Contaminated Land
Air Quality
Environmental Audit

SMITH GRANT
Environmental Consultancy
LLP

Partnership No: OC 300776

ADG 2

Town & Country Planning Act 1990
Section 78 Appeal

Concrete Batching Plant at Ferme Park, Hornsey

Appendices to Evidence of:

Alexander David Grant
Smith Grant LLP

on behalf of:

London Concrete Ltd

Planning Inspectorate Reference: APP/Y5420/A/05/1189822
Local Authority Reference: HGY/2005/0007

R616-APP

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Typical ambient levels are 0.3–0.4%/d in an urban area, 0.01–0.5%/d in a rural area and 0.8–1.0%/d in an industrial area.

The other main criterion for nuisance[202,300,393] due to non-toxic dust is a deposition rate of 200 mg/m^2/d averaged over a month or 80 mg/m^2/d for black coal dust. Above these levels the need for cleaning becomes excessive. The criteria themselves are relatively unsophisticated compared to those for noise. They should be treated with caution and more experience is needed of their application.

Other criteria are based upon total suspended particulates (TSP)[393]; the US Environmental Protection Agency proposed standard is an annual average of 75 μg/m^3 which is roughly equivalent to 50 mg/m^2/d.

Acceptable levels can be related to the ambient[393], eg 2–3 times the background deposition rate, and a criterion based upon the number of times daily levels exceed this 'acceptable' level. Ambient levels are typically 10–50, 30–80 and 80–160 mg/m^2/d in rural, suburban, and town centre or industrial areas respectively. Although other sources give 65, more when harrowing fields, to 20–100[429] in rural locations, 90 for suburban areas and 160 for town centres and 130 mg/m^2/d for commercial areas.

Using any of the above criteria it may still be necessary to examine the collected dust, eg by microscope, to be sure that the dust has come from the site and not elsewhere.

There are also less precise criteria, eg that the process plant should be substantially free from visible emissions[422]. However for mineral process plant prescribed under Section 2(1) of the Environmental Protection Act 1990 (EPA) for control by Local Authorities, specific emission limits are given in guidance provided by the Secretary of State[491,492].

6.3.2 Monitoring

Measurement[174,202,303] of dust from a particular source is usually either imprecise or expensive. Total deposition gauges collect dust deposited in them which can then be weighed[394].

Directional gauges BS 1747[307] are particularly poor at measuring quantity and are not very precise in terms of direction[308]. An automatic directional dust sampler with dual heads[291] controlled and activated by wind direction and speed is likely to be more useful in identifying and quantifying sources of fugitive dust. Another simpler improved deposit gauge has been put forward[320].

The criteria available for acceptable rates of dust deposition or coverage relate to dust from all sources. As with noise, it is necessary to discriminate between sources and this sometimes requires human intervention. The automatic directional sampler referred to above may be able to discriminate sufficiently to provide a reliable quantification of dust deposition originating from a site.

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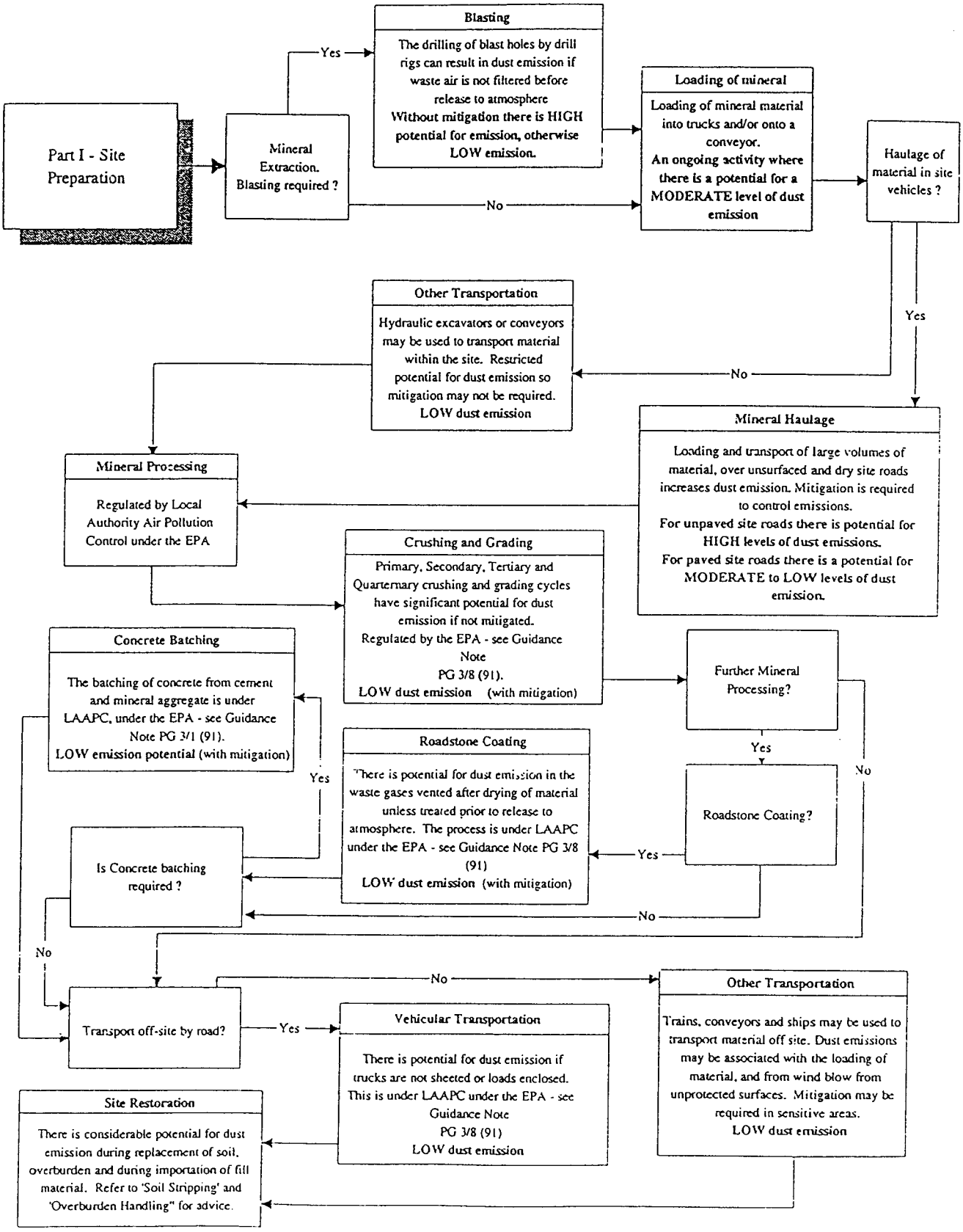
Part II - Extraction and Processing



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Process Guidance Note 3/1 (04)

Secretary of State's Guidance for Blending, Packing, Loading, Unloading and Use of Bulk Cement

defra
Department for Environment
Food and Rural Affairs

SCOTTISH EXECUTIVE

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Defra would like to acknowledge the work of the Environment Agency's Local Authority Unit in the drafting of this guidance note.

Environment Agency

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1 Introduction

1.1 This note is issued by the Secretary of State, the Welsh Assembly Government (WAG) and the Scottish Ministers ("the Government") to give guidance on the conditions appropriate for the control of emissions into the air from blending, packing, loading, unloading and use of bulk cement processes/installations.[1] It supersedes guidance note PG3/1(95) published in August 1995.

1.2 This is one of a series of notes giving guidance on Best Available Techniques (BAT) and Best Available Techniques Not Entailing Excessive Cost (BATNEEC)[2]. The notes are all aimed at providing a strong framework for consistent and transparent regulation of installations.

Site specific BAT/ BATNEEC

1.3 This note is for use under both Local Air Pollution Control (LAPC) established by Part I of the Environmental Protection Act 1990, and Local Air Pollution Prevention and Control (LAPPC) regime established by the Pollution Prevention and Control Act 1999[3]. It constitutes statutory guidance to regulators under regulation 37 of The Pollution Prevention and Control (England and Wales) Regulations 2000, SI 1973[4]. To the extent it provides guidance on techniques, it also constitutes statutory guidance to regulators under section 7(11) of the 1990 Act, and in any event regulators are expected to have regard to it. The note will be treated as one of the material considerations when determining any appeals made against a decision under either the 1990 or 1999 Acts.

1.4 The note also (where appropriate) gives details of any mandatory requirements affecting air emissions which are in force at the time of publication, such as those contained in Directions from the Government.

1.5 All processes are subject to BAT/ BATNEEC. In general terms, what is BAT/ BATNEEC for one process in a sector is likely to be BAT/ BATNEEC for a comparable process; but in each case it is, in practice, for regulators (subject to appeal) to decide what is BAT/ BATNEEC for the individual process and the regulator should take into account variable factors (such as configuration, size and other individual characteristics of the process) and the locality (such as proximity of particularly sensitive receptors[5]). Ultimately, therefore, what constitutes BAT/ BATNEEC is site specific but this guidance note comprises guidance for the generality of processes in the sector and careful regard should be had to it, in order to maximise consistency of permits as appropriate.

Who is affected

1.6 This guidance is for:

- regulators: who must have regard to the guidance when determining applications and reviewing extant authorisations and permits
- operators: who are best advised also to have regard to it when making applications, and in the subsequent operation of their process
- members of the public: who may be interested to know what the Government considers (in accordance with the legislation) amounts to appropriate conditions for controlling air emissions for the generality of processes in this particular industry sector

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1. The term "process(es)" is used in the remainder of the note to mean both "processes" under the Environmental Protection Act 1990 and "installations" under the Pollution Prevention and Control Act 1999.
2. BATNEEC is the formulation used in the Environmental Protection Act 1990 and BAT is used in the Pollution Prevention and Control Act 1999. For the purpose of this guidance note, the two concepts are regarded as having essentially the same effect.
3. In accordance with the Pollution Prevention & Control (England and Wales) (Amendment) Regulations 2002, SI 2002/275, blending, packing, loading, unloading and use of bulk cement processes transfer from regulation under the 1990 Act to the 1999 Act from 1 April 2003. The relevant date in Scotland under Part 2 of schedule 3 to SSI 2000/323 is 31 December 2002.
4. In Scotland, section 24 of the Pollution Prevention and Control (Scotland) Regulations 2000.
5. Guidance on the relationship between BAT/BATNEEC and air quality objectives is contained in the General Guidance Manual on policy and procedures for A2 and B installations.

1.7 The guidance is based on the state of knowledge and understanding at the time of writing of:

- processes for the blending, packing, loading, unloading and use of bulk cement
- their potential impact on the environment and
- what constitutes BAT/ BATNEEC for preventing and reducing air emissions

1.8 The note may be amended from time to time in order to keep abreast with developments in BAT including improvements in techniques and new understanding of environmental impacts and risks. Such changes may be issued in a complete revision of this document, or in separate additional guidance notes which address specific issues. (It may not always be possible to issue amending guidance quickly enough to keep in absolute step with rapid changes, which is another circumstance where paragraph **1.5** above might apply.)

1.9 Steps will be taken to ensure that those who need to know about changes are informed. Operators (and their advisers) are, however, strongly advised to check with the regulator whether there have been any changes before relying on this note for the purposes of making an application under the 1990 or 1999 Acts or making any other decisions where BAT/ BATNEEC may be a consideration.

Consultation

1.10 This note has been produced in consultation with relevant trade bodies, representatives of regulators including members of the Industrial Pollution Liaison Committee, and other interested organisations.

Publication

1.11 This and the other published guidance in this series is available, free of charge, via Defra at **www.defra.gov.uk**. There are links to this site from the following web sites:

- Scottish Executive at **www.scotland.gov.uk.**
- Environment Agency at **www.environment-agency.gov.uk**.
- Scottish Environment Protection Agency at **www.sepa.org.uk**.

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1.12 General guidance explaining LAPPC and setting out the policy and procedures, is contained in the "General Guidance Manual on Policy and Procedures for A2 and B Installations" available from **www.defra.gov.uk/environment/ppc/index.htm,** referred to in this document as the "General Guidance Manual." This is designed for operators and members of the public, as well as for local authority regulators. In Scotland there is the SEPA Practical Guide for Part B activities available from **www.sepa.org.uk/ppc/guidance/practicalguidepartbactivities.pdf** .

1.13 In addition to the General Guidance Manual referred to above, explanation or clarification of certain terms used in this guidance note may be found in a general guidance note issued under Part I of the Environmental Protection Act 1991: 'Interpretation of terms used in process guidance notes', known as General Guidance Note 4 - GG4 - published by HMSO in 1991. Where there is any conflict between GG4 and the guidance issued in this note or in the General Guidance Manual, the latter two documents should prevail, as should any subsequent guidance issued in relation to LAPPC.

2 Timetable for compliance and reviews

Existing processes or activities

2.1 The previous guidance advised that upgrading to that standard should usually have been completed by 1 April 1996. Requirements still outstanding from any existing upgrading programme should be completed.

