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## Dust Impacts

### Ecology and agriculture

There are few detailed studies of the effects of dust **deposition** on ecology and agriculture. The effect that dust will have is determined by a number of variables, including:

- the concentration of dust particles in the ambient air and its associated **deposition** rates. Characteristics of the vegetation and leaf surface can influence the rates of dust deposition on vegetation, such as surface roughness and wetness;
- meteorological and local microclimate conditions and degree of penetration of dust into vegetation;
- size distribution of dust particles;
- dust chemistry - ranging from highly alkaline dusts e.g. from limestone quarries, to **inert dusts**, and acidic dusts, such as dusts from coal workings.

Dust may have physical effects on plants such as blockage and damage to stomata, shading, abrasion of leaf surface or cuticle, and cumulative effects e.g. drought stress on already stressed species. The chemical effects of dust, either directly on the plant surface or on the soil, are likely to be more important than any physical effects. Dust deposited on the ground may produce changes in soil chemistry, which may in the longer-term result in changes in plant chemistry, species competition and community structure.

Many substances, such as chalk and limestone have traditionally been used in agriculture to increase crop sensitivity. Dust **deposition** levels are likely to be well below the level of agricultural applications, and therefore effects on agricultural crops are likely to be minimal. Areas of high ecological value or agricultural resources may be more sensitive to dusts than other areas. Examples of sensitive areas include designated nature conservation areas containing sensitive species, intensive horticultural areas, and fruit growing areas.

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### Nuisance effects

Nuisance dust is the larger size fraction that is visible in the atmosphere. Dust effects on people have been identified as arising from increases in airborne dust concentrations, and **deposition** levels. Dust depositions on windows, on the outside of the house, and on cars are the most frequently mentioned reasons for concern. Table 3 lists the factors that can determine whether surface soiling by dust is considered a nuisance.

#### SITE DUST

#### TABLE 3

*Surface soiling by dust as a nuisance.*

**Deposition** on a surface which is usually expected to remain free from dust

The colour contrast between the deposited dust and the surface upon which it settles

The nature of the illumination of the surface - "dinginess"

The presence of a nearby clean 'reference' surface against which comparison may be made

The rate of change in the visual properties of a surface

The identity of the area and the composition of the local community

social factors, such as lifestyle and patterns of working

the personal experiences and expectations of the observer

adverse publicity influencing the expectations of the observer

The rate of **deposition** and therefore the time taken for dust deposition to become visible are important influences on the perception of dust. The rates of deposition vary widely with **emissions**, variations in wind speed and direction and also variations in the **background dust** concentration. These background levels will determine the reaction of local people to any additional dust from specific mineral sources, together with the following three factors:

- **the frequency of dust deposition incidents.** A community may be prepared to tolerate an incident once a month, but not repeated incidents at frequencies of one or two a week;
- **the amount of deposited dust.** The amount of dust will usually decrease with distance, so the proximity to the source will be a major factor in the determining the level of complaint.
- **the area affected by deposition.** If the **emissions** increase then there is the possibility of a larger area being affected. This will increase the probability of complaint unless the dust is diluted to a point below which people are concerned.

One of the problems is how to quantitatively measure the rate and severity of soiling. A number of methods are described later which will avoid dependence on subjective descriptions and complaints.

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### Health Effects

Particulate air pollution is associated with a range of effects on health (from particles less than 10 $\mu$ m in diameter, known as **PM<sub>10</sub>**) including effects on the respiratory and cardiovascular systems, asthma and mortality. Detailed studies have been and continue to be made on the actual level of impact on health. Work published in 1999 by the University of Newcastle Department of Epidemiology and Public Health, investigating the impact of particulate matter from opencast workings on public health, found:

- opencast coal mining was associated with a small increase in the mean concentration of airborne particles measured as **PM<sub>10</sub>** in areas close to opencast sites. This was due to an increased concentration of shale rather than soot;
- the respiratory health of children living in communities close to opencast sites was very similar to that of children living in communities distant from such sites;
- increase in particulate concentration close to the opencast sites was mainly due to earth moving and excavation.

It is not thought that there are any substantiated claims that health has been affected around working quarries.

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