



THE SCOTTISH OFFICE
Development Department

Planning Advice Note

PAN 50 ANNEX B

CONTROLLING THE ENVIRONMENTAL EFFECTS OF SURFACE MINERAL WORKINGS

Annex B: The Control of Dust at Surface Mineral Workings

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planning series:

- **National Planning Policy Guidelines (NPPGs)** provide statements of Government policy on nationally important land use and other planning matters, supported where appropriate by a locational framework.
- **Circulars**, which also provide statements of Government policy, contain guidance on policy implementation through legislative or procedural change.
- **Planning Advice Notes (PANs)** provide advice on good practice and other relevant information.

Statements of Government policy contained in NPPGs and Circulars may, so far as relevant, be material considerations to be taken into account in development plan preparation and development control.

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introduction

1. This Annex to PAN 50 *Controlling the Environmental Effects of Surface Mineral Workings* provides advice on how the planning system can be used to keep dust emissions from surface mineral workings within environmentally acceptable limits without imposing unreasonable burdens on minerals operators. It is mainly based on Government commissioned research by Arup Environmental/Ove Arup and Partners *The Environmental Effects of Dust from Surface Mineral Workings*. This research specifically excluded the health effects of dust generated by surface mineral workings. While this Annex does refer to recent Government air quality advice and guidance, it does not address the specific issue of the health implications of mineral developments in general, and opencast coal mining in particular, which may be the subject of further advice in due course following current Government research.
2. General advice on dust is given in pages 18 and 19 of PAN 50. In addition, PAN 51 *Planning and Environmental Protection* gives advice on the role of the planning system in controlling pollution and its relationship to a number of environmental protection regimes. The Government has recently issued advice on Air Quality and Land Use Planning as part of a series of guidance notes to local authorities on the requirements for carrying out their functions under Part IV of the Environment Act 1995 on Local Air Quality Management.
3. Dust is a major environmental concern associated with mineral sites. Residents living in proximity to mineral sites can potentially be affected by site dust up to 1km from the source, although continual or severe concerns about dust sources are most likely to be experienced near to dust sources, generally within 100 metres. The Government recognises that dust from mineral workings can have a significant impact on the environment and the quality of life of communities. It is concerned to ensure that, in the interests of employees in the industry and the population at large, dust levels are kept to the minimum practicable level consistent with sound working practices.
4. In relation to opencast mining, the Committee on Medical Effects of Air Pollutants (COMEAP) has concluded that no convincing evidence exists to support the suggestion that air pollution from opencast mining may have a detrimental effect upon the health of those living nearby. However, the Government, in response to concerns, has commissioned research into the possible health effects of open cast mining.
5. Pending the issue of further advice on the health effects of dust, planning departments in collaboration with pollution control authorities should consider the implications arising in the circumstances of the particular developments proposed. The UK Expert Panel on Air Quality Standards (EPAQS) recommended in November 1995 an air quality standard for fine particles (PM₁₀, those of diameter 10µm (micrometres)) of 50 micrograms per cubic metre which is measured over a 24 hour mining average period. They also recommended a progressive reduction in average annual concentrations of PM₁₀ particles. The EPAQS standard for PM₁₀ particles was adopted in the Air Quality Regulations 1997. The regulations bring into force health based objectives, to be met by 2005, for seven key pollutants which were identified under the UK National Air Quality Strategy. The Strategy is under review and consideration is being given to whether an objective should be included for PM_{2.5}.
6. It is open to local authorities to serve an abatement notice where a statutory nuisance exists. (See PAN 51 *Planning and Environmental Pollution*.) However it is clearly preferable to plan mineral operations which are environmentally acceptable from the outset rather than to rely on

retrospective action. Discussions between planning authorities, the mineral operator, the environmental protection bodies and local communities likely to be affected will be important when authorities are assessing planning applications. Such liaison is encouraged as good practice.

7. The reasonable use of planning controls by planning authorities, in particular the use of conditions attached to planning permissions, is an important tool for the control of dust at mineral sites. However, the Government also looks to the minerals industry to be a "good neighbour" and to keep dust emissions down to levels which are acceptable to the local community through good environmental practice.

8. The Government wishes to encourage co-operation between operators and planning authorities so that sensible regimes can be agreed for individual sites based on an established methodology. The controls outlined in this Annex should be used where they are necessary and relevant to the individual circumstances under consideration.

9. This Annex

- **provides background information on dust,**
- **recommends the use of a dust assessment study for new and extended mineral workings and provides guidance on the key stages,**
- **explains methods for controlling and mitigating dust from mineral sites,**
- **provides advice on planning and environmental controls, and**
- **discusses conditions and enforcement.**

background

10. Dusts are normally present in the atmosphere, at varying levels of concentration. They have a variety of man-made and natural origins including:

- sea salt from oceanic weathering;
- products of combustion from e.g. fires, power stations and motor vehicles;
- matter resulting from volcanic action or other geothermal activities;
- natural weathering of minerals;
- mechanical handling of minerals and allied materials;
- industrial activities.