Upgrading for this note

2.2 The new provisions of this note and the dates by which compliance with these provisions is expected are listed in the table below, together with the paragraph number where the provision is to be found. Compliance with the new provisions should normally be achieved by the dates shown. Authorisations/permits should be varied as necessary, having regard to the changes and the timetable.

Table 1: Compliance timetable

Guidance	Relevant Paragraph / Row in this Note	Compliance Date
Recording of continuous monitoring for discharges with exhaust flow >300 m^3/min from arrestment plant handling dry dust which discharges externally, other than that serving silos	**Table 2** Row 3 and **5.13**	Within 24 months of the publication of this note
Emission limit for particulate matter of 50 mg/m^3 for discharges with exhaust flow >300 m^3 /min from arrestment plant handling dry dust which discharges externally, other that that serving silos	**Table 2** Row 3	Within 24 months of the publication of this note
For existing arrestment equipment discharging to external environment with exhaust flow >100 m^3/min, where 50 mg/m^3 design criteria can be designed into existing plant by the use of higher grade replacement filters or different scrubber liquor flow rates or packing media for example, then this should be complied with as soon as practicable. Where this cannot be easily achieved, then the equipment should be designed to achieve an emission of 100mg/m^3	**5.13**	As soon as practicable, which in most cases should be within 24 months of the publication of this note
New or replacement arrestment equipment discharging to external environment with exhaust flow >100 m^3/min should be designed to achieve 50 mg/m^3	**5.13**	On installation
Design specification to operate to an emission standard of less than 10 mg/m^3 for all new silo filtration plant	**5.14**	Prior to installation
New silos to be fitted with automatic protection systems unless silos are protected during deliveries to an equivalent degree by alternative techniques	**3.15** and **6.9**	On installation
Tankers delivering to silos should be fitted with on-board relief valve and filtration equipment or an alternative agreed technique should be used	**6.9**	Within 36 months of the publication of this note
All other provisions	-	To be complied with as soon as practicable, which in most cases should be within 12 months of the publication of this note

2.3 Replacement plant should normally be designed to meet the appropriate standards specified for new installations or activities.

Relaxation of conditions

2.4 Where provisions in the preceding guidance note have been deleted or relaxed, authorisations should be varied as necessary as soon as reasonably practicable. **Section 7** provides a summary of all changes.

New processes or activities

2.5 For new processes or activities, the authorisation/permit should have regard to the full standards of this guidance from the first day of operation.

Substantially changed processes or activities

2.6 For substantially changed processes or activities, the authorisation/permit should normally have regard to the full standards of this guidance with respect to the parts of the process that have been substantially changed and any part of the process affected by the change, from the first day of operation.

Permit reviews

Reviewing permits

2.7 Under LAPC the requirement is to review conditions in authorisations at least every four years. (Section 6(6) Environmental Protection Act 1990).

2.8 Under LAPPC the legislation requires permits to be reviewed periodically but does not specify a frequency. It is considered for this sector that a frequency of once every six years ought normally to be sufficient for the purposes of Regulation 15(1) Pollution Prevention and Control Regulations 2000.

More frequent review may be necessary in individual cases for the reasons given in Regulation 15(2). Further guidance on permit reviews is contained in chapter 26 of the General Guidance Manual. Regulators should use any opportunities to determine the variations to authorisations/permits necessitated by paragraph **2.2** above in conjunction with these reviews.

2.9 Under both LAPC and LAPPC, conditions should be reviewed where complaint is attributable to the operation of the process and is, in the opinion of the regulator, justified.

3 Process description

Regulations

3.1 Blending, packing, loading, unloading and use of bulk cement processes are prescribed for:

- **LAPC**, under section 3.1 (a) of Schedule 1 to the Environmental Protection (Prescribed Processes and Substances) Regulations 1991, SI 472 (as amended).
- **LAPPC**, under section 3.1 of Schedule 1 of the Pollution Prevention and Control Regulations 2000 SI 1973 [6].

3.2 This note refers to all processes prescribed in regulations for local enforcing authority control in which cement is blended, packed, loaded, unloaded or used in bulk, whether for internal use or for sale - for example, concrete batching plants, concrete block making plants and bulk cement transfer including cement and clinker loading to, and unloading from, ships.

3.3 In the context of this note, "bulk" is taken to mean "loose" and "bulk cement" will generally be transported in a tanker and stored in silos.

3.4 For the purposes of this note, cement should be taken to include Portland cements, high alumina cements and other powders used as cementitous materials or partial cement replacements, for example, pulverised fuel ash or ground slag.

3.5 At port facilities there may be a number of processes operated by different people but involving the use of common equipment which may be supplied by a third party, for example a Port Authority. In these circumstances, each operator should have their own authorisation/permit and it is for the operators to ensure that they meet the requirements of their authorisation/permit. In other cases, one person or a Port Authority may operate all cement handling processes at a port. In these circumstances, only one authorisation/permit is required for each location.

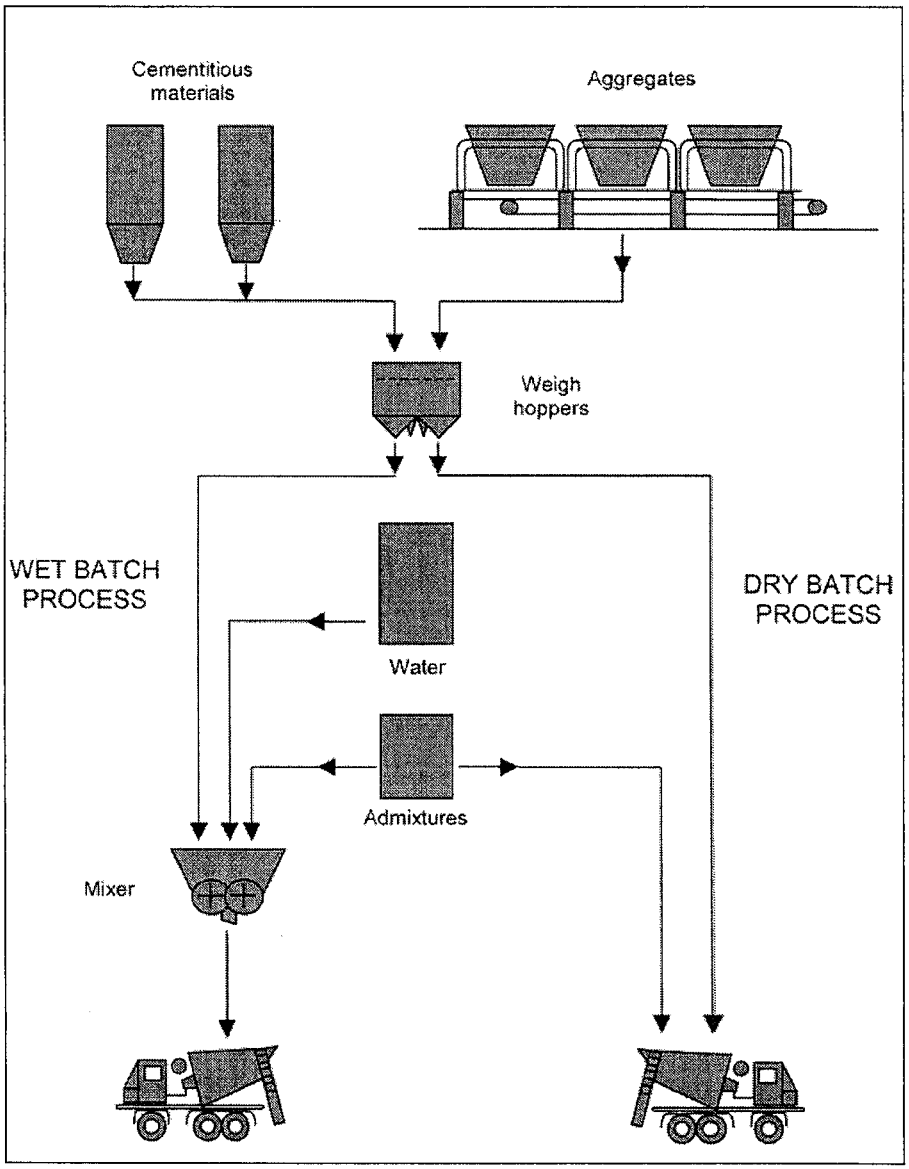
Outline of process descriptions

Ready mixed concrete

3.6 Concrete is manufactured by mixing, in carefully controlled proportions, Portland cement or a mixture of cementitous materials in powder form, together with coarse and fine aggregates (gravel, crushed stone or sand), and water. The proportions chosen are determined by the performance or composition necessary to meet the specification or performance requirements. Small amounts of admixtures may be included to modify the properties of the mix.

6. In Scotland, section 6.3 Part B of Schedule 1 of the Pollution Prevention and Control, (Scotland) Regulations 2000 (SSI 2000/323)

Figure 3.1: Flow diagram of cement batching plant process



Bulk powdered material transfer

3.7 Cement and other powdered cementitous materials are delivered by road or rail in bulk tankers, or by water in barges or ships. The powdered materials are transferred through a closed system of heavy duty hoses to storage silos, using compressed air as a carrier medium. Silos are vented to allow air to escape through filters, so controlling dust emission.

3.8 Unloading of cement at port facilities may be into a flat storage warehouse, sometimes via a hopper. It is expected that ship unloading of bulk cement out of bulk carriers for further conveyance, either directly to bulk trucks or to warehouse, will be made using mechanical equipment with a totally enclosed conveying system with a material intake strictly underneath the materials surface in the ship's hold. To prevent dust from seeping out of the warehouse building it is necessary to create a small negative pressure inside the building. This is done by putting suction fans onto jet pulse self-cleaning filters, through which displaced air is drawn. Filters and fans should be able to handle at least twice the volume of air that is being blown into the warehouse. Multiple filter/fan sets equally spaced over the building should be used, rather than one or two big sets at the ends of the building. There are many different ways in which reclamation of the cement from the building into bulk trucks or a bagging installation can be carried out. The flat storage system requires a high level of control. Level detectors have to be used to prevent overfilling and these

should be fitted with an automatic shut down system in the event of an alarm. The automatic control system should also ensure that the filter/fan systems are switched on before delivery takes place. If intermediate hoppers are used these should also be fitted with filter and automatic high level alarm and shutdown systems.

3.9 The delivery of powder from road tankers relies on a compressor (blower) mounted on the tanker lorry providing a supply of air which is used in three ways:

- to pressurise the tank vessel with air so that inside the vessel there is significant pressure which helps feed the powder out of the tankers. The tank is pressurised at the start of the blow, and can be repressurised as necessary during the course of discharging
- a separate feed from the air supply passes to the distributor system which fluidises the powder around the distributor plate
- a third feed of air receives fluidised powder and flows from the tanker, along the connecting pipework and into the silo. The powder fed from the distributor system is thus transferred to the silo in the air stream

3.10 The flow of air/material through the pipe depends on the pressure in the blowing line and hence the pressure in the tankers. The pressure required to successfully convey the powders is determined by the resistance to flow and gravity that is to be overcome, which varies depending upon the height to which the powders are to be pumped (i.e. the height of the silo) and the pipe length and diameter.

3.11 The tanker discharge is controlled by the tanker driver. The driver controls the flow of air to the tank, the distributor and the silo, to maintain a constant flow of material into the silo without exceeding the flow capacity of the filter system or exerting excessive pressure in the silo (which is not a pressure vessel).

3.12 In the event that the silo becomes pressurised the pressure relief valve should lift for safety reasons. If the pressure relief valve is not designed to relieve the pressure quickly enough, the silo may rupture or the filter unit may be ejected from the top of the silo. Such incidents give rise to an unacceptable emission to atmosphere and have been caused by:

- failure to maintain the relief valve which is on top of the vessel. The valve needs regular maintenance as cement dust will rapidly set around the valve causing blockages
- failure to maintain the filter, allowing it to become blocked
- inadequately controlled blowdown at the end of the delivery cycle from the tanker into the silo

3.13 Where the tanker is discharged through the silo, venting of the residual air can be limited by a flow restrictor. However, rather than venting through the silo, residual air can be vented to atmosphere through a filter mounted on the tanker.

3.14 It is good practice for the operator to keep a record of start and finish times of deliveries as this enables any problems arising from a delivery to be traced to the particular delivery tanker driver responsible. It also protects the operator in the event of reported problems that actually arise on a different site, for example.

3.15 All new silos should be installed with automatic protection systems to control the delivery of material from the tanker such that it is not possible to over-fill or over-pressurise the silo. An alternative automatic system fitted to the tanker may be acceptable, provided that it is demonstrated to protect the silo to an equivalent degree.

3.16 If the filter system on the silo is not capable of handling the large flow of air that is generated during the delivery process, this may cause an increase in pressure within the silo. Filter manufacturers supply information on the pressure drop across filters and the filtration rate. Pumps can be fitted to match the pressure drop and aid the delivery process. It is important that the filter size is calculated to match the flow rates of air through the silo. The filter systems must be cleaned to prevent blockages and accumulation of powder in the filter system.

