of TSP, and includes all particles smaller than 10μm in diameter (smaller than 1/7th of a hair width). Particles in the size range 2.5μm to 10μm in diameter are referred to as ***coarse particles*** ($PM_{2.5\text{-}10}$).
$PM_{2.5}$	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.

PM levels in air are measured by the weight (micrograms) of particles per cubic metre of air (µg/m3). One (µg/m3) equals one millionth of a gram in a cubic metre of air. TSP can also be measured as the weight of dust falling on a given area over time ("dust deposition").

Particulate matter from mining

The vast majority of dust from mining activities consists of PM_{10} (around 40 per cent) and particles larger than PM_{10} (around 60 per cent), generated from natural activities such as mechanical disturbance of rock and soil materials by dragline or shovel, bulldozing, blasting, and vehicles on dirt roads. PM is also generated when wind blows over bare ground and different types of stockpiles. These larger particles can have amenity impacts as well as health impacts.

$PM_{2.5}$ (i.e. fine particles) are also produced at mine sites, though they only account for about 5 per cent of the particles emitted during the mining process. Fine particles produced at mine sites are mainly from vehicle and mobile equipment exhausts.

Potential health impacts from PM

The human body's respiratory system has a number of defence mechanisms to protect against the harmful effects of PM. PM is often trapped in sticky mucus on the walls of the airways and can be removed by cilia, small hair-like objects which line the surface of the airways. This mucus can then be swallowed or coughed up.

Generally, it is thought that fine particles below 2.5μm in diameter may be of a greater health concern than larger particles as they can reach the air sacs deep in the lungs. However, coarse particles ($PM_{2.5\text{-}10}$) could also be associated with adverse health effects.

People who may be more susceptible to the health effects of fine and coarse particles are:

- Infants, children and adolescents
- Elderly
- People with respiratory conditions such as asthma, bronchitis and emphysema
- People with heart disease
- People with diabetes.

If health effects arise from exposure to coarse particles, such as from mining activities, the symptoms are likely to be:

- Cough
- Wheeze, or worsening of asthma
- Increased need for medications (e.g. puffers, antibiotics)
- Increased breathlessness
- High levels of TSP may also cause coughing, sneezing or sore eyes.

Potential amenity impacts

Amenity impacts from dust are usually associated with coarse particles and particles larger than PM_{10}. The impact of dust from a nearby mine on local amenity depends on the distance from the mine site and climatic conditions such as wind speed and direction.

Concerns about amenity from mine site dust often relate to "visibility" of dust plumes and dust sources. Visible dust is usually due to short-term episodes of high emissions, such as from blasting.

Other amenity impacts include dust depositing on fabrics (such as washing) or on house roofs, and the transport of dust from roofs to water tanks during rain. Much of this dust derives from sedimentary rocks other than coal which are disturbed during coal mining (i.e. "overburden"). However, a small proportion is actually coal dust. Whilst research has shown negligible amounts of trace elements in coal dust are released into rainwater, and all trace elements measured are below the Australian Drinking Water Guidelines (ADWG), NSW Health's Rainwater Tanks brochure provides advice on how to maintain water tanks for safe drinking. Strategies to reduce dust in water tanks include first flush devices and desludging. The brochure can be obtained from NSW Health website www.health.nsw.gov.au/public-health/ehb/water/rainwater.html or contact your local public health unit.

Government regulations

In New South Wales, outdoor air quality is governed by both State and Commonwealth regulations. National Environmental Protection Measures (NEPMs) provide air quality standards that are applied in cities and large towns across Australia. NEPM standards apply to average concentrations across a region.

The NSW Department of Environment, Climate Change and Water (DECCW) also has regulatory criteria for assessing ambient air quality. Although mostly consistent with the relevant NEPM, these criteria are more comprehensive. For example, whilst the NEPM for 24-hour air quality allows 5 exceedences per year (to account for bushfires/dust storms and other extreme events), the DECCW impact assessment criterion does not allow for any exceedences DECCW's impact assessment criteria are used to assess PM in localised areas, close to the mine itself.

The standards imposed by the regulatory authorities take into account what we know about health effects on people with asthma, lung conditions, and heart disease. PM standards and criteria are set to control short term (daily) and long term (average) levels. The table below summarises the relevant air quality standards and criteria for mines.

Recent development consents and project approvals for mines in NSW use the DECCW criteria as standards applicable to operating mines. Consents and project approvals also provide that where certain standards are not being met at residences within the mine's acquisition or management zones, then the property owners are entitled to have their property acquired by the mine at a price established in accordance with certain standard provisions contained within the particular consent or approval . Residents requiring information about these provisions should first examine the consents or project approvals for the mine nearest to them, and then call and discuss these matters with the mine's community relations staff.

All recent development consents and project approvals also require mines to closely monitor and report their PM emissions. The most recent approvals require both predictive and real time monitoring and management to reduce emissions.

How are dust emissions from mine sites minimised?

Primary dust control at mine sites is achieved by a combination of water sprays (such as stockpile sprays and road watering) and enclosures (such as covered conveyors). A further key control is keeping the area of disturbed land to a minimum, through progressive mine rehabilitation. This helps reduce dust from wind erosion. Locating mines some distance from surrounding neighbours, the design of mine layouts and choice of equipment and work practices can also reduce potential dust impacts on both health and amenity.

Dust modelling and prediction is an important part of minimising dust and determining appropriate dust controls and management programs. Many sites use weather stations and real-time dust monitors located between the mine and nearby neighbours to match dust events to activities on the mine site. This information can then be used to adjust mining activities to minimise dust. For example, changing the location of dumping operations or modifying a blasting program based on favourable weather conditions.

How can you avoid mine dust?

Provided that mines are operated with proper dust controls, it is unlikely that healthy adult residents would suffer any serious health effects from the expected exposure to particulate matter.

If you notice that dust levels are high, try to keep your windows and doors closed. People who have asthma or lung conditions should avoid outdoor activities at these times. An air-conditioner can reduce PM levels inside, but it is more important to regularly clean the intake filter.

Residents finding dust levels a nuisance or a health risk should contact the relevant mine through the community complaints line or by phoning the community relations staff; or raising the issue through the mine's Community Consultative Committee.

Residents experiencing the symptoms outlined in this brochure should see their local doctor. For further information about potential health effects from PM see www.health.nsw.gov.au/publichealth/environment/air/air_pollution.asp

Residents may also wish to contact the NSW DECCW Environment Line on 131 555 for information on air quality and environmental issues.

Table 1 Air Quality Standards and Criteria for Particulate Matter

Pollutant	**Averaging Period**	**Concentration Standard**	
		$\mu g/m^3$	**Agency**
TSP	Annual	90	NSW DECCW Impact Assessment Criterion
PM_{10}			NSW DECCW Impact Assessment Criterion
	1 day (24 hr)	50	NEPM air quality standard (allows exceedence 5 times /year)
	Annual	30	NSW DECCW
$PM_{2.5}$	1 day (24 hr)	25	NEPM advisory standard
	Annual	8	NEPM advisory standard
Dust deposition	Annual (total)	4 grams/m^2/month	NSW DECCW
	Annual (increase)	2 grams/m^2/month	NSW DECCW