11. Dust is the generic term which BS 6069 (Part Two) uses to describe as particulate matter in the size range 1-75 μm in diameter and is produced through the action of crushing and abrasive forces on materials. Dust may be generated at mineral sites during a range of site preparation, excavation, transportation and minerals processing operations. Depending upon their chemical composition, the particles can be chemically active e.g. limestone, or effectively inert, e.g. sand. Their colour varies from black e.g. coal, through brown to white e.g. cement or sand.

12. The potential for the generation of dust at surface mineral sites is largely related to the hardness of the minerals being handled, the extent and degree of handling necessary, and the size of the mineral products being produced. Soft friable materials break easily producing a greater number of dust particles for a given degree of handling. In contrast hard materials require more energy to break into smaller pieces and are less likely to form dust. However, intensive processing

of hard minerals will be required to break them down and this has the potential to produce significant quantities of dust.

13. The process by which dust becomes airborne is referred to as 'dust emission'. In general terms emission may be seen to occur through 2 related but distinct processes namely:

- saltation (or jumping) of particles across a surface;
- suspension of particles and their entrainment in airflow.

A significant cause of dust emission at mineral workings is wind blow. Wind has the potential to lift dust from surfaces, depending on the speed of the wind, the condition of the surface and the size of the dust particles.

14. In addition to dust caused directly by the extraction process, dust emissions from surface mineral workings can also be caused by:

- haulage, where the weight of vehicles, their speed of passage and number of wheels in contact with the ground can produce dust;
- mechanical handling of operations, including crushing and grading processes where in general the more powerful the machinery and the greater the volumes of material handled the greater the potential for dust emission;
- blasting;
- surface stripping and the handling and storage of overburden.

15. Large dust particles (greater than 30µm) make up the greatest proportion of dust emitted from mineral workings and will largely deposit within 100m of sources. Intermediate sized particles (10-30 µm) are likely to travel up to 250-500m. Smaller particles (less than 10 µm) which make up a small proportion of dust emitted from most workings can travel up to 1km from sources.

Dust sources and impacts

16. Dust emission, dispersion patterns and impacts are difficult to predict due to the wide range of activities that give rise to dust within mineral workings and the uncertain influence of local meteorology and topography. Computer modelling techniques can provide crude predictions of likely dispersion patterns, and various dust monitoring techniques can provide an understanding of levels of dust deposited in and around a site.

17. The amount of dust generated and emitted from a surface mineral working and the impact on the surrounding area varies with respect to 4 main factors:

- the type of mineral and working method;
- climate! local meteorology and topography;
- the types of processing activities undertaken on a site;
- the character and land use of the area surrounding the site.

Mineral type

18. There are a number of factors that account for the variation in potential dust impacts between different mineral types. These are:

- the scale of operations: generally the more extensive the scale of operations, such as those associated with opencast coal sites, the more likely that dust will be a concern,
- the nature of the mineral: softer minerals, such as coal, crumble more easily during handling producing a greater number of dust particles,
- the colour and opacity of the mineral: high contrast dust from minerals, such as coal or limestone are generally more likely to be noticed on deposition,
- the length of operation: a potential dust problem may be more acceptable if it is known that operations will soon cease or move to another part of the site,
- the type of activities undertaken within a site and the location and duration of those activities.

Climate and topography

19. The potential for any site to emit dust is greatly influenced by weather. Rainfall decreases dust emissions, due to both surface wetting and increasing the rate at which airborne dust is removed from air. In contrast, strong drying winds increase the rate at which dust is lifted from an untreated surface and emitted into the air and also has the effect of spreading dust over a larger area.

20. The topography of a site and surrounding areas can have strong effects on localised wind patterns. The effect is most pronounced in or near to valleys or hills which can channel and direct winds. In addition the presence of surface features, such as woodland, and buildings or structures can influence dust deposition patterns.

21. Open, exposed sites lacking shelter and surface features are likely to be more susceptible to dust blow. At the same time, wind speeds increase with height and hence large mounds which project well above ground level can be the subject of significant wind erosion. In contrast, activities within a quarry or void will be sheltered to some extent from external winds, thereby restricting the potential for dust to disperse beyond the site. The placing of dust generating activities within worked out areas of the site can therefore significantly reduce potential dust impacts off site.