Concrete block manufacturing

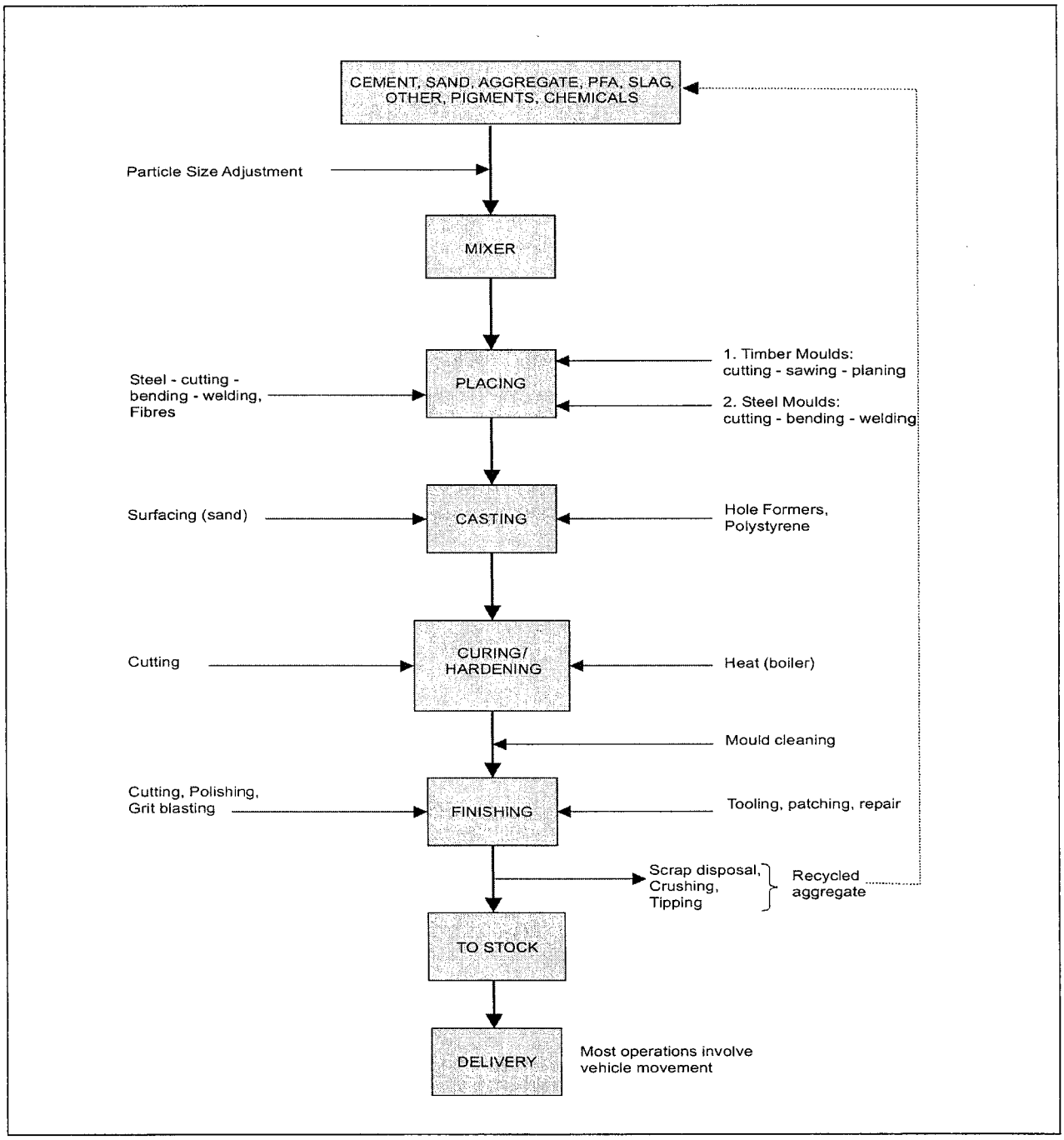
3.17 Pre-cast concrete comes in many shapes and sizes. It is manufactured using aggregates such as sand, gravel, furnace bottom ash and crushed rock in combination with powdered materials such as cement, pulverised fuel ash and limestone, for example. Pre-weighed aggregates, cement and water are transferred to a mixer. Powdered materials are transferred by a fully enclosed system. Displaced air is continuously extracted and passed through suitable filters before being discharged to atmosphere. The finished mix is deposited into pre-formed moulds, vibrated and compressed into blocks. After a prescribed curing period they are stored until ready for dispatch. Curing may take place at atmospheric temperature or by the use of heated air, in which case the combustion process must be controlled to avoid dark smoke.

Cement clinker

3.18 It should be noted that **Figure 3.2** is for information and describes most of the operations that may occur in a pre-cast product. Many of them will not occur in the majority of products so the flow diagram does not describe the "norm" for a pre-cast works.

3.19 Cement clinker is not a homogeneous material, often having lumps up to about 9" in size amongst it. When unloading from ships an enclosed mechanical procedure is considered to be BAT. Handling this material using ordinary cranes and grabs gives rise to unacceptable dust emissions

Figure 3.2: Flow diagram of concrete block manufacturing processes (see paragraph 3.18)



4 Potential releases

Pollutants and sources

4.1 The key emissions from these processes that constitute pollution for the purposes of Part I of the Environmental Protection Act 1990 or the Pollution Prevention and Control Regulations 2000, and therefore warrant control, are those consisting of particulate matter.

4.2 The following parts of the process may give rise to particulate matter in the form of dust:

- drying, handling, bagging, loading and unloading processes
- mixing, processing and storage
- transfer of potentially dusty materials including discharge into hoppers and onto conveyors, and delivery to storage silos and storage sheds
- roadways including haulage roads, if dry

4.3 Combustion processes may be used for drying purposes. Emissions from such processes are controlled by way of good operation and maintenance of burners, to prevent visible emissions.

5 Emission limits, monitoring and other provisions

5.1 The emission limit values and provisions described in this section are achievable using the best available techniques described in **Section 6**. Monitoring of emissions should be carried out according to the method specified in this section or by an equivalent method agreed by the regulator. (See Ref. **(e)** (M1) and Ref. **(f)** (M2))

Table 2: Emission limits, monitoring and other provisions

Row	Particulate matter	Emission limit/ provisions	Type of monitoring	Monitoring frequency (subject to paragraphs 5.10 and 5.11)
1	Whole process	No visible emission across site boundary	Operator observations	At least daily
2	Silo inlet and outlets	No visible emission	Operator or driver observations also start & finish times	Every delivery
3	Arrestment equipment * with exhaust flow >300 m^3/min (other than silo arrestment plant)	50 mg/m^3	Continuously recorded indicative monitoring	Continuous
			Isokinetic sampling	At least once to demonstrate compliance, then as necessary to provide a reference for the continuous indicative monitor
4	Arrestment equipment * with exhaust flow >100 m^3/min (other than silo arrestment plant)	No visible emission Equipment should be designed to achieve 50 mg/m^3	Continuous indicative monitoring to demonstrate that the arrestment equipment is functioning correctly	Continuous
5	Arrestment equipment * with exhaust flow 100 m^3/min or less (other than silo arrestment plant)	No visible emission	Operator observations at least daily or continuous indicative monitoring to show that the equipment is functioning correctly	At least daily or continuous, depending on type of monitoring
* where the plant is discharging to the external environment				

Monitoring, investigations and recording

5.2 The need for and scope of testing, and the frequency and time of sampling depend on local circumstances, operational practice and the scale of operation. As part of proper supervision the operator will monitor emissions, make tests and inspections of the process and keep records, in particular:

- The operator should keep records of inspections, tests and monitoring, including all non-continuous monitoring, inspections and visual assessments. The records should be:
  - kept on site
  - kept by the operator for at least two years; and
  - made available for the regulator to examine
- Any historical records kept off-site should be made available for inspection within one working week of any request by the regulator.

Information required by the regulator

5.3 The regulator needs to be informed of monitoring to be carried out and the results; the results should include process conditions at the time of monitoring.

- The operator should notify the regulator at least 7 days before any periodic monitoring exercise to determine compliance with emission limit values. The operator should state the provisional time and date of monitoring, pollutants to be tested and the methods to be used.
- The results of non-continuous emission testing should be forwarded to the regulator within 8 weeks of the completion of the sampling.
- Adverse results from **any** monitoring activity (both continuous and non-continuous) should be investigated by the operator as soon as the monitoring data has been obtained/received. The operator should:
  - identify the cause and take corrective action
  - record as much detail as possible regarding the cause and extent of the problem, and the action taken by the operator to rectify the situation
  - re-test to demonstrate compliance as soon as possible; and
  - notify the regulator

Visible emissions

5.4 The aim should be to prevent any visible airborne emission from any part of the process. This aim includes all sites, regardless of location. Visible emissions may comprise dust, from cement, aggregate or cementitous materials, or smoke from combustion units. Cementitous material includes particulate matter of aerodynamic diameter less than 10 microns (PM10). If an operator is required to monitor to identify suspected emission sources, monitoring to the standard BS 1747 Part 1 should be sufficient in the first instance. Where combustion units are in use for dryers then the combustion process should be controlled and equipment maintained as appropriate. Abnormal emissions require immediate attention. Emissions should be limited, and monitored as follows:

- Emissions from combustion processes should in normal operation be free from visible smoke and in any case should not exceed the equivalent of Ringelmann Shade 1 as described in British Standard BS 2742:1969.
- All releases to air, other than condensed water vapour, should be free from persistent visible emissions.
- All emissions to air should be free from droplets.
- Visual assessments of emissions should be made frequently, and at least once a day during operations. The time, location and result of these assessments should be recorded.
- Where, in the opinion of the regulator, there is evidence of airborne dust from the process off the site, the operator should make their own inspection and assessment, and where necessary undertake ambient monitoring with the aim of identifying those process operations giving rise to the dust. The monitoring may either be by a British Standard method or by a method agreed with the regulator. In these situations, determination of wind direction may be required. Once the source of the emission is known, corrective action should be taken without delay.

Abnormal events

5.5 The regulator needs to be notified about certain events, whether or not there is related monitoring showing an adverse result, and the operator should respond to problems which may have an adverse effect on emissions to air.

- The operator should provide a list of key arrestment plant and should have a written procedure for dealing with its failure, in order to minimise any adverse effects.
- In the case of abnormal emissions, malfunction or breakdown leading to abnormal emissions the operator should:
  - investigate and undertake remedial action **immediately**
  - adjust the process or activity to minimise those emissions; and
  - promptly record the events and actions taken
- The regulator should be informed without delay:
  - if there is an emission that is likely to have an effect on the local community; or
  - in the event of the failure of key arrestment plant, for example, bag filtration plant or scrubber units

Continuous monitoring

5.6 Continuous **indicative** monitoring can be used as a management tool. In conjunction with continuous recording it identifies any trends in emissions; for example, that emissions are gradually increasing, which may indicate a need for maintenance. It can also be used with or without continuous recording to trigger an alarm when there is a sudden increase in emissions; for example if arrestment plant fails. For a given concentration of particulate, the output level varies with the instrument. It should be noted that not all monitors provide a linear response to an increase in particulate matter. The monitor should be set up to provide a baseline output when the plant is known to be operating under the best possible conditions; i.e. such that emissions are fully compliant with the authorisation/permit. The instrument manufacturer should be able to set an output level which corresponds to around 75% of the emission limit, to trigger alarms. Thus the alarms are activated in response to this significant increase in particulate loading above the baseline, so that warning of the changed state is given before an unacceptable emission occurs. The regulator may wish to agree the alarm trigger level.

5.7 All new continuous monitoring equipment should be designed for less than 5% downtime over any 3-month period. Where continuous monitoring is required, it should be carried out as follows:

- All continuous monitoring readings should be on display to appropriately trained operating staff.
- Instruments should be fitted with audible and visual alarms, situated appropriately to warn the operator of arrestment plant failure or malfunction.
- The activation of alarms should be automatically recorded.
- All continuous monitors should be operated, maintained and calibrated (or referenced, in the case of indicative monitors) in accordance with the manufacturers' instructions, which should be made available for inspection by the regulator. The relevant maintenance and calibration (or referencing, in the case of indicative monitors) should be recorded.
- Purchasers of new or replacement monitoring equipment should specify the requirement for less than 5% downtime over any 3-month period, on ordering.

Calibration and compliance monitoring

5.8 Calibration of quantitative instruments and compliance monitoring should meet the following provisions as appropriate:

- No result should exceed the emission concentration limits specified, except where either:
  (a) data is obtained over at least 5 sampling hours in increments of 15 minutes or less; or
  (b) at least 20 results are obtained where sampling time increments of more than 15 minute are involved; AND in the case of (a) or (b)
  (c) no daily mean of all 15-minute mean emission concentrations should exceed the specified emission concentration limits during normal operation (excluding start-up and shut-down); and
  (d) no 15-minute mean emission concentration should exceed twice the specified emission concentration limits during normal operation (excluding start-up and shut-down).
- Non-continuous emissions monitoring of particulate matter should be carried out according to the main procedural requirements of BS ISO 9096: 2003, with averages taken over operating periods, excluding start-up and shutdown.

5.9 Exhaust flow rates should be consistent with efficient capture of emissions, good operating practice and meeting the requirements of the legislation relating to the workplace environment.

