

Mine dust and you

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What is this fact sheet?

People living near mine sites often ask about the effects of dust emissions in the air as a result of mining activities. This fact sheet has been prepared to explain the type of dust that is generated from mine sites and the potential risks from mine dust to health.

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 exists in the air we breathe.

PM exists naturally in the atmosphere, eg sea-salt spray and pollens. PM can be increased due to human activities such as vehicle exhaust, 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 balls we can see 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	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" PM10	A subset of TSP, and refers to all particles of size 10 μm in diameter and greater.

PM10	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 PM10 and TSP categories and refers to all particles less than 2.5µm in diameter. PM2.5 is referred to as fine particles and is mainly produced from combustion processes such as vehicle exhaust.

Particles levels in air are measured by the weight (micrograms) of particles per cubic metre of air ($\mu\text{g}/\text{m}^3$). One ($\mu\text{g}/\text{m}^3$) 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 coarse particles (around 40 per cent) and particles larger than PM10, generated from natural activities such mechanical disturbance of rock and soil materials by dragline or shovel, bulldozing, blasting, and vehicles on dirt roads. Particles are 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.

Fine particles from vehicle exhausts and mobile equipment 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.

PM exposure can lead to a variety of health effects. For example, numerous studies link particle levels to increased hospital admissions and emergency room visits and even to death from heart or lung diseases. Both long (over years) and short term (hours or days) particle exposure have been linked to health problems.

Generally, it is thought that fine particles below 2.5 µm 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 2.5-10) 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.

Some recent research suggests that heart problems, such as angina and heart attacks may also be associated with coarse particle pollution.

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 PM10. 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.

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. 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.

Government regulations

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

The NSW Environment Protection Authority (NSW EPA) also has regulatory criteria for assessing ambient air quality. Although consistent with the Air NEPM, these criteria are more comprehensive. NSW EPA 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 (daily) and long term (average) levels. The table below summarises the relevant air quality standards and criteria for mines.

Table 1 - Air Quality Standards and Criteria for Particulate Matter

Pollutant and averaging period	Concentration Standard ($\mu\text{g}/\text{m}^3$)	Agency

TSP - 1 year	90	NSW EPA Criterion
PM10 - 1 day	50	NSW EPA Criterion and NEPM Standard
PM10 - 1 year	25	NSW EPA Criterion and NEPM Standard
PM2.5 - 1 day	25	NSW EPA Criterion and NEPM Standard
PM2.5 - 1 year	8	NSW EPA Criterion and NEPM Standard
Dust deposition - 1 year	4 grams/m ² /month (maximum total)	NSW EPA Criterion
Dust deposition - 1 year	2 grams/m ² /month (maximum increase)	NSW EPA Criterion

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 important to regularly clean the intake filter.

Residents experiencing the health symptoms outlined in this fact sheet should see their local doctor. For further information about potential health effects from PM see the related [link](#) on Air Pollution.

Related links

- [Air Pollution](#)
- [Air quality](#)
- [Air quality index fact sheet](#)
- [Bushfire smoke fact sheet](#)
- [Dust storms fact sheet](#)
- [Rainwater tanks brochure](#)

In NSW you can call 1300 066 055 to talk to your NSW Public Health Unit

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