Type of processing activity

22. Table 1 summarises the dust potential of different activities.

Table 1: SUMMARY OF THE POTENTIAL FOR DUST EMISSION FROM TYPICAL ACTIVITIES WITHIN MINERAL WORKINGS (After Arup Environmental 1995)

Activity	Relevance for Mineral Types	Duration of Activity	Potential for Dust Emission
Soil handling	Most minerals	Relatively short	Significant potential, but depends on dryness and silt or clay content of the material and transportation to mounds on the edge of site
Overburden handling	Most minerals, but quantities vary considerably	Varies, can be intermittent over life of site	Significant potential, particularly during the unloading and haulage stages
Drilling and blasting	Usually for hard rocks and limestone	Short, but can take place frequently	Without mitigation, drill rigs have significant potential. Properly designed and controlled blasts have limited potential
Other extraction and handling activities	Most minerals	Varies considerably but usually relatively long	Varies considerably depending on the equipment used.
Initial loading activities	All mineral types	Ongoing during extraction	Can be significant but varies considerably depending on the nature of the material, whether it is wet or dry, volumes handled and equipment used
Crushing and grading	All minerals may not always take place at the place of extraction	Varies, generally ongoing	Varies depending on type of equipment and exposure to wind. Largely controlled through the Environmental Protection Act (1990)
Storage of minerals within site	Most mineral types	Usually ongoing during extraction	Varies depending on the volume of stored material, nature of material, whether it is wet or dry and exposure to wind
Transport within site	All mineral types	Usually ongoing	Can be significant but varies depending on type of transport. If road transport then the size of vehicle and nature of roads (surfaced or unmade) are important factors
Transport off-site	All mineral types	Usually ongoing	Mainly by road but varies. Not generally significant
Soil / overburden reinstatement	Most minerals	Usually relatively short	Significant potential but depends on the state of the material and transportation from edges of the site

Site location

23. The geology of Scotland determines the location of surface mineral resources. In areas where mineral workings are close to centres of population, their environmental performance must be such that they are viewed as acceptable neighbours for the period of the operation of the site. The relationship of the activities undertaken within mineral workings to surrounding land uses will vary from site to site. Not only will the nature and composition of land uses vary but the sensitivity to dust and perceptions of whether the effects of dust constitute a nuisance will differ. Table 2 broadly categorises those uses which are more likely to be sensitive to dust.

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and clinics Retirement homes Hi-tech industries Painting and furnishing Food Processing	Schools Residential areas Food retailers Greenhouses and nurseries Horticultural land Offices	Farms Light and heavy industry Outdoor storage

Dust Standards and Monitoring

24. The definition of standards for dust is a particularly complex issue, not least because dust can give rise to various nuisance and other impacts. In contrast to the environmental impacts of noise for which noise standards have been identified as the basis of control, there are no agreed standards or guidelines for the nuisance impacts of mineral dusts in the UK. There are a variety of dust guidelines in use for specific monitoring devices and sites, but these incorporate a wide range of values and little consensus has emerged in the levels used.

25. Of the dust guidelines that have been used in the UK, some have been drawn from other countries where various dust deposition and air quality standards have been defined. Guidelines have also been defined specifically in association with monitoring techniques and methods, and are subject to numerous qualifications. As pointed out at paragraph 5, the UK Expert Panel on Air Quality Standards (EPAQS) recommended a standard for fine dust particles (PM₁₀), which was adopted as an air quality objective in the UK National Air Quality Strategy. While there are no statutory standards or mandatory guidelines relating specifically to thresholds for inert mineral dust, the Air Quality Regulations 1997 set a statutory objective for PM₁₀. Technical guidance on carrying out a review and assessment of air quality is to be issued as part of the package of guidance notes to local authorities on their duties under Part IV of the Environment Act 1995.

26. Until more information and UK monitoring data specific to mineral sites and nuisance effects is available, it is recommended that care is taken in the use of guidelines. The emphasis in the regulation and control of dust should be the adoption and promotion of best practices on site. It is also recommended that a comprehensive monitoring programme is established as an essential step in seeking to understand more fully the relationship between dust deposition levels and the perception of dust nuisance.

27. Accordingly, dust guidelines should be developed alongside dust monitoring techniques particularly for indicators of dust soiling and relate to a specific site and to those activities that take place within the site. The development of site specific guidelines requires extensive dust monitoring information to justify their selection, taking into account the localised environmental conditions relating to a site, i.e. the background levels of dust. They also need to be flexible enough to reflect the wide variations in the patterns of dust deposition.

28. In the absence at present of statutory UK or European Community (EC) standards for the control of nuisance dust, guideline values in the range 200 - 350 mg/m²/day have been variously used for mineral sites. It should be noted that the nature of deposit can influence strongly the perception of nuisance. For example, black coal dust which has a high contrast with its background may cause complaints if deposited at a rate in excess of only 80 mg/m²/day.