- The introduction of dilution air to achieve emission concentration limits should not be permitted.

Varying monitoring frequency

5.10 The monitoring that is required is to demonstrate correct functioning of arrestment equipment. In this context it is not appropriate that reduced monitoring be applied.

5.11 The frequency of testing should be increased, for example, as part of the commissioning of new or substantially changed processes, or where emission levels are near to or approach the emission concentration limits.

Sampling provisions

5.12 Care is needed in the design and location of sampling systems in order to obtain representative samples for all release points.

- Sampling points on new plant should be designed to comply with the British or equivalent standards. e.g. BS ISO 9096: 2003, BS EN 13284-1or BS ISO 12141:2002 for sampling particulate matter in stacks.
- The operator should ensure that adequate facilities for sampling are provided on stacks or ducts.
- Where monitoring is not in accordance with the main procedural requirements of the relevant standard, deviations should be reported as well as an estimation of any error invoked.

Emissions from arrestment plant

5.13 There are specific design requirements that apply to arrestment plant. There are also monitoring and recording requirements for emissions from arrestment plant handling dry dust which discharges **externally**, other than that serving silos (these are addressed elsewhere in this note). Purchasers of new or replacement plant should specify the design criteria on ordering, and ensure that the plant is capable of meeting the limit. The design criteria should be made available to the regulator for inspection. The plant should be operated and maintained in such a way that it works within the design parameters at all times.

- Arrestment plant with an exhaust flow of over 300 m^3 / min should be continuously indicatively monitored and recorded for particulate matter.
- New or replacement arrestment plant with an exhaust flow of over 100 m^3/min should be designed to achieve the limit of 50 mg/m^3 for particulate matter when functioning correctly.
- Where 50 mg/m^3 design criteria can be designed into existing plant, by the use of higher grade replacement filters or different scrubber liquor flow rates or packing media for example, then this should be complied with in accordance with **Table 1**.

- Arrestment plant with an exhaust flow of 100 m^3 / min or less should be designed and maintained to prevent visible emission of dust. Checks should be made and recorded on a daily basis to ensure the correct functioning of the plant.
- Where emissions do not exceed 50 mg/m^3 without arrestment plant being needed, and this is demonstrated by a single isokinetic sampling exercise undertaken in accordance with paragraph **5.8**, continuous monitoring should not be required.
- Where arrestment plant is designed to meet a specific emission limit, the specification should be available for inspection by the regulator. The plant thereafter should be maintained to meet this specification.
- All replacement arrestment plant, including that serving silos, should meet the standards required of new plant.

Emissions from silos

5.14 During silo filling it is most likely that any emissions would be released during the first and last five minutes of the delivery. The first few minutes is when emissions due to leaks or split hoses would first be noticed. The last few minutes is when excess pressure from the tanker/ blowing system may cause an emission through the pressure relief valve if the delivery is not controlled correctly. During silo filling procedures isokinetic monitoring of emissions from the arrestment plant is not likely to be possible as the delivery period is so short. For this reason there is no numerical emission limit for such plant. It is important however that the plant is designed to cope with the delivery flow rate that is used for the silo.

- All new or replacement silo filtration plant should be designed to operate to an emission standard of less than 10 mg/m^3 for particulate matter.

5.15 Silo systems require appropriate inspections and assessments to minimise potential for emissions during the filling process. The following measures relating to arrestment plant on silos and other silo management techniques are only applicable where the silo vents to the external environment or where silo emissions may escape from inside a building into the external environment.

- Operators should have a procedure in place to ensure that visual assessment of emissions from silo inlet connections and the silo arrestment plant are undertaken throughout the duration of all bulk deliveries. The start and finish times of all deliveries should be recorded.

Inspection of filtration plant

- Silo arrestment plant and arrestment plant serving other process operations should be inspected at the frequency specified below:

Table 3: Filtration plant inspection frequency

Filter cleaning method	Frequency of visual inspection
Fitted with reverse jets	at least once a month
Fitted with mechanical shakers	at least once a week
Requiring manual shaking	daily inspection or prior to any delivery being made if deliveries are not daily

- The outlet should be checked for signs that emissions have occurred. The equipment should also be checked for defects in the air flow or the cam shakers. If emissions or defects are detected then corrective action should be taken promptly and before another delivery takes place. Any failure of the silo management system (e.g. high level alarms, filter, pressure relief valve) should lead to full investigation of the operation of the plant and equipment.

- Reduced inspection frequency of bag filter (or cartridge) arrestment plant may be appropriate, as follows:
  (a) where pressure drop sensors or other continuous monitors are used to monitor the arrestment plant; such monitors should be inspected according to manufacturers' recommendations to ensure their proper operation.
  (b) where continuous camera operation enables observation of all emission points from the arrestment plant and pressure relief valves.
  (c) for filters fitted with reverse jets or with mechanical shakers where operating experience has demonstrated satisfactory operation of the arrestment plant.
  (d) where the process operation is infrequent.

6 Control techniques

Summary of best available techniques

6.1 The following table provides a summary of the best available techniques that can be used to control the process in order to meet the emission limits and provisions in **Section 5**. Provided that it is demonstrated to the satisfaction of the regulator that an equivalent level of control will be achieved, then other techniques may be used.

Table 4: Summary of control techniques

Sources of dust	Control techniques
Loading and unloading processes • transfer of aggregate to bins • transfer of dry batch to mixer • transfer of dry batch to lorry	Containment Suppression • use of ring spray bars Reduced drop heights • use of variable height conveyors • use of chutes Dust arrestment (loading area) • bag filters • cartridge filters
Double handling transfer points	Site and process design
Delivery from road tanker to silo • It is common for overcharging of silos to cause the pressure relief valve to lift, thereby causing an unacceptable emission	Various techniques
Silos	Dust arrestment • bag filters • cartridge filters
Aggregate stockpiles	Wind dynamics management • use of fencing, bunding, profiling etc Reduced drop heights Suppression • water and/or suppressants • well positioned spray guns • sufficient coverage by sprays Covering • below ground or covered stock bins • dust covers • housing
Conveyors, conveyor transfer points	Containment • wind boards Reduced drop heights Appropriate siting • away from site boundary especially if near residential or other sensitive receptors

Table 4: Summary of control techniques

Sources of dust	Control techniques
Blending, packing processes etc.	Containment Reduced drop heights Dust arrestment • bag filters / cartridge filters
Roadways including haulage roads	Suppression • site and process design
External operations • conveyors • stockpiles • roadways	Appropriate siting • away from site boundary especially if near residential or other sensitive receptors Wind dynamics management • use of fencing, bunding, profiling etc.
Vehicles - bodies and wheels	Wheel-wash and under-body vehicle wash Exhausts that do not point vertically down

Techniques to control emissions from contained sources

6.2 Best available techniques are required to control dust emissions, for example, from reception and storage of cement and other potentially dusty materials, internal transportation (whether by pneumatic means, in vehicles, front loaders or on conveyors), processing, loading and unloading. Potential fugitive emissions, which are those from non-contained sources such as roads and other surfaces, also need to be controlled.

6.3 The main principles for preventing dust emissions are containment of dusty processes and suppression of dust using water or proprietary suppressants. Suppression techniques need to be properly designed, used and maintained, in order to be effective. For example, where water is used for dust suppression, processes require an adequate supply of water and all water suppression systems need adequate frost protection. To demonstrate an adequate water supply on tanks that are not fed from the mains, a low level alarm could be fitted.

6.4 Protection of external sources, such as stockpiles and external conveyors, from wind whipping is necessary. There are various methods that may be used to this end.

6.5 A policy of containment and arrestment is the preferred option for control of emissions to air from processes handling cement. Filtered emissions can be expected to be below 10 mg/m^3 if modern plant designed for the purpose is used. Crushed rock, sand or coarse aggregate, can be delivered, stored and handled so as to minimise dust emissions, for example by dampening or covering.

6.6 **The control techniques described below address the sources of particulate matter listed in Table 4.**

Silos

6.7 The silo management system includes the high level alarms, arrestment plant and pressure relief device. If best practice is being applied then any failure of the silo management system leads to full investigation of the operation of the plant and equipment. Continuous high level monitoring systems are currently available for use in storage silos. They may be used telemetrically to monitor stock within the silo. They may also be used to automatically stop delivery of material to the silo. It is expected that such systems will become more widely used in the future.

6.8 Careful delivery by trained personnel will avoid materials being blown into silos at a rate which is likely to result in pressurisation of the silo, especially towards the end of the delivery when the quantity of material entering the ducting is reduced. If deliveries are accepted from tankers without on board relief valve and filtration systems, particular care to avoid pressurisation of silos when venting air through the silo at the end of the delivery is needed.

6.9 The following measures relating to arrestment plant on silos and other silo management techniques are only applicable where the silo vents to the external environment or where silo emissions may escape from inside a building into the external environment.

- All dusty or potentially dusty materials should be stored in silos, in confined storage areas within buildings, or in fully enclosed containers / packaging. Where the storage is open within a building, then suitable precautions should be taken to prevent wind whipping.
- When delivery to a silo or bulk storage tank takes place, displaced air should either be vented to suitable arrestment plant (for example cartridge/bag filters) or backvented to the delivery tanker, in order to minimise emissions. Arrestment plant fitted to silos should be of sufficient size (and kept clean) to avoid pressurisation during delivery.
- In order that fugitive emissions are minimised during the charging of silos, transfer lines should be securely connected to the silo delivery inlet point and the tanker discharge point, in that order. Tanker drivers should be informed of the correct procedures to be followed.
- Bulk storage tanks and silos containing dry materials should be equipped with audible and/ or visual high level alarms, or volume indicators, to warn of overfilling. The correct operation of such alarms should be checked in accordance with manufacturers' instructions. If manufacturers instructions do not specify, then the check should be weekly or before a delivery takes place, whichever is the longer interval.
- If emissions of particulate matter are visible from ducting, pipework, the pressure relief device or dust arrestment plant during silo filling, the operation should cease; the cause of the problem should be rectified prior to further deliveries taking place. Tanker drivers should be informed of the correct procedure to be followed.
- Seating of pressure relief devices on silos should be checked at least once a week, or before a delivery takes place, whichever is the longer interval.
- Immediately it appears that the device has become unseated during silo filling, no further delivery should take place until corrective action has been taken. The pressure relief device should be examined to check for defects before being re-set and a replacement fitted if necessary. Tanker drivers should be informed of the correct procedure to follow.
- Deliveries to silos from road vehicles should only be made using tankers with an on-board (truck mounted) relief valve and filtration system. This means that venting air from the tanker at the end of a delivery will not take place through the silo. Use of alternative techniques may be acceptable provided that they achieve an equivalent level of control with regard to potential for emissions to air.
- Care should be taken to avoid delivering materials to silos at a rate which is likely to result in pressurisation of the silo. If compressed air is being used to blow powder into a silo then particular care is required towards the end of the delivery when the quantity of material entering the ducting is reduced and hence the air flow is increased.
- All new silos should be fitted with an automatic system to cut off delivery in the event of pressurisation or overfilling. Use of alternative techniques may be acceptable provided that they achieve an equivalent level of control with regard to potential for emissions to air.

Stockpiles and ground storage

6.10 Consideration should be given to the siting of aggregate stockpiles, based upon such factors as the prevailing winds, proximity of site boundary and proximity of neighbours. Minimisation of drop height is very important in stockpiling to reduce wind whipping of particulates. When designing storage bays, internal walls separating storage bays should be at least ½ metre lower than external walls of the bays.

- Storage areas where there is vehicular movement should have a consolidated surface which should be kept in good repair.
- To control dust emissions from stockpiles, storage bays should be used. Stock should not be piled higher than the external walls of the bay and should not be forward of the bay. If necessary, covers or dust suppressants should be used.
- Where dusty materials are stored, stockpiles should be treated where necessary to minimise dust emissions, using one or more of the methods detailed in **Table 4**. Fixed water sprays should be installed for long term stocking areas if appropriate.

Conveying

6.11 There are various ways of keeping conveyor belts and the surrounding areas clean. For example, where chevron belts are used, catch plates may be fitted to contain dust falling from the underside of the belt at the turning point. From a health and safety perspective this is not always possible and hoses and sprinklers is a possible alternative. New conveyors can be designed to minimise free fall at discharge points. A chute, or similar equipment, at the point of discharge from a conveyor reduces dust arising. Arrestment plant might be a suitable control option if dusty emissions arise from conveyor transfer points. The conditions relating to conveyors should not be applied where material has been screened to remove particles under 3 mm in size, unless visible dust emissions have been observed from the conveyors. The following conditions should only be applied where emissions to the external environment are likely to arise:

- Where dusty materials are conveyed, the conveyor and any transfer points should be provided with adequate protection against wind whipping. All transfer points should be enclosed to such an extent as to minimise the generation of airborne dust.
- Conveyors should be fitted with effective means for keeping the return belt clean and for collecting materials removed by this cleaning operation.
- Conveyor belts should not be overloaded.
- Where the free fall of material gives rise to external dust emissions, techniques should be used at the point of discharge to minimise this.
- Planned preventative maintenance schedules should include conveyor systems.

