1 Introduction

1.1 This note is issued by the Secretary of State, the National Assembly for Wales and the Scottish Executive ("the Government") to give guidance on the conditions appropriate for the control of emissions into the air from hide and skin processes/ installations[1]. It supersedes guidance notes PG6/21(92) published in February 1992 and PG6/21(96) published in September 1996.

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 processes and 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) 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 or 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.

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" and "activities" 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 purposes 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, hide and skin 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 [general guidance, paras]

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

- hide and skin processes
- 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/BATNEEC 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**.
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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 1st October 1995. 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

Provision	Relevant Paragraph/ Row	Compliance Date
Inclusion of continuous monitoring provisions for odour arrestment plant	**5.12**	Within 24 months of the publication of this note.
Daily inspection of odour arrestment and air handling plant	**5.14**	Within 3 months of the publication of this note.
Monitoring of arrestment plant performance - particulate matter and volatile organic compounds (VOCs)	**5.16** and **5.17**	Within 24 months of the publication of this note.
Provision for solvent management plan	**5.17**	Within 12 months of the publication of this note.
Testing of odour arrestment efficiency annually and inclusion of BS EN method	**5.18**	Within 12 months of the publication of this note.
Provision for mist eliminator for scrubbers	**6.8**	Within 12 months of the publication of this note.
Restriction of use of VOCs with risk phrases R45, R46, R49, R60 and R61	**6.9**	Within 24 months of the publication of this note.
Provision for an Odour Response Procedure	**6.29**	Within 3 months of the publication of this note.
Inclusion of a standard for odour arrestment efficiency	**Table 3** Row 2	Within 24 months of the publication of this note.
Inclusion of provisions to limit the sulphur content of fuel where a thermal system is used for odour arrestment	**Table 3**, Rows 3 and 4	Within 6 months of the publication of this note.
Introduction of emission limits for particulate matter and reduction of limits for VOCs	**Table 3**, Rows 5, 6 and 7	Within 24 months of the publication of this note.
Indicative guide values of 1ppm for releases of ammonia, amines and mercaptans instead of absolute limits	**Table 4**	Within 24 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 24 months of the publication of this note.

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

Relaxation of conditions

2.4 Where requirements 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 charge 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 [legal/ procedural guidance being drafted]. 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 Hide and Skin Processes are prescribed for:

- Local air pollution control, LAPC, under section 6.9 Part B of Schedule 1 to the Environmental Protection (Prescribed Processes and Substances) Regulations 1991, SI 472 (as amended).
- Local air pollution prevention and control, LAPPC, under section 6.8 Part B of Schedule 1 of the Pollution Prevention and Control (England and Wales) Regulations 2000 SI 1973.[6]

In the event that any of the following definitions apply, such processes are prescribed for national regulatory agency integrated pollution prevention and control, IPPC, in accordance with the Pollution Prevention and Control (England and Wales) Regulations 2000 SI 1973:

(1) may result in the release into water of any substance listed in paragraph 13 of Part 2 of Schedule 1 in a quantity which, in any period of 12 months, is greater than the background quantity by more than the amount specified in relation to the substance in that paragraph, or

(2) tanning hides and skins at plant with a treatment capacity of more than 12 tonnes of finished products per day

3.2 Regulation 9 (1) requires that no person should operate an installation after the prescribed date except under and to the extent authorised by a permit granted by the regulator. The date for section 6.8 Part B processes in England and Wales is 1st April 2005. (See Schedule 3 Part 2 paragraph 9 (3) regarding applications being deemed to have been made for existing Part B processes) In Scotland the prescribed date is 31st December 2002.

3.3 In respect of the interface with Part A:-

(a) Hide and skin processes may have previously fallen within national regulatory control because they involved the release of a substance prescribed for water into water. Such releases would have been due to adventitious discharge of materials used as pesticides on live animals or for protection during transport. These releases have effectively been eliminated by phasing out the use of organochlorine insecticides in Europe and by careful sourcing of materials from Africa and Asia. Therefore, it is unlikely that hide and skins processes will fall under IPPC control by virtue of the definition in section 6.8 Part (A1) (f) (in paragraph 13 of Part 2 of Schedule 1 of the Regulations).

(b) it is possible that a hide and skin process may involve tanning hides and skins at plant with a treatment capacity of more than 12 tonnes of finished products per day (section 6.8 Part (A1) (a)). In this case the process would fall to national regulatory IPPC control.

3.4 There are certain process operations which are carried out in the processing of hides and skins which are exempt activities and do not fall within the control regime. If the process only involves the salting of hides and skins and no other process detailed in the Regulations, the process is exempted (section 6.8 'exempt activity' (x)).

3.5 This note refers to skin and hide processes and relates to all treatment and processing of animal skin following the delivery of the skin from either a hide and skin market or a slaughter house or a knackers yard, including the fellmongering operation to remove hair or wool (including the fellmongery of sheepskins), tanning (a process which stabilises the skin), and post tanning operations other than surface coating. For the purpose of this note the term "skin" includes skins and hides.