29. The measurement of effective area cover (EAC) as an indication of dust surface soiling, and hence nuisance, is often used. This measure assesses soiling rates in place of gravimetric methods which measure the mass of dust deposited onto a surface area per unit area, e.g. by BS 1747 (Part 1). Results express soiling in terms of change in % EAC with time. Research indicates that a soiling rate of 0.2% EAC/day is noticeable, whilst 0.5% EAC/day may be considered the maximum judged to be generally acceptable, although colour and type of dust may influence what is considered tolerable.

dust assessment

30. Developers should undertake a dust assessment study for all new and extended mineral workings. The extent and depth of assessment will be influenced by the type and scale of working and proximity of sensitive land uses in surrounding areas. Figure 1 provides guidance on the key stages for a dust assessment study.

31. Dust assessments can be qualitative or quantitative. Quantitative assessments involve computer modelling or detailed predictions of anticipated deposition rates.

32. A dust assessment study is best undertaken by a competent person/organisation with acknowledged experience of undertaking this type of work. It should identify the operations or processes likely to cause dust, taking into account local climate and topography and make recommendations for mitigation measures. This will assist the operator and the local authority in effectively controlling dust from a site.

Figure 1 Key stages of a dust assessment study

Stage i Establish existing baseline conditions

- Existing ambient conditions should *be identified on a time scale sufficient to identify seasonal variations in the range of existing conditions which already exist ideally by a dust monitoring programme* it should take into account the principal existing dust sources (other than the site) such as air pollution from urban and industrial areas, existing mineral operations agricultural activities and construction activities.
- The location of residential areas schools and other dust-sensitive land uses should be identified in relation to the site and site based dust sources.
- The assessment should explain how topography may affect emission and dispersal of site dust particularly the influence of areas of woodland downwind or adjacent to the site boundary and valley or hill formations in altering wind patterns.
- The assessment should explain how climate is likely to influence patterns of dispersal by analysing data from the UK Meteorological Office or other recognised agencies on wind conditions local rainfall or ground moisture conditions.

Stage ii Identify site activities that could lead to dust emission

- Potential dust sources should be identified and their potential to emit dust assessed with respect to the duration of the activity or the potential of dust to become airborne.

Stage iii Identify site parameters which may increase potential impacts from dust

- This brings together information collected in stages i) and ii) with information on sensitive land uses around the site in order to understand how these uses could be affected by dust Computer modelling techniques can be used to understand how dust could disperse from a site Alternatively a more qualitative approach, relying on technical expertise can be used to bring together the data collected in stages i) and ii).

Stage iv Recommend mitigation measures and site design modifications

- Measures to control dust should be specified and described in terms of their potential to reduce dust and consequent impacts.

methods of reducing and controlling dust

33. Methods for controlling and mitigating dust from mineral sites, within the framework of 'good practice', are summarised below in terms of site layout and methods of working. A summary of good practice is contained in the Appendix.

Site layout

34. Sufficient time needs to be devoted to site design, including phasing, so that careful consideration is given to the relationship of activities within the site to sensitive areas outside the site. So far as possible, dust generating activities should be located away from dust sensitive land uses and facilities (summarised in Table 2), and incorporated within the site design. Ideally, the results from a dust assessment study can be used to define minimum 'stand off distances'.

35. The incorporation of stand-off distances does not replace the need to consider best practices for controlling dust within a site. Although the potential for severe dust impacts is greatest within 100m of dust generating activities, there is still the potential for dust in some circumstances to affect receptors up to 1km away.

36. Other factors that should be taken into account in the layout of a site to reduce dust impacts are:

- placing dust generating activities in areas where maximum protection can be obtained from topography, woodland or other features;
- locating dust generating activities in areas where prevailing winds will blow dust away from sensitive areas/ uses;
- minimising the need to transport and handle materials by placing adequately sized storage facilities close to processing areas.

Method of working

37. The location of certain dust generating activities will move around a site during different phases of working and therefore their relationship with dust sensitive land uses around the site will change. It is important that the minimisation of dust through site design is addressed at each phase of the operation. The relocation of some activities during different phases of operation within the site should be discouraged, where there is the potential to increase dust levels.

38. Some activities should ideally be undertaken during favourable weather conditions. Where possible dry and windy days should be avoided. This should be specified for activities such as:

- soil stripping and reinstatement operations (although, as explained below, it can be desirable for other reasons for these to be undertaken during dry conditions);
- overburden handling near to dust sensitive land uses/properties/receptors.

Such specifications should also take account of other factors, such as the need to avoid moving top and sub-soils during wet weather to protect soil structure.

39. The potential for different activities to generate dust during the life of a mineral working needs to be carefully considered. The key methods of reduction and control are summarised in Table 3.