Process operations

6.12 Emissions from the process operations covered by this note comprise very fine particulate matter, in the form of dust. The control of dust emissions from these processes is mainly by the use of enclosures. The potential for fugitive emissions is reduced by minimising airborne dust from internal transport.

6.13 In loading areas, examples of dust control measures include the following:

- enclosure fitted with extract ventilation to arrestment plant
- enclosure fitted with water sprinklers
- enclosure and the use of a rubber sock

- The discharge or loading of ships handling cement clinker using cranes and grabs should not be permitted, except in the remotest situations where there is no possibility of the inevitable dust problems affecting the local residents or persons working in the vicinity.
- The transfer of cement should be by air slide, enclosed elevator, enclosed screw feeder, enclosed chain en-mass conveyor, gravity or pneumatic means.

- The packing of cement into bags should be carried out using purpose designed plant fitted with extraction for displaced air ducted to arrestment plant (for example bag filters).
- Truck mixers should be loaded in such a way as to minimise airborne dust emissions, for example by loading with wet pre-mixed materials. If they are loaded with dry materials, local dust control measures should be provided. When loading with dry materials a ribbon feed technique should be used. This involves depositing a partial load followed by water in a reiterative way until the full load has been made. For example, 1.5 metres of cement and aggregate followed by water, then another 1.5 metres of cement and aggregate followed by water, and so on (a truck load consists of about 6 metres).
- In all cases a rubber sock type chute system should be used for loading into truck mixers.

Fugitive emissions

6.14 Fugitive dust emissions should be prevented whenever practicable. When this is not practicable emissions should be controlled at source by measures agreed between the regulator and the operator. Examples include correct storage of raw materials, organising the process in such a way that spillage is avoided, and maintaining high standards of internal and external housekeeping. To make buildings as dust tight as necessary to prevent visible emissions, self-closing doors and close-fitting entries and exits for conveyors are among the options that may be used. Attention should be paid to preventing and cleaning up deposits of dust on external support structures and roofs, in order to minimise wind entrainment of deposited dust. If necessary, emissions should be controlled and abated using suitable arrestment equipment.

- All process buildings should be made as dust tight as is necessary to prevent visible emissions.
- All process buildings should be cleaned regularly, according to a written maintenance programme, to minimise fugitive emissions.
- All new buildings housing processing machinery should be externally clad with materials that can be readily cleaned.
- Where local exhaust ventilation is used, emissions should be ducted to suitable arrestment plant.
- Dusty wastes should be stored in closed containers.
- The method of collection of product or waste from dry arrestment plant should be such that dust emissions are minimised.
- A high standard of housekeeping should be maintained.
- All spillages which may give rise to dust emissions should be cleaned up promptly, normally by wet handling methods. Dry handling of dusty spillages should not be permitted other than in fully enclosed buildings. (N.B. Dry handling of dusty spillages within fully enclosed buildings may not be acceptable under COSHH.) In the event of a major spillage it should be dealt with on the same day that it occurs, and measures to minimise emissions, such as wetting the surface to create a crust, should be taken immediately.

Roadways and vehicles

6.15 In designing a new process, minimising vehicle movement in the site layout will enable better control of roadways with the potential for fugitive emissions.

6.16 Vehicle exhausts directed above the horizontal are preferred as these avoid the impact of the exhaust raising dust when travelling on internal roadways.

6.17 On some sites wheel-cleaning facilities may be useful to prevent dust being carried off the site. Where the plant is co-located with a quarry which has wheel-wash and underbody wash facilities available these might be used where necessary. If a plant is co-located with a quarry which does not have wheel-wash facilities it may not be appropriate to install them. Sometimes the presence of a long access road ensures that any dust falls off the vehicles and does not reach the public highway. Vehicles may also be effectively cleaned, prior to leaving site, with a brush and hose.

- Roadways in normal use and any other area where there is regular movement of vehicles should have a consolidated surface capable of being cleaned. They should be kept clean in order to prevent or minimise dust emissions. They should be kept in good repair.
- Where necessary to prevent visible dust being carried off site, wheel-cleaning facilities should be provided and used by vehicles before leaving the site.

Air quality

Ambient air quality management

6.18 In areas where air quality standards or objectives are being breached or are in serious risk of breach and it is clear from the detailed review and assessment work under Local Air Quality Management that the Part B process itself is a significant contributor to the problem, it may be necessary to impose tighter emission limits. If the standard that is in danger of being exceeded is not an EC Directive requirement, then industry is not expected to go beyond BAT to meet it. Decisions should be taken in the context of a local authority's Local Air Quality Management action plan. For example, where a Part B process is only responsible to a very small extent for an air quality problem, the authority should not unduly penalise the operator of the process by requiring disproportionate emissions reductions. More guidance on this is provided in paragraph 360 of the Air Quality Strategy which gives the following advice:

"*The approach from local authorities to tackling air quality should be an integrated one, involving all strands of local authority activity which impact on air quality and underpinned by a series of principles in which local authorities should aim to secure improvements in the most cost-effective manner, with regard to local environmental needs while avoiding unnecessary regulation. Their approach should seek an appropriate balance between controls on emissions from domestic, industrial and transport sources and draw on a combination and interaction of public, private and voluntary effort.*"

Dispersion and dilution

6.19 Pollutants that are emitted via a stack require sufficient dispersion and dilution in the atmosphere to ensure that they ground at concentrations that are harmless. This is the basis upon which stack heights are calculated using HMIP Technical Guidance Note D1 (D1). The stack height so obtained is adjusted to take into account local meteorological data, local topography, nearby emissions and the influence of plant structure. It is necessary that the assessment also take into account the relevant air quality standards that apply for the emitted pollutants.

Revised stack height calculations should not be required unless it is considered necessary because of a breach or serious risk of breach of an EC Directive limit value and because it is clear from the detailed review and assessment work that the Part B process itself is a significant contributor to the problem.

The calculation procedure of D1 is usually used to calculate the required stack height but alternative dispersion models may be used in agreement with the regulator. D1 relies upon the unimpeded vertical emission of the pollutant. A cap or other restriction over the stack impedes the vertical emission and hinders dispersion. For this reason where dispersion is required such flow impeders should not be used. A cone may sometimes be useful to increase the exit velocity and achieve greater dispersion.

An operator may choose to meet tighter emission limits in order to reduce the required stack height.

Where an emission consists purely of air and particulate matter, (i.e. no products of combustion or any other gaseous pollutants are emitted) the above provisions relating to stack height calculation for the purpose of dispersion and dilution should not normally be applied. However, if the emission point is within a designated air quality management area with respect to PM10, then this may have to be reviewed.

Stacks, vents and process exhausts

6.20 Liquid condensation on internal surfaces of stacks and exhaust ducts might lead to corrosion and ductwork failure or to droplet emission. Adequate insulation will minimise the cooling of waste gases and prevent liquid condensation by keeping the temperature of the exhaust gases above the dewpoint. Stacks and ductwork should be leakproof.

6.21 The dispersion from all stacks and vents can be impaired by low exit velocity at the point of discharge, or deflection of the discharge. Unacceptable emissions of droplets could possibly occur from wet arrestment plant where the linear velocity within the associated ductwork exceeds 9 m/sec. The use of mist eliminators reduces the potential for droplet emissions.

- Where a linear velocity of 9 m/sec is exceeded in the ductwork of existing wet arrestment plant, it should be reduced to the extent that is practicable to ensure that droplet fallout does not occur.
- Flues and ductwork should be cleaned to prevent accumulation of materials, as part of the routine maintenance programme.
- Exhaust gases discharged through a stack or vent should achieve an exit velocity which is normally greater than 15 m/sec during normal operating conditions to achieve adequate dispersion. A lower velocity may be acceptable provided it achieves adequate dispersion and dilution in accordance with paragraph **6.19** above.
- A minimum discharge velocity should be required in order to prevent the discharged plume being affected by aerodynamic downwash.
- Stacks or vents should not be fitted with any restriction at the final opening such as a plate, cap or cowl, with the exception of a cone which may be necessary to increase the exit velocity of the emissions.

Management

Management techniques

6.22 Important elements for effective control of emissions include:

- proper management, supervision and training for process operations;
- proper use of equipment;
- effective preventative maintenance on all plant and equipment concerned with the control of emissions to the air; and
- it is good practice to ensure that spares and consumables are available at short notice in order to rectify breakdowns rapidly. This is important with respect to arrestment plant and other necessary environmental controls. It is useful to have an audited list of essential items.

- Spares and consumables - in particular, those subject to continual wear - should be held on site, or should be available at short notice from guaranteed local suppliers, so that plant breakdowns can be rectified rapidly.

Appropriate management systems

6.23 Effective management is central to environmental performance; It is an important component of BAT and of achieving compliance with permit conditions. It requires a commitment to establishing objectives, setting targets, measuring progress and revising the objectives according to results. This includes managing risks under normal operating conditions and in accidents and emergencies. It is therefore desirable that processes put in place some form of structured environmental management approach, whether by adopting published standards (ISO 14001 or the EU Eco Management and Audit Scheme [EMAS]) or by setting up an environmental management system (EMS) tailored to the nature and size of the particular process. Operators may also find that an EMS will help identify business savings.

Regulators should use their discretion, in consultation with individual operators, in agreeing the appropriate level of environmental management. Simple systems which ensure that LAPC considerations are taken account of in the day-to-day running of a process may well suffice, especially for small and medium-sized enterprises. While authorities may wish to encourage wider adoption of EMS, it is outside the legal scope of an LAPC authorisation/ LAPPC permit to require an EMS for purposes other than LAPC/LAPPC compliance. For further information/advice on EMS refer to EMS Additional Information in **Section 8**.

Training

6.24 Staff at all levels need the necessary training and instruction in their duties relating to control of the process and emissions to air. In order to minimise risk of emissions, particular emphasis should be given to control procedures during start-up, shut down and abnormal conditions.

Training may often sensibly be addressed in the EMS referred to above.

- Training of all staff with responsibility for operating the process should include:
  - awareness of their responsibilities under the authorisation / permit; in particular how to deal with conditions likely to give rise to dust emissions, such as the event of spillage
  - minimising emissions on start up and shut down
  - action to minimise emissions during abnormal conditions
- The operator should maintain a statement of training requirements for each operational post and keep a record of the training received by each person whose actions may have an impact on the environment. These documents should be made available to the regulator on request.

Maintenance

6.25 Effective preventative maintenance should be employed on all aspects of the process including all plant, buildings and the equipment concerned with the control of emissions to air. In particular:

- A written maintenance programme should be provided to the regulator with respect to pollution control equipment; and
- A record of such maintenance should be made available for inspection.

7 Summary of changes

Reasons for the main changes are summarised below.

Table 5: Summary of changes

Section / Paragraph / Row	Change	Reason	Comment
Emission limits, monitoring and other provisions			
Table 2 Row 1	No visible airborne dust emission across the site boundary. This is a new provision.	Improved enforceability.	Control of the process, especially the deliveries and the silo management system, should ensure that this is achieved.
Table 2 Row 3 and **5.13**	For arrestment plant handling dry dust (other than on silos) with an exhaust flow >300 m^3/min there is a new emission limit for particulate matter of 50 mg/m^3. There is also a new requirement to record the continuous monitoring.	Plant should already be designed to meet this limit. It is easily achievable.	Such equipment should be designed to meet this limit and isokinetic sampling of the emissions should be carried out at least once to demonstrate compliance with this limit. Continuous monitoring and recording of the emissions from such plant is required to ensure continued compliance with the limit. Records of the emissions provide a very useful management tool with respect to the maintenance requirements to keep the plant operating within its design specification.
5.13	All new and replacement particle arrestment plant, with an exhaust flow >100 m^3/min, should be designed to meet a limit of 50mg/m^3. Where 50 mg/m^3 design criteria can be designed into existing plant, by the use of higher grade replacement filters or different scrubber liquor flow rates or packing media for example, then this should be complied with as soon as practicable, which in most cases should be within 12 months of the publication of this note. Where 50 mg/m^3 cannot be designed into existing plant, then it is expected that the design should achieve 100 mg/m^3. The equipment should be designed to meet this limit and indicative monitoring used to demonstrate that the plant is functioning correctly to its design specification. Alarms to warn of malfunction should be fitted.	Such equipment should be designed to meet this BAT criteria.	There is no change to the monitoring required for such plant. (Continuous indicative monitoring to demonstrate that the plant is functioning correctly to its design specification is required.) Design specifications need to be provided to regulators and plant maintained according to such specifications.
5.14	All new silo filtration plant should be designed to operate to an emission standard of less than 10 mg/m^3 for particulate matter.	Such equipment should be designed to meet this limit. It is easily achievable.	Design criteria include specified flow rates and required surface area of specific filtration medium in order to meet the standard.
5.8 and **5.12**	Use of BS 3405 for monitoring particulate matter emissions replaced by BS ISO 9096:2003. Sampling points on new plant should be designed to comply with BS ISO 9096:2003 requirements.	BS ISO 9096:2003 designed to measure concentrations below those for which BS 3405 was written.	The main procedures of BS ISO 9096:2003 should be followed and any points of diversion from the standard noted. The effect on the results of any deviation from the standard should be estimated and reported.

