Particles in the Lower Hunter

Air quality in the Lower Hunter is good by world standards but airborne particle levels can exceed national standards at times.

Higher particle levels measured near the Port of Newcastle have also raised community concerns.

There are health benefits to improving air quality. Reducing long-term exposure of communities to small particles can deliver health benefits.

Health effects

Small particles PM$_{2.5}$ and PM$_{2.5-10}$ cause the most concern for human health. They are invisible to the naked eye and can be inhaled into the lungs.

The elderly, children and people with existing heart and lung problems are most at risk.

Findings of the Lower Hunter Particle Characterisation Study

Major sources of PM$_{2.5}$ and PM$_{2.5-10}$ particle pollution were identified.

Findings of the Lower Hunter Dust Deposition Study

Large dust particles (greater than 10 micrometres) fall out of the air close to their sources and settle on surfaces like window sills.

Dust makes homes look dirty but is less of a health concern than small particles.

Amenity effects

Large dust particles that settle on surfaces
The nine source factors contributing to PM$_{2.5}$ particles in the Lower Hunter

Primary particles

Fresh sea salt
Particles blown from breaking ocean waves.

Wood smoke
Particles from residential wood heating with some contribution from vegetation fires.

Soil
Soil dust emitted as primary particles; some carbon in the soil dust at Mayfield and Stockton possibly due to coal particles or soot.

Vehicles
From on-road and non-road sources (including locomotives).

Nitrate
Primary ammonium nitrate at Stockton (industry).

Secondary particles

Pollutant-aged sea salt
Sea salt that has reacted chemically in the air with pollution from other sources such as industry and vehicles.

Secondary ammonium sulfate
Secondary particles from sources of sulfur dioxide (fossil fuel burning) and ammonia (agriculture, industry, vehicles, non-road equipment, soils, the ocean).

Nitrate
Secondary sodium nitrate at Mayfield, Newcastle and Beresfield from nitrogen oxide sources (vehicles, non-road equipment, industry).

Primary and secondary particles

Mixed shipping and industry
Primary and secondary particles from shipping and industry.

Mixed industry and vehicle
Primary and secondary particles from industry, vehicles and non-road sources.

The six key factors contributing to PM$_{2.5-10}$ particles in the Lower Hunter

Primary particles

Fresh sea salt
Primary particles blown from breaking ocean waves.

Light-absorbing carbon (with some sea salt)
Coal particles may contribute to this source.

Soil
Comprises soil dust emitted as primary particles.

Industry
Related to industrial emissions.

Bioaerosol
Fungal spores and pollens combined with industrial emissions and sea salt.

Secondary particles

Pollutant-aged sea salt
Sea salt that has reacted chemically in the air with pollution from other sources, e.g. industry, vehicles.

Most PM$_{2.5-10}$ particles were primary particles, but there is evidence of chemical reactions in the pollutant-aged sea salt factor.