TABLE 3 KEY METHODS OF REDUCING AND CONTROLLING DUST (After Arup Environmental 1995)

Soil handling and storage	<ul style="list-style-type: none">-Restrict the duration of the activity. Seal and seed storage mound surfaces as soon as is practicable.-Protect surfaces from winds until disturbed areas are sealed and stable.
Overburden handling and storage	<ul style="list-style-type: none">-Protect exposed material from wind (by keeping material within voids or protecting them by topographical features).-Spray exposed surfaces of mounds regularly to maintain surface moisture.-Minimise handling.
Drilling and blasting	<ul style="list-style-type: none">-Use dust extraction equipment, such as filters, on exhaust air emissions from drill rigs.-Remove the dusty material collected from the area of blast prior to detonation.
Loading/Unloading activities	<ul style="list-style-type: none">-Reduce drop heights wherever practicable.-Protect activities from wind.
Minerals processing	<ul style="list-style-type: none">-Varies depending on types of equipment used but generally complete enclosure is best with use of air extraction and filter equipment as appropriate.-Use water sprays.
Material storage	<ul style="list-style-type: none">-Dampen material.-Protect from wind and store under cover.-Screen material to remove dusty fractions prior to external storage.
Transport by conveyor within site	<ul style="list-style-type: none">-Protect by use of wind and roof boards.-Shelter transfer points from wind.-Use scrapers to clean belts, with collection of scrapings for disposal.-Minimise drop heights and protect from wind.-Use water sprays.
Transport by vehicle within and off-site	<ul style="list-style-type: none">-Restrict vehicle speed.-Water unsurfaced roads.-Wheel or body wash at an appropriate distance from site entrance. This should usually be inside the site entrance.-Load and unload in areas protected from wind.-Minimise drop heights.-Sheet or cover loaded vehicles.-Use water sprays/spray curtains to moisten material.-Sweep paved roads

site management and monitoring

40. Effective and environmentally sensitive management practices on site are critical for the control of dust. In order to achieve this, the development and implementation of an appropriate site management system or formal Environmental Management System (EMS) is recommended for mineral sites where dust is an issue.

41. EMS or another site management system:

- would demonstrate the willingness of an operator to comply with environmental objectives and would also provide regulators with a mechanism to check the performance of any environmental measures taken,
- should also allow the operator more flexibility in dealing with the environmental impacts of sites,
- provides a mechanism for auditing (and possibly independent auditing) of site operations.

Any EMS should be formally agreed between the operator and regulator before work commences on site.

42. The key features of an EMS with respect to the control of dust are:

- the specification of a site (or organisation) policy on dust and environmental matters;
- the identification of site management responsibilities for dust and environmental issues;
- the development of documented systems for managing site practices and implementing management controls;
- the development of means by which the performance of the site management system can be measured and monitored.

43. Under the EMS the following may be specified, as appropriate, according to the management system developed:

- the specification of working practices and controls;
- the specification of measures that will be taken if problems occur;
- a schedule of maintenance and servicing of equipment.

44. An EMS generally incorporates a periodic review to keep it up to date. For the operator a review allows the system to be improved and upgraded and offers an opportunity for the environmental performance of the site to be reviewed by the regulator or by independent assessors.

45. Detailed, and long term, dust monitoring is required to fully describe background levels and site dust deposition patterns. Patterns of dust deposition, or of airborne dust, are extremely variable. In particular, dust patterns are often characterised by few or occasional dusting events comprising high levels of dust deposition largely caused by particular, and possibly infrequent, combinations of wind and rainfall conditions. At other times dust deposition from the mineral site itself may be low or insignificant, but a property/receptor is still likely to be subject to background and other dust sources.

46. Due to the complex nature of dust (with variations in particle size, density, physical composition and shape), dust can be measured in a number of ways. There are a wide range of monitoring techniques and methods in use, of which the main types are:

- **measurement of airborne dust concentrations**, by using gauges which sample air volumes or by using light scattering devices that measure the attenuation of light;
- **measurement of dust deposition** using passive dust fall gauges or by examining the progressive soiling by dust;
- **measurement of dust flux**, that is the movement of dust in air, in a given direction, by means of directional gauges; and
- **visual monitoring.**

The aims and purpose of dust monitoring need to be clear if it is to be effective. Consideration needs to be given to the location and number of monitoring stations, the duration and frequency of monitoring and the choice of monitoring gauge (noting that there are various logistical problems associated with different gauges).

planning and other environmental controls

47. There are 3 main areas of control, in respect of mineral dusts from surface mineral workings that give rise to soiling and nuisance impacts:

- planning mechanisms administered by the planning authority encompassing the formulation of policy; the imposition of planning conditions attached to planning permissions and the requirement for supporting evidence as part of Environmental Assessment procedures;
- Integrated Pollution Control (IPC) and Local Authority Air Pollution Control (LAAPC) for mineral related activities that are prescribed under the Environmental Protection Act 1990; and the Air Quality Regulations 1997;
- recourse to both Public and Statutory Nuisance law when seeking the abatement of dust nuisance.