Table 5: Summary of changes

Section / Paragraph / Row	Change	Reason	Comment
Control techniques			
6.9	All **new** silos should be installed with automatic protection systems to control the delivery of material from the tanker to the silo such that it is not possible to overfill or over-pressurise the silo.	To reduce delivery emission incidents due to overfilling of silos.	Alternative techniques may be acceptable provided that they achieve an equivalent level of control.
6.9	Delivery to silos from road vehicles should only be made by tankers with an onboard (truck mounted) relief valve and filtration system or using a technique that affords an equivalent level of protection to the environment.	Venting of air from the tanker at the end of the delivery will not take place through the silo.	This measure should reduce the incidence of silos being over-pressurised and, in some cases, splitting. Compliance date - 36 months from the date of the publication of this note.

8 Definitions and further information

This guidance	Process Guidance Note 3/1(04).
Previous guidance	Process Guidance Note 3/1(95) which in its turn replaced PG3/1(91).
LAPC	explained in the Introduction of this guidance.
LAPPC	explained in the Introduction of this guidance.
Permit	the written permission to operate an installation prescribed for LAPPC – (the replacement for authorisation under LAPC).
Authorisation	the written authority to operate a process prescribed for LAPC - (will be replaced by permit under LAPPC).
Local enforcing authority	is replaced by the word 'regulator' in LAPPC.
Regulator	replaces the phrase 'local enforcing authority' from LAPC.
Existing process	should be taken to have the following meaning (which is based on paragraph 14 of Schedule 3 to SI 1991 /472): • a process which was being carried on at some time in the 12 months immediately preceding the first day of the month following publication of this guidance note; • a process which is to be carried on at a works, plant or factory or by means of mobile plant which was under construction or in the course of manufacture or in the course of commission on the first day of the month following publication of this guidance note, or the construction or supply of which was the subject of a contract entered into before that date.
New process	not an existing process.
Authorised person	under section 108 of the Environment Act 1995, "authorised person" has replaced the term "inspector".
Installation	should be interpreted in accordance with the guidance contained in the the General Guidance Manual on Policy and Procedures for A2 and B Installations. www.defra.gov.uk/environment/ppc/manual/index.htm.
Process	the term "process has been used in this guidance note to refer to both "processes" under the Environmental Protection Act 1990 and "installations" under the Pollution Prevention and Control Act 1999.

Health and safety

Operators of processes and installations must protect people at work as well as the environment:

- requirements of a permit or authorisation should not put at risk the health, safety or welfare of people at work
- equally, the permit or authorisation must not contain conditions whose only purpose is to secure the health of people at work. That is the job of the health and safety enforcing authorities

Where emission limits quoted in this guidance conflict with health and safety limits, the tighter limit should prevail because:

- emission limits under the Environment Protection Act 1990 or Pollution Prevention and Control Act 1999 relate to the concentration of pollutant released into the air from prescribed activities
- exposure limits under health and safety legislation relate to the concentration of pollutant in the air breathed by workers
- these limits may differ since they are set according to different criteria. It will normally be quite appropriate to have different standards for the same pollutant, but in some cases they may be in conflict (for example, where air discharged from a process is breathed by workers). In such cases, the tighter limit should be applied to prevent a relaxation of control

EMS additional information

Further information/advice on EMS may be found from the following:

- Envirowise at **www.envirowise.gov.uk** and **www.energy-efficiency.gov.uk** and Environment and Energy Helpline freephone 0800 585794
- ISO 14001 **www.bsi.org.uk** or telephone BSI information centre (020 8966 7022)
- EU Eco Management and Audit Scheme (EMAS) **www.emas.co.uk** or telephone the Institute of Environmental Management and Assessment (01522 540069)

Regulators and process operators may also like to be aware of:

BS 8555: a new standard to help SMEs implement an EMS, by offering a five-phase approach, is contained in BS 8555 which was published in 2003 following on from work undertaken by the Acorn Trust. The Institute of Environmental Management and Assessment, which has taken over the Trust's activities, is developing a scheme of accredited recognition for companies achieving different phases of BS 8555. BS 8555 can be used to achieve ISO 14001 and registration to the higher standard, EMAS.

Some of the **High Street banks**, such as NatWest and the Coop, now offer preferential loan rates to organisations that can demonstrate they are committed to improving their environmental performance. The NatWest also produce a self help guide for SMEs, 'The Better Business Pack', focusing on waste, utilities, transport and supply chain issues. It gives tools, guidance and examples. Contact: WWF-UK on 01483 426444.

References

(a) Secretary of State's Guidance (England and Wales): General Guidance Manual on Policy and Procedures for A2 and B Installations , March 2003 - available from the Defra web-site and, in hard copy, from the Defra Publications line 08459 556000 **www.defra.gov.uk/environment/ppc/index.htm**

(b) DOE/WO Additional Guidance AQ17(94), issued to local authorities by the Air and Environment Quality Division of DEFRA and by the Welsh Office, provides further advice on the assessment of odour. The Scottish equivalent of AQ17(94) is SN 11(94).

(c) Current air quality objectives are specified in:
- The Air Quality (England) Regulations 2000 SI 928
- The Air Quality (Wales) Regulations 2000 SI 1940
- The Air Quality (Scotland) Regulations 2000 SI 97

(d) HMIP Technical Guidance Note D1: "Guidelines on Discharge Stack Heights for Polluting Emissions", published by The Stationery Office, ISBN 0-11-752794-7.

(e) M1 Sampling requirements for monitoring stack emissions to air from industrial installations, Environment Agency July 2002 **(EA website)**

(f) M2 Monitoring of stack emissions to air. Environment Agency May 2003 **(EA website)**

(g) BS ISO 9096:2003: Stationary source emissions. Manual determination of mass concentration of particulate matter.

Web addresses

The final consultation drafts and final published versions of all guidance notes in this series can be found on **www.defra.gov.uk/environment/index.htm**.

Welsh Assembly Government web-site **www.wales.gov.uk**.

Local Authority Unit of the Environment Agency for England and Wales. **www.environment-agency.gov.uk**.

Scottish Environment Protection Agency (SEPA) **www.sepa.org.uk**.

Energy saving and environmental management measures can increase industry profits. Envirowise (formerly ETBPP) show how at **www.envirowise.gov.uk** (or freephone 0800 585794).

Appendix 1: Extract from Pollution Prevention and Control (England and Wales)[7] Regulations 2000 SI 1973[8]

(The processes for local air pollution prevention and control are listed under "Part B". The "Part A1" processes are for national regulatory control. The "Part A2" processes are subject to local authority integrated pollution prevention and control.)

Section 3.1 - Production of Cement and Lime

Part A1

(a) Producing or grinding cement clinker.

(b) Producing lime -

(i) in kilns or other furnaces with a production capacity of more than 50 tonnes per day; or

(ii) where the activity is likely to involve the heating in any period of 12 months of 5,000 tonnes or more of calcium carbonate or calcium magnesium carbonate or, in aggregate, or both.

Part A2

Nil.

Part B

(a) Storing, loading or unloading cement or cement clinker in bulk prior to further transportation in bulk.

(b) Blending cement in bulk or using cement in bulk other than at a construction site, including the bagging of cement and cement mixtures, the batching of ready-mixed concrete and the manufacture of concrete blocks and other cement products.

(c) Slaking lime for the purpose of making calcium hydroxide or calcium magnesium hydroxide.

(d) Producing lime where the activity is not likely to involve the heating in any period of 12 months of 5,000 tonnes or more of calcium carbonate or calcium magnesium carbonate or, in aggregate, of both.

7. For activities carried out in Scotland the PPC (Scotland) Regulations should be referred to. For activities carried out in Ireland the PPC (Ireland) Regulations should be referred to.

8. Every effort has been taken to ensure that this Appendix is correct at the date of publication, but readers should note that the Regulations are likely to be subject to periodic amendment, and this Appendix should not therefore be relied upon as representing the up-to-date position after the publication date.

4

FERME PARK, HORNSEY

PROPOSED CONCRETE PLANT

EVALUATION OF HEALTH ISSUES

By Dr. A.J. Ingram
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UK & EUROTOX Reg. Toxicologist

November 2005

1. Introduction

1.1. This health assessment concerns a proposal by London Concrete Ltd (LC) to construct and operate a concrete batching plant at Ferme Park, Hornsey, North London.

1.2. At earlier stages of this proposal, statements suggesting that silicosis, lung cancer and increased incidence of asthma might result from dust and increased traffic movements resulting from the proposed plant were made [1]. No reasons for refusal are now advanced on this basis.

1.3. Dr A.J. Ingram was instructed to examine and evaluate the health issues relating to the concrete batch plant and prepare a report.

1.4. The proposed concrete plant is of modern design, being fully enclosed, with aggregates and sand being delivered by rail and carried to hoppers within the plant by covered conveyers. Cement and other materials are to be supplied by road and transferred by hose to silos within the plant. The loading bay is enclosed on three sides and provided with air extraction and filters.

2. Materials to be Handled on the Proposed Site, Hazards and any health effects

2.1. The materials that are proposed for use in the concrete batching plant are cement, natural aggregates, sand, pulverised-fuel ash PFA and additives to improve the properties of the product (Pozzolith 300N and Pozzolith AEP). Pozzolith 300N and Pozzolith AEP [2,3] are not classified as dangerous and are only added in small amounts. They present no health hazard. They will not be discussed further.

(i) Cement [4,5]

2.2. Under conditions of very high exposure, cement dust and wet cement can be irritant to the skin, eyes and respiratory tract; however such effects are not seen with low levels of exposure. As the silica in cement is mainly in a combined form (only 1% free crystalline silica), silicosis is unlikely to result from exposure to Portland cement [6]. Hence, where exposure levels are kept below the occupational exposure limits for a nuisance dust of 10 mg/m^3 (8hr TWA) of inhalable dust and 4 mg/m^3 (8hr TWA) for respirable dust [7], no adverse health effects are produced.

(ii) Pulverised-Fuel Ash PFA [8,9]

2.3. This is produced from ash from coal-fired power plants, being supplied in powder or granulated form. Although it contains high levels of silica, this is in a vitreous form due to the high temperatures to which it has been exposed.

Only very small amounts of crystalline silica are present and most of this is larger than the respirable range. Hence, this will not produce adverse health effects where exposure to dust does not exceed levels for a nuisance dust {10 mg/m^3 (8hr TWA) of inhalable dust and 4 mg/m^3 (8hr TWA) for respirable dust [7]}.

(iii) Natural Aggregates and Sand [10,11,12]

2.4. Neither of these are classified as dangerous for supply but both contain high levels of crystalline silica. Despite this, most of the silica is of too large a particle size to be inhaled and very little is in the respirable range (<10 mμ in size). It is only silica in the respirable range that gives rise to silicosis. In situations where large amounts of natural aggregates and sand are handled, it is necessary to avoid dust generation and to monitor dust levels to ensure that they are kept within the prescribed limits indicated below:

Occupational Exposure Limits [7]

Total inhalable dust	10 mg/m^3 (8hr TWA)
Respirable Dust	4 mg/m^3 (8hr TWA)
Respirable Silica	0.3 mg/m^3 MEL (8hr TWA)

2.5. As the limit for respirable crystalline silica is a maximum exposure limit (MEL), it is recommended by the HSE that levels are kept below 0.1 mg/m^3. At levels below this no silicosis or other adverse health effects are likely to occur.

2.6. As monitoring at eight other concrete plants operated by London Concrete showed that levels for respirable crystalline silica (RCS) in the batching area and in the yard outside were 0.03 mg/m^3 or less, it can be concluded that no adverse health effects are likely to result from the operation of proposed concrete plant due to levels of RCS. Also, as other dust measurements were well below occupational limits, it can be concluded that no adverse health effects are likely to arise from nuisance dust arising from gravel, sand or any of the other ingredients of concrete.

(iv) Mineral particles, PM_{10} exhaust emissions and asthma

2.7. Asthma is a condition common in childhood that in some cases persists into adult life. It usually develops as a result of an immunological response. Immunological responses are produced by animal, plant, bacterial or viral proteins that can act as antigens. Asthma is usually a Type 1 hypersensitivity reaction involving an immunoglobulin E (IgE) response directed against environmental antigens such as house-dust mites, pollen or animal dander [15]. When these agents are encountered, mast cell granules are released, giving rise to constriction of the bronchi, which results in an asthmatic attack.

2.8. Mineral particles are not allergenic and would therefore not be expected to give rise to asthma. Also, as amounts of inhalable and respirable dust released from the proposed concrete plant will be well within permitted

limits, no enhancement of a pre-existing asthmatic condition is likely to occur in nearby receptors.

2.9. There has been much speculation on the causes of the increased incidence of asthma and it has been suggested that exposure to cigarette smoke and air pollutants, including PM_{10} diesel exhaust particulates, may play a part. However, as diesel particulates are non-allergenic, any role they might have would probably be an enhancement of a pre-existing asthmatic condition and even this is unproven [16]. As the small increase in traffic movements associated with the proposed concrete batching plant is unlikely to significantly increase pollution levels, no increase in asthma incidence would be expected to result from this.

3. Conclusions

3.1. Examination of the materials handled in the proposed concrete plant reveals that the main health issue relates to dust levels, including respirable crystalline silica. As the design of the proposed plant minimises dust generation and release, no adverse health effects will be likely to be suffered by workers operating the plant or neighbouring receptors. This is confirmed by dust monitoring at other concrete plants operated by London Concrete.

3.2. Hence, there is no likelihood of silicosis or lung cancer resulting from the operation of the proposed concrete batching plant in workers or neighbouring receptors.

3.3. The suggestion that operation of the proposed concrete plant may lead to an increase in asthma incidence is not credible. Mineral particles do not have the right properties to cause asthma and likely respirable dust release from the plant is expected to be minimal. Also, the small increase in traffic movements is unlikely to significantly affect PM_{10} air pollution levels, which in any case have not been proven to affect asthma incidence. Furthermore, there have been increases in asthma incidence in situations where there have been general improvements in air quality [17].

3.4. Providing that the plant is constructed and operated as specified, there are no health reasons why this consent should be refused.

4. References

1. Green N8 (2005) Would you like a concrete factory to be built here in the heart of our densely populated residential neighbourhood http://www.greenn8.org.uk/ .
2. Material Safety Data Sheet Pozzolith 300N Feb MBT, Albany House, Swinton Hall Road, Swinton, Manchester.
3. Material Safety Data Sheet Pozzolith AEP Feb Limited, Albany House, Swinton Hall Road, Swinton, Manchester.
4. Health and Safety Data Sheet(undated) Cement. Rugby Cement, Crown House, Rugby.
5. HSE information Sheet (Undated) Cement Construction information sheet No 26 (Revision 2). HSE Books, PO Box 1999, Sudbury, Suffolk

6. National Institute for Occupational Health and Safety (NIOSH) (1977) Portland Cement. (P431-433) Occupational Diseases A Guide to their recognition. National Institute for Occupational Health and Safety (NIOSH), US Department of Health, Education and Welfare.
7. EH40/2005 List of approved workplace exposure limits. HSE Books, PO Box 1999, Sudbury, Suffolk.
8. COSHH Data Sheet No 1. Pulverised-Fuel Ash (PFA). Ash Resources Ltd, West Burto, Near Retford, Notts.
9. Health and Safety Data Sheet Lytag granular lightweight aggregate (pelletted pulverised fuel ash (PFA) Euromin Limited, Turberville Wharf, Albion Street, Southwick, Brighton
10. Safety Data Sheet (Undated) Natural Aggregates. Bardon Aggregates, Greystones, Huncote Road Croft Leicester.
11. Health & Safety Product Data Sheet (Undated) Natural Aggregates. Arc Ltd., The Ridge, Chipping Sodbury, Bristol, Avon.
12. Safety (MSDS) data for Sand. http://physchem.ox.ac.uk/MSDS/SA/sand.html
13. HSE information Sheet (1999) Silica Construction information sheet No 36 (Revision 1). HSE Books, PO Box 1999, Sudbury, Suffolk
14. Advance Environmental (2003) Occupational Dust Monitoring Surveys. carried out at the London Concrete plants of Aggregate Industries UK Limited at the following locations: Neasdon, Purley, Gerrards Cross, Bow, Greenwich, Heathrow, Brentford, Wembley.
15. Roitt I., Brostoff J & Male D. (1993) Immunology (Third Edition) Publ. Mosby, London.
16. CONCAWE (1999) The health effects of $PM_{2.5}$ (including ultrafine particles) 1-98. Report No 99/60 CONCAWE , Brussels.
17. Public Health Advisory Board Asthma: Epidemic Increase – Cause Unknown. Public Health Advisory Board Washington DC http://www.phpab.org/asthma%20report/asthma%20web%20version1.htm

5

possibility independent auditing) of site operations. An EMS should therefore be formally agreed between the operator and regulator before work commences on site.

General guidance on Environmental Management Systems is provided by the British Standards Institute (BS7750:1992 - Specification for an Environmental Management System). 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.

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.

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.

3.4 Dust Standards and Monitoring

Dust Standards and Guidelines

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, however, a wide range of dust guidelines in use for specific monitoring devices and sites.

Of the various 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 various qualifications. This makes comparison between different methods, and therefore guidelines difficult. Various guidelines and standards are summarised in Table 3.1 below, and are considered further in Volume Two of this report.

Some of these guidelines and standards, particularly those that measure airborne dust concentrations such as the UK Occupational Exposure standards, relate specifically to health effects rather than nuisance effects. An EC standard for suspended particulates applies to the UK, and though it does not specify the impacts to which it applies, has more in common with health related effects. The UK Expert Panel on Air Quality Standards (EPAQs) is likely to recommend a standard for 'particles' in the near future, though this will solely apply to health effects. The EPAQs standard will apply to all fine dust (PM10) particles, including PM10 dust from mineral workings,but is primarily concerned with products of combustion such as those found in vehicle exhaust emissions. The study recognises, therefore, that consideration of PM10 dust at mineral sites will be increasingly required in future. However, the study concluded that the use of guidelines and standards relating to health effects are not appropriate or useful for determining nuisance effects from mineral sites. This is because nuisance effects are predominantly caused by deposition of coarse dusts, whilst health effects may result from inhalation of fine airborne dust. The deposition rate of PM10 dusts is extremely small in relation to the rate of deposition of coarser dust.

There are various guidelines which have been defined specifically for dust nuisance impacts. These incorporate a wide range of values and little consensus has emerged on the levels used. The study has found little basis for applying any of these guidelines as a definitive absolute dust nuisance standard for the UK, particularly given the:

- inherent differences in the efficiency of dust monitoring devices;
- lack of supporting survey information on the perception of dust nuisance, and the levels of dust at which an impact can be recognised to occur;
- limited consistent data on UK dust deposition;
- wide variability in dust emissions and depositions from sites;

- confounding effect of background dust levels and alternative dust sources;
- range of different sensitivities of properties/ receptors to dust.

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 any of these guidelines. In particular, the study recommends that no one definitive absolute standard should be defined for the nuisance effects of mineral dust, and that the emphasis in the regulation and control of dust should be the adoption and promotion of best practices on site (see Volume 2 of this Report). 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.

Dust guidelines can be developed alongside dust monitoring techniques (and particularly for indicators of dust soiling). These guidelines will relate to a specific site and to those activities that take place within the site. The study recommends that such guidelines should continue to be developed on a site specific basis. 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. The Best Practice Guide to Dust Monitoring provides advice and information on identifying suitable site specific guidelines in association with site monitoring.

Monitoring

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. For these reasons, detailed, and long term, dust monitoring is required to fully describe background levels and site dust deposition patterns.

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 study considers that the aims and purpose of dust monitoring need to be clear if it is to be effective. Consideration also 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).

Further information on the types of dust monitoring techniques available, and advice on suitable dust monitoring programmes are given in the Best Practice Guide to Dust Monitoring in this Report.

6

Contaminated Land
Air Quality
Environmental Audit

SMITH GRANT
Environmental Consultancy
LLP

Partnership No: OC 300776

CONCRETE BATCHING PLANT
at FERME PARK, HORNSEY
DUST MANAGEMENT SCHEME
for: NETWORK RAIL and LONDON CONCRETE Ltd

November 2005

R616-R04

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1 Introduction

1.1 London Concrete has applied to Haringey Council for permission to construct and operate a concrete batching plant on railway land at Ferme Park, Hornsey. Aggregates for use in the process will be delivered to the site by rail.

1.2 In parallel with the planning application, London Concrete has applied to the Council for a Local Authority Pollution Prevention and Control (LAPPC) permit to carry on the process.

1.3 During consideration of the planning application, which is at present the subject of an appeal, Smith Grant Partnership (SGP) was instructed, on behalf of London Concrete and Network Rail, to prepare a dust management scheme for the operation of the plant, the provisions of which will be secured via a Section 106 unilateral undertaking.

1.4 The dust management scheme will form an integral part of the environmental management controls at the plant. This is consistent with the guidance in PGN 3/1 (04) [1], which notes the desirability of a structured approach to environmental management.

1.5 The Council has indicated that, if permission is granted, it is likely to include a condition requiring assurance that appropriate measures are taken during the construction phase to limit impact and to use the draft London Code of Practice, Part 1: *The Control of Dust from Construction*. As the control of construction dust will be secured through planning, it is not therefore included in this scheme.

2 Description of Proposed Development and Site Setting

2.1 Aggregates will be imported by rail via a bottom discharge hopper into storage bins and will be transferred as required directly into the batching plant by conveyor. The discharge hopper, storage bins and conveyors will be fully enclosed. The batching plant will also be fully enclosed and will be equipped with extraction ducts to retain any dust from the weighing and loading areas. The cement silos will be fitted with alarms and pressure relief valves and will be vented through reverse jet filters. Wet or slurry mixes will be used predominantly during batching operations. The loading bay will be covered and enclosed on three sides to provide shelter from the wind and to contain any dust which might be released. The yard will be surfaced with concrete.

2.2 The site setting is urban, with industrial land on Cranford Way to the north, housing at Chettle Court to the south and Uplands Road to the west, a main railway line to the east and, beyond that, further housing at Wightman Road. A children's play area lies below Chettle Court and the edge of the railway land is designated as a "green corridor". There is little effective screening from the effects of dust between the site and the closest potentially sensitive receptors.

2.3 The annual wind rose for Heathrow indicates that the prevailing winds in the area blow from the south, southwest and west, ie, from the site towards the railway tracks, for a total of 54% of the time annually.

3 Potential for Emissions

3.1 The nature of the proposed operation is such that, in the absence of adequate management controls, airborne dust could be raised from the site. As advised in guidance [2], coarse dust particles greater than 30µm make up the greatest proportion of dust emitted from mineral workings and associated operations, and are largely deposited within 100m of the dust source(s). Adverse impacts are therefore most likely to be experienced within this distance.

3.2 The principal potential sources of dust emissions have been identified as:

- aggregate discharge and storage,
- conveyors,
- cement discharge operations,
- concrete batching and discharge,
- transport and plant movements,
- spillages, and
- housekeeping.

[1] Process Guidance Note 3/1 (04), *Secretary of State's Guidance for Blending, Packing, Loading, Unloading and Use of Bulk Cement*, DEFRA, 2004
[2] *The Environmental Effects of Dust from Surface Mineral Workings*, HMSO, 1995

4 Means of Prevention

4.1 General Requirements

4.1.1 The technical details of the process are specified in the LAPPC application for the process and are not reiterated here. The objective of this scheme is to specify the management measures to control the likely sources of dust during normal operations and abnormal occurrences. These measures are based on the adoption of best available techniques (BAT) as detailed in PGN 3/1 (04) and relevant parts of current best practice for minerals extraction [3].

4.1.2 The guidance details standard good practices which are accepted by the Government and the minerals industry as providing effective protection against the effects of airborne dust. The essence of the guidance is that any impacts can be controlled by effective site management.

4.2 Weather Conditions

4.2.1 With the effective enclosure of all potentially dusty processes, normal operations at the site are not considered to be susceptible to the weather conditions. However, as an over-riding requirement, during dry or windy weather, if any operations are identified as causing or likely to cause visible emissions across the site boundary, or if abnormal emissions are observed within the site, then the Site Manager will immediately modify, reduce or suspend those operations until either effective remedial actions can be taken or the weather conditions giving rise to the emissions have moderated.

4.3 Aggregate Discharge and Storage

4.3.1 If on delivery, the aggregates are found to be dry and potentially dusty, they will be conditioned with water prior to discharge from the rail wagons. During discharge operations, further water will be applied as necessary to control any visible dust.

4.3.2 The rate of discharge will be controlled to ensure that the hopper and bins are not over-filled and that conveyors are not over-loaded.

[3] Minerals Policy Statement 2, Appendix 1B, *Methods for Reducing and Controlling Dust*, ODPM, 2005

4.3.3 External doors and other openings to the clad structures enclosing potentially dusty operations will be kept closed whilst those operations are in progress.

4.4 Conveyors

4.4.1 Conveyor belts and rollers will be inspected daily for wear and alignment and adjusted or repaired as necessary.

4.4.2 Effective scrapers will be fitted to the return belts. All scraped material will be collected up for re-incorporation or disposal.

4.4.3 The covers to the conveyors and discharge points will be checked weekly and repaired or replaced as necessary to ensure full protection from the weather.

4.4.4 Care will be taken at all times to ensure that the conveyors are not over-loaded.

4.4.5 The areas below the conveyor belts will be checked for spillages at weekly intervals. In the event of any spillages, the cause will be investigated and rectified. Any spillages will be cleaned up promptly.

4.5 Cement Discharge Operations

4.5.1 On arrival on site, the tanker driver will report to the Site Manager.

4.5.2 The Site Manager will satisfy himself that all alarms, pressure relief valves and filters have been checked and are operational, in accordance with the maintenance schedule, before any cement [4] is discharged from the road tanker into a silo.