Formulation of plans and policies

48. Plans and policies should contain guidance on those considerations related to dust emissions and control that will be taken into account in assessing planning applications. In addition, other mineral policies likely to be relevant to the control of dust include: separation distances; landscaping and screening; and site boundaries. The supporting text to these policies should explain their relevance to the control of dust.

Environmental assessments and information in support of a planning application

49. EC Directive 85/337/EEC and The Environmental Assessment (Scotland) Regulations 1988 are discussed in paragraphs 7-11 of PAN 50. In March 1997, The EC Council of Ministers adopted a new Environmental Assessment Directive (97/11/EC), to be implemented by 14 March 1999 which amends the original Directive and will bring some larger mineral working under Schedule 1.

50. The planning authority can obtain information on the likely dust effects from proposed mineral working by requiring an applicant to undertake an Environmental Assessment (EA), or by requesting additional information in support of an application. A dust assessment study could be part of a formal EA or undertaken independently.

51. The requirement for an EA is discretionary for mineral extraction activities falling under Schedule 2 of The Environmental Assessment (Scotland) Regulations 1988. This will depend on such factors as the sensitivity of the location, size, working methods, waste disposal, processing, transportation arrangements, and duration of working. Dust emissions from the site will be related to a combination of these factors.

Pre-planning application discussions

52. It is important that discussions between operators and planners about the potential for dust from a proposed mineral working are undertaken at a very early stage in the development process. Discussions prior to the submission of an application are recommended so that both the planners and operators can:

- establish the need for a dust assessment study prior to detailed design;
- establish the applicability or appropriateness of a site management system or EMS that addresses environmental issues;
- consider the potential for different site activities to emit dust and their relationship to sensitive local areas, and the applicability of buffer zones between the site boundary and sensitive land uses;
- discuss the layout of the site in order to minimise impacts and consider the possibility of incorporating stand-off zones around major dust generating activities.

Determination of a planning application

53. A planning authority, or a reporter on appeal, should use the findings from a dust assessment study when determining planning applications or when attaching conditions to planning permissions. Pre-application discussions should have addressed the principal matters relating to the design and layout of the site and if these are not reflected in the plans and details of workings, revisions may be requested by the authority.

54. In most circumstances the principal dust concerns can be addressed through:

- appropriate design and layout of the site;
- the management of the site;
- use of appropriate equipment;
- the adoption of appropriate mitigation measures.

55. The lack of mitigation measures to provide adequate protection for sensitive land uses from the effects of dust should be given appropriate weight (as a material consideration) in the decision process.

The interface between planning and environmental controls

56. Planning authorities and environmental protection authorities have different powers and functions that can on occasions overlap. It is however a long established principle that planning

controls should not duplicate other statutory controls, or be used to secure objectives achievable under other legislation. In general terms the initial works relating to the extraction of material prior to mineral processing are unlikely to require authorisation under the Environmental Protection Act 1990. These activities still have the potential to emit dust, and planning conditions provide an effective means of control.

Dust Nuisance

57. The Environmental Protection Act procedures allow a local authority to serve an abatement notice where a statutory nuisance exists. Statutory nuisances, defined in s79 of the EPA include:

- any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance; and
- any accumulation or deposit which is prejudicial to health or a nuisance.

Failure to comply with an abatement notice is an offence and if necessary the local authority may abate the nuisance and recover expenses.

Liaison

58. Liaison between operators, the local community and planning and environmental protection authorities is important for:

- initially agreeing dust monitoring strategies, and then reviewing the results,
- the review of any specified site management systems or Environmental Management System,
- discussing appropriate courses of action if conditions of consents are not being followed,
- addressing complaints from the local community.

conditions attached to planning permissions and enforcement

59. Authorities should seek to identify the most appropriate control measures to address specific potential dust problems, and attach planning conditions to consents which are precise and unambiguous. The wording of the condition should make it clear as to when and where the control, or mitigation of dust, is necessary and should be adopted. **Conditions should be worded in such a way that contraventions are easy to identify and enforcement action can be readily undertaken if necessary.**

General/Non-specific conditions

60. General wording such as seeking the "best practicable means to ensure that operations are carried out in such a way as not to cause "nuisance" is unlikely to ensure that control measures are incorporated into the design and operation of a mineral site. An alternative approach would be to require a scheme for the control and mitigation of dust to be submitted to and approved by the planning authority before the commencement of development. Such a condition should require adherence to the scheme unless the authority consents to a variation.

Dust Mitigation through Watering

61. Conditions which seek to mitigate dust through the use of water bowsers or sprays are frequently used by local authorities and are commonly used with regard to haul roads. These type of conditions should wherever possible be specific about where and when water bowsers or sprays should be used.

62. For sites where major dust sources are close to sensitive land uses, it may be advisable for the local authority to specify that the source is kept damp constantly, or during working hours. This is preferable to a condition which states that damping should be undertaken during adverse weather conditions, unless there is a clear definition of what constitutes adverse conditions. If a planning authority needs to be assured that dampening measures will deal effectively with a range of a potential dust sources that may be present during different stages of the life of a site, they could request that a scheme for the installation and operation of water sprays and bowsers is submitted for approval. In this case, adherence to the scheme should be made a condition of the planning permission.

Other Conditions Relating to Haul Roads and Traffic

63. Planning authorities can require that some haul roads, in particular those outside the working area or those that are frequently used (and near to sensitive areas) are hard surfaced. It will also be important to ensure, through conditions, that these roads are regularly watered. Sheetting of lorries, wheel washing and sometimes lorry washing can assist in the control of dust from traffic when leaving the site. Seeking to influence the design of vehicle exhausts (to point upwards) and to restrict the speed of vehicles on haul roads within the site constitutes good practice.

Soil Stripping and Overburden Handling

64. Conditions can seek advance warning of soil stripping in order to give the local authority the opportunity to stop operations if adverse weather is forecast. The onus should be on the operator to provide information on forecast weather conditions. Conditions regarding advance warning of soil stripping and weather forecasts require to be carefully worded. The period of notice would have to be long enough to allow the authority to react yet short enough for reasonably accurate weather information to be available. Other conditions can relate to the seeding of soil or overburden mounds; the specification of the shape and height of mounds and the compaction and binding of their surfaces. It is important that these conditions are specific as to the type of mounds, for example topsoil and subsoil mounds. They should also specify the period of time that the mound should remain undisturbed as long as this accords with the operators programme of works for the site.

65. Conditions may also restrict soil handling operations to specific periods of the year, restricting their year round potential to produce dust. Such conditions are usually linked to proposals for site restoration and aftercare, and care must be used in ensuring that potential conflicts with other interests, such as protecting soil quality, are avoided.

Cessation of Activities

66. Conditions can sometimes specify that certain types of dust emitting activities should cease during 'adverse weather conditions'. This type of condition is difficult if not impossible to enforce as action can only be taken after the event and again there is the difficulty of defining what constitutes 'adverse' conditions. It may also be difficult or impractical for the operator to comply with, on economic, programming or contractual grounds for example where blasting has been set up and cannot be delayed because of Health and Safety considerations. Nevertheless, it may be important to identify activities within particular parts of the site that should not take place during weather

conditions which will increase their potential to emit dust. In order for any conditions to be enforceable, they must specify, firstly a maximum dust level which is not to be exceeded and secondly what should happen if the level is exceeded e.g. operations should be suspended or other safeguards implemented.

67. For this type of condition to be effective it would require the operator to monitor meteorological conditions. It would also require the operator to accept in broad terms what constitutes adverse meteorological conditions (i.e. the direction of the wind and wind strength), although these type of details could be specified within a management system for dust control rather than in the condition itself. A requirement to keep a log book that regularly records weather conditions and activities undertaken within the site will provide the regulator with the means to check compliance and should be available to the public.

Monitoring of Dust

68. Where dust generating site activities are close to dust sensitive land uses, it may be appropriate for dust monitoring to be undertaken. The onus for carrying out monitoring should normally fall on the operator. The results of monitoring will need to be examined with respect to local background levels, the influence of other sources of dust; their relationship to complaints about dust and the potential dust sources within the site. This will allow the operator and the authority to review the effectiveness of control mechanisms and to allow necessary action to be taken if the dust mitigation practices or the management system on site does not perform adequately.

69. Conditions are not the appropriate mechanism to outline the detailed requirements for a scheme of monitoring. Instead a condition should specify that a scheme of monitoring to be approved by the planning authority should be submitted. It may be appropriate, in some circumstances, to state that work should not commence on site until a satisfactory scheme has been approved. The appropriateness of this scheme to monitor dust from the site can then be considered by planning officers in consultation with environmental officers and mineral operators.

Stand Off Distances

70. It is preferable that dust generating activities are separated by a stand-off distance from sensitive uses. The minimum extent of this stand-off distance should be estimated through the use of a dust assessment study (possibly including dust monitoring). These stand-off distances would be employed to ensure that the more severe dust impacts are not experienced around a site.

71. The planning authority can seek to incorporate a stand-off distance into the site layout through pre-application discussions. Nevertheless given that the site layout will change as work progresses, a stand-off distance from specified dust generating activities can also be specified as a condition.