4.5.3 All discharge operations will be carried out strictly in accordance with the written procedures.

4.5.4 The tanker driver will attend the discharge controls throughout the operation and will immediately cease discharging cement should any alarm sound or if a visible emission occurs. The Site Manager will be informed promptly and no further discharge will take place until the cause of the incident has been identified and remedied.

[4] In this context, "cement" includes any other cementitious or fine-grained powder

4.6 Concrete Batching and Discharge

4.6.1 The dust extraction system at the loading bay will be switched on before batching commences.

4.6.2 Batching will not commence until the batcher man is satisfied that the truck mixer is correctly positioned under the discharge point.

4.6.3 The trunking at the discharge point will be checked weekly for wear and / or splits and will be repaired or replaced as necessary.

4.6.4 Batching will be suspended immediately if any spillages occur or in event of persistent dust emissions outside the loading bay. The cause of any spillages or persistent dust emissions will be investigated and appropriate remedial action will be taken. Any spillages will be cleaned up promptly and the rear of the truck mixer will be washed down as necessary.

4.6.5 Dry batching will be carried out only when the wet pan is unavailable for maintenance or repair. To minimise the need for dry batching, and where practical, maintenance and repairs will be carried out when batching is not taking place.

4.6.6 External doors and other openings to the clad structure of the plant will be kept closed whilst batching is in progress.

4.7 Transport and Plant Movements

4.7.1 The yard and the access from Cranford Way will be surfaced with concrete or tarmacadam.

4.7.2 A road sweeper will be deployed at least twice-weekly to clean the running areas of the yard and the access route along Cranford Way.

4.7.3 The surface of the yard and Cranford Way will be inspected daily for the presence of deposits of loose material and track-out. Further sweeping will take place as necessary. Arrangements will be made to ensure the ready availability of a road sweeper for this purpose.

4.7.4 The site surfaces will be regularly checked for wear, and any potholes or other defects will be made good promptly.

4.7.5 During dry conditions, the surface of the yard will be hosed down as necessary.

4.7.6 All site plant and heavy goods vehicles will be fitted with upward exhausts to minimise the disturbance of any material from the running surfaces.

4.7.7 A site speed limit of ten miles per hour will be enforced for all vehicles to minimise the entrainment of dust into the atmosphere.

4.7.8 All heavy goods vehicles leaving the site will be checked beforehand by the driver, and will be cleaned as necessary to ensure that material is not dropped on the access road or on the public highway. A high pressure hose and water supply will be kept available at all times to clean the wheels, chassis and other parts of vehicles as required.

4.7.9 The exhaust emissions of all vehicles and plant will be regularly checked. All vehicles and plant owned by London Concrete emitting black smoke will be taken out of service for maintenance checks and repairs. Any other vehicles emitting black smoke will be turned away from the site with the instruction that the matter be remedied before the vehicle is allowed to return.

4.8 Spillages

4.8.1 Any spillages of aggregates or cement will be sprayed as necessary with water and cleaned up promptly. Particular attention will be paid to the area around the bottom discharge unit, the areas under conveyors and other inaccessible parts of the site.

4.9 Housekeeping

4.9.1 All clad structures will be inspected at monthly intervals and repaired as necessary to prevent fugitive dust emissions.

4.9.2 All cladding and external structures will be cleaned at least annually and will be repaired or painted as necessary.

4.9.3 All non-running areas of the yard will be cleared of all deposits and other materials to prevent wind blown dust and to present a tidy workmanlike appearance.

5 Maintenance

5.1 Effective control of airborne dust emissions requires the maintenance and proper use of all plant and equipment. A programme of planned maintenance will be carried out on all plant, in accordance with the manufacturers' recommendations, to ensure that it operates at optimum efficiency.

5.2 Stocks of essential spares and consumable items will be held at the plant or kept readily available for use at short notice.

5.3 Any malfunction or breakdown leading to abnormal emissions will be dealt with promptly and operations will be adjusted or suspended until normal working can be restored. All such malfunctions will be recorded in the site logbook.

5.4 The water supply shall be adequately protected against frost to ensure its availability for dust suppression at all times.

6 Site Management

6.1 The Site Manager will exercise, either personally or by delegation to suitably trained and responsible staff, day to day control on the site. He will be responsible for ensuring full compliance with the dust management scheme and the satisfactory working of the whole site.

6.2 Staff at all levels will receive the necessary training and instruction in their duties relating to all operations and the potential sources of dust emissions. Particular emphasis will be given to dealing with plant malfunctions and abnormal conditions.

6.3 Any member of staff who wilfully or negligently fails to comply with the provisions of the dust management scheme will be subject to disciplinary action. Any external hauliers who fail to observe the requirements in respect of vehicle operations will be banned from the site.

6.4 The Site Manager will ensure that a high standard of housekeeping is maintained at all times.

7 Emissions Monitoring

7.1 All activities with the potential to cause airborne dust emissions will be monitored at the start of operations and subsequently at least every four hours throughout the working day. This will include a visual assessment of any impacts at the downwind site boundary.

7.2 All observations and findings, including wind and other weather conditions, will be recorded in the site logbook.

7.3 Should visible dust be generated, the Site Manager will act promptly to identify the source(s) of the dust and take the necessary corrective action. Each event, its cause and the action taken will be recorded in the site logbook.

7.4 If necessary, the Site Manager will instruct the suspension of any operation or process causing visible dust emissions more than 10m from the source or crossing the site boundary until such time as the situation has been resolved.

7.5 Site staff will be instructed to inform the Site Manager whenever visible dust emissions are observed, or appear likely to occur, as a result of any operation or process.

8 Emergency Response

8.1 An emergency response procedure, to be followed by all site staff and cement delivery drivers in the event of a major dust emission, was submitted with the LAPPC application, and will be appended to any permit which may be issued.

8.2 Laminated copies of the procedure will be posted in the control cabin and workplace canteen, and at the bottom discharge unit, cement silo inlets and concrete loading bay to ensure that the correct actions are taken in the event of a major dust emissions.

8.3 For the purposes of emergency response, major dust emissions will be defined as including

- any visible dust crossing the site boundary,
- any visible dust escaping from clad structures,
- persistent visible dust during the unloading and transfer of aggregates into the storage bins and batching plant,
- any visible cement emissions during delivery operations,

- persistent visible dust during dry batching and loading operations,
- persistent visible dust from transport and plant movements, and
- persistent wind blown dust in the yard.

8.4 The contact details of key personnel and organisations will be listed in the procedure.

9 Complaints

9.1 All complaints will be recorded and reported to the Site Manager, who will investigate the circumstances and ensure that the necessary corrective measures are taken. A prompt response will be made to the complainant and a record, including copies of all correspondence and telephone filenotes, will be made in the complaints register.

9.2 The Council will be advised, in writing within one week, of any dust complaint received together with details of the findings of the investigation and any corrective measures which have been taken.

9.3 In the event of any substantiated complaint, the continuing effectiveness of the dust management scheme will be subject to review in response to the incident.

10 Review and Update

10.1 The continued effectiveness of the dust management scheme will be subject to periodic review in consultation with the Council and update. The review process will take into account the complaints history of the site, observations of dust and any future potentially sensitive developments on neighbouring land.

10.2 Reviews of the scheme will also be undertaken if:

a) the pollution from the installation is of such significance that the existing emission limit values need to be revised,
b) substantial changes in BAT make it possible to reduce significantly emissions from the installation without imposing excessive costs, or
c) operational safety of the activities carried out in the installation requires other techniques to be used.

7

Appendix 1B. Methods for Reducing and Controlling Dust

1B.1 This Appendix outlines issues for consideration when designing mineral operations in relation to reducing and controlling dust emissions.

SITE LAYOUT

1B.2 Sufficient time and thought needs to be devoted to site design, including the phasing of operations to allow careful consideration of the relationship of activities within the site to sensitive areas outside it. As far as possible, dust-generating activities should be located away from residential properties/sensitive premises/users (summarised in Table 1A2), and dust management issues reflected within the site design. Where appropriate, the distance between sensitive uses and dust-generating activities should be maximised. Ideally, the results of a dust assessment study (see Appendix 1C) should be used to inform site design.

1B.3 Other factors that should be taken into account in the layout of a site to reduce dust impacts are:

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

METHOD OF WORKING

1B.4 The location of dust-generating activities can 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.

1B.5 Some activities should ideally be undertaken only during favourable weather conditions. Where possible, extended periods of dry and windy conditions should be avoided. This should be taken into account in framing conditions specified for activities such as:

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

Such specifications should also take account of other factors, such as the need to avoid moving top and subsoils during wet weather to protect soil structure. The potential for different activities to generate dust during the life of a mineral working needs to be carefully considered. There may be circumstances when it would be preferable to allow higher limits during a shorter period than to maintain lower limits over a longer period. Table 1B1 summarises site operations which can emit dust and possible methods of control.

Table 1B1 Summary of Site Operations and Possible Methods of Controlling Dust (after *Arup Environmental 1995*)

Activity	Possible Dust Control Methods
Soil handling and storage	• Restrict the duration of the activity. Seal and seed storage storage mound surfaces as soon as is practicable. • Protect surfaces from winds until disturbed areas are sealed and stable.
Overburden handling	• 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 unless mound surface has formed a crust after rainfall or is grassed. • Minimise handling.
Drilling and blasting	• 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	• Reduce drop heights wherever practicable. • Protect activities from wind.
Minerals processing	• 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	• Dampen material. • Protect from wind and store under cover. • Screen material to remove dusty fractions prior to external storage.
Transport by conveyor within site	• 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 offsite	• Restrict vehicle speed. • Water unsurfaced roads and paved roads. • Wheel or body wash at an appropriate distance from site entrance. This should always be within the site and the roadway from the washing facility to the highway should be hard-surfaced. • 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/wash paved roads. • Use paved roads where practicable.

1B.6 Minerals site working requires the operation of a wide range of machinery, including powerful, earth-moving equipment and rock-crushing plant. The potential for emission of dust from some of this equipment is high, although in many cases mitigation techniques can substantially reduce this potential.

Table 1B2 Summary of Possible Measures for Reducing and Controlling Dust

Mineral Planning Authorities should:

- liaise with the pollution control authority under the EPA 1990;
- consider objectives for PM_{10} under the Air Quality Regulations 2000;
- consider the need to agree or specify where appropriate 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, vapour masts and sweepers on haul roads, stockpiles;
  - design of handling systems, drop heights, windguards, loading points;
  - use of chemical binders on haul roads and stockpiles (consult the Environment Agency);
  - the provision of monitoring facilities.

Operators should:

- minimise the creation of dust by planning and design where appropriate e.g. by:
  - the use of conveyors rather than haul roads;
  - locating haul roads, tips and stockpiles away and downwind from neighbours;
  - creating 'sensitive zones' within which dust-generating activities are limited;
  - planning layout and constructing stockpiles, tips and mounds to minimise dust creation;
  - the use of a crushing and screening plant within its design capacity;
  - minimising the height of fall material and the use of appropriate chippings for stemming.
- control the escape of dust and remove dust where appropriate e.g. by:
  - enclosing conveyors, chutes, process plant, stockpiles;
  - providing dust-removal processing for plant and loading areas;
  - using sprays, mists, microfoam or foam;
  - fitting outlets with cyclones, wet scrubbers or filters;
  - insisting on good maintenance of all plant and equipment;
  - ensuring compact, grade, surface and maintenance of haul roads;
  - fitting dust extractors, filters and collectors on drilling rigs;
  - restricting dust-generating activities to sheltered areas;
  - using windbreaks/netting screens/semi-permeable fences, tress and shrubs;
  - limiting drop heights in stockpiling, processing and loading operations;
  - fitting windboards/hoods to conveyors/transfer points;
    reducing speeds and limit movement of vehicles, and/or using upswept exhausts (check implications for noise);
  - using water bowsers, road sweepers, sprays and vapour masts as necessary;
  - spraying exposed surfaces e.g. unsurfaced haul roads, stockpiles, with chemical binders (consult the Environment Agency);
  - vegetating exposed surfaces (e.g. overburden mounds) with quick-growing plants;
  - limiting spillage and facilitating its removal by the use of hard surfaces;
  - sweeping haul roads and other dusty surfaces;
  - shaking-off dirt from vehicles and/or providing vehicle-washing facilities;
  - providing a surfaced road between washing facilities and site exit;
  - using linings (in loading chutes and lorries);
  - using closed or sheeted vehicles carrying dry material.
- temporarily suspend activities if unacceptable levels of dust cannot be avoided; and
- consider the provision of an on-site weather station.

1B.7 Information on site management (i.e. Environmental Management Systems) is given in Appendix B (*Environmental Management Systems*) to MPS2: *Controlling and Mitigating the Environmental Effects of Minerals Extraction in England.*

1B.8 Operators should consider the measures suggested in Table 1B2 (see page 35) when framing applications and proposing conditions to be attached to planning applications. MPAs should also consider them when assessing planning applications and conditions for new or extended mineral operations, and when reviewing conditions for existing operations.