Other Related Conditions

72. Conditions can relate to multiple objectives that are additional to the control of dust. For instance the screening of site activities by planting or fencing can assist in the mitigation of visual, noise and dust impacts. When considering the type and extent of screening appropriate for different site activities, planners should be clear on the principal impacts that are being addressed. A focused Environmental Assessment can be of assistance in this respect.

Planning Enforcement

73. A breach of a planning condition has to be proved in order for enforcement action to be taken and it is therefore important that conditions are precise and unambiguous. Conditions have to be capable of being monitored to be enforceable. As a general rule, it will be easier to prove that a breach has taken place where conditions relate to specific dust control and mitigation measures than if the conditions relate to general environmental requirements.

development plans

74. One of the functions of development plans is to provide guidance to mineral developers on the appropriate development control criteria that will be used in determining planning applications for mineral development. Structure plans set out this guidance in general terms, and local plans set out this guidance in greater detail. NPPG 4: Land for Mineral Working gives further advice on the minerals content of development plans.

75. In drawing up their development plans, planning authorities will wish to consider the advice in this Annex on the steps that might reasonably be taken to control dust.

conclusion

76. This Annex provides the basic framework for the consideration of the dust aspects of surface mineral development proposals and for the monitoring and control of operations.

77. The Annex has been based on the best information currently available. It may need updating in the future to reflect changes in technology and environmental standards, and in the light of any future relevant research findings. In particular, as pointed out in the Introduction, the health effects of dust generated by surface mineral workings may be the subject of further advice in due course following current Government research.

note

78. Enquiries about this Annex to PAN 50 should be addressed to Brian Spiers (0131 244 7546). Further copies, together with other PANs, NPPGs and a list of current advice and guidelines, are available from SEDD Planning, Room 2-H Victoria Quay, Edinburgh EH6 6QQ (0131 244 7543).

Appendix : summary of good practice on dust

Planning Authorities should:

- liaise with the pollution control authority under the Environmental Protection Act,
- consider objectives for PM₁₀ under the Air Quality Regulations 1997
- consider the need to agree or specify planning conditions relating to the:
 - layout of the site, design of stockpiles,
 - containment of conveyors and processing plant and dust collection equipment,
 - use of bowsers, sprays and vapour masts on haul-roads, stockpiles, transfer points,
 - design of material-handling systems, drop heights, wind guards, loading points,
 - use of binders on haul-roads and stockpiles (after consulting SEPA),
 - limiting levels of dust measured in a specific way; provision of monitoring facilities.

Operators should:

- minimise the creation of dust by planning and design, e.g.
 - use of conveyors rather than haul-roads,
 - locate haul-roads, tips and stockpiles away and down-wind from neighbours,
 - create 'sensitive zones' within which activities are limited,
 - layout and construct stockpiles, tips and mounds to minimise dust creation; use gentle slopes and avoid sharp changes of shape,
 - use crushing and screening plant within its design capacity,
 - minimise the height of fall material,
 - use appropriate chippings for stemming,
- control the escape of dust, e.g.:
 - enclose conveyors, chutes, process plant, stockpiles,
 - provision of dust removal system for the plant,
 - use sprays, mists, microfoam or foam,
 - fit outlets with cyclones, wet-scrubbers, filters,
 - insist on good maintenance,

Operators should:

- control the escape of dust e.g.,
 - compact, grade, surface and maintain haul-roads,
 - fit dust extractors, filters and collectors on drilling rigs,
 - use mats when blasting,
 - restrict dust-making activities to sheltered areas,
 - use wind-breaks/netting screens/semi-permeable fences,
 - limit drop of falling material,
 - fit wind-boards/hoods to conveyors/transfer points,
 - reduce speeds and limit movement of vehicles, use upswept exhausts,
 - use water bowsers, sprays or vapour masts,
 - spray exposed surfaces e.g. unsurfaced haul-roads, stockpiles, with binders (consult SEPA),
 - vegetate exposed surfaces e.g. overburden mounds, with quick growing plants,
 - limit spillage; facilitate the removal by the use of hard surfaces,
 - sweep haul-roads and other dusty surfaces,
 - shake-off dirt from vehicles, provide vehicle washing facilities,
 - provide a surfaced road between washing facilities and site exit,
 - use closed or sheeted vehicles carrying dry material,
- remove dust from the atmosphere, e.g.
 - use fine water sprays/mists, with or without additives,
 - use trees or shrubs around the site,
- temporarily suspend the activity or operation, if the creation of dust cannot be avoided.

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National Planning Policy Guidelines /Planning Advice Notes

NPPG 4 Land for Mineral Working
PAN 47 Community Councils and Planning
PAN 50 Controlling the Environmental Effects of Surface Mineral Workings
PAN 51 Planning and Environmental Protection

Legislation

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