6. In Scotland, section 6.8 Part B of Schedule I of the Pollution Prevention and Control (Scotland) Regulations 2000 (SSI 2000/323).

3.6 Separate guidance has been provided on processes falling within the Part A definition for national regulatory control (IPPC6.08 - Guidance for the Tanning of Hides and Skins Sector - Environment Agency/SEPA/NIEHS). Separate guidance has also been provided on the finishing of leather by the application of coating materials involving the use of 5 tonnes or more of organic solvents in any 12-month period (PG6/22(04) - Secretary of State's Guidance for Leather Finishing.

3.7 The disposal of certain animal by-products fall under the controls of an EU Regulation laying down health rules concerning animal by-products not intended for human consumption (Regulation 1774/2002). This Regulation comes into effect on 30 April 2003 and replaces the controls under the Animal By-Products Order 1999(SI1999/646 as amended). The Regulation specifies the permitted disposal methods for animal by-products, controls and records the movement of animal by-products and also details hygiene requirements in the collection, transport, storage and processing of animal by-products. Whilst the Order specifically excludes skins and hide which are not intended for the production of an animal feedstuff, some of the by-products from a hide and skin process (fleshings and fat recovery operations) may fall within these controls and the Order. Where there is any conflict between the standards of this note and the EU Regulation 1774/2002, the tighter standard should prevail because the Regulation is primarily concerned with the veterinary requirements of animal by-product disposal and for prevention of pathogens in animal feedstuffs.

Process or activity

3.8 In the context of this note, "process" or "activity" comprises the whole process from receipt of raw materials via production of intermediates to dispatch of finished products, including the treating, handling and storage of all materials and wastes relating to the process.

3.9 The hide and skin processing industry spans a wide range of activities and can be sub-divided according to raw material source, since the raw material used largely determines the end market. The main sub-divisions are:

(a) Bovine-hides from cattle and calves are processed into leather for uses which include footwear uppers and soles, leather goods such as handbags and brief cases, upholstery and rugged clothing (for example, motor cycle jackets); and:

(b) Ovine-skins from sheep and lamb divide into two categories, wool sheep skins (i.e. sheep from temperate regions such as Europe, Australia and New Zealand), and hair sheep skins (i.e. sheep from semi-tropical countries, mainly in Africa and Asia). High quality wool sheep skins, particularly from the UK, are processed to produce leather for fashion clothing. Medium-quality skins are used to produce suede or wool-on products, and heavier, generally lower- quality sheep skins are split to produce skivers (for shoe lining, book binding, etc) and chamois.

3.10 Hides and skins from both local and foreign sources may be used and due to the requirement that hides and skins from slaughter houses are collected daily, regional hide markets usually undertake the initial collection and processing of the skins and hides although skins and hides may go directly to a tannery or fellmongery The skin and hide markets collect, classify, weigh and preserve (usually with salt or by chilling) the hides and skins prior to sale to fellmongers and tanners. Imported raw hides and skins are usually salted or brined, or dried, or salted and dried or chilled depending upon the origin. All of these methods of preservation avoid deterioration of the skins.

3.11 Bovine hides are sold from the hide and skin market to tanneries either in the UK or overseas for conversion into leather while the domestic sheep skins are primarily sold to fellmongers for removal and sale of the wool and processing of the pelt to "pickle" with acidulated brine. Some sheep skins are processed with wool on for rugs and coats etc.

3.12 The process operations can be divided into four categories:-

- hide and skin storage and limeyard or beamhouse operations
- tanyard operations
- post-tanning operations; and
- finishing operations

Limeyard or Beamhouse Operations

3.13 Fellmongery processes include a number of stages, typically as follows:

(i) "soaking" commonly using a biocide, for example sodium hypochlorite solution;
(ii) "painting" or "liming" on the flesh side with a depilatory paint containing typically sodium sulphide and lime;
(iii) "pulling" to remove the wool or hair which is then dried;
(iv) further treatment of the skin in alkaline solutions to release the hair roots;
(v) further treatment following pH adjustment involving buffer solutions, for example ammonium sulphate and enzymes prior to rinsing and pickling with acid and salt;
(vi) final fleshing to remove unwanted animal fat remaining on the skin;
(vii) splitting the hides horizontally into a grain layer and a flesh layer (can be carried out in either a limed state or tanned state).

These processes result in a product (pickled pelts) which are stable and can be held in store prior to sale to tanneries.

Tanyard Operations

3.14 The subsequent processing of sheep skins involves further wet operations, including deliming, bating (a process to clear the grain, reduce swelling peptise fibres and remove protein degradation products), degreasing (sometimes with organic solvents), tanning with trivalent chromium salts or other agents (such as cod oil) in large rotating drums or other processing vessels, incorporation of dyes and oils to confer the required properties of colour, softness and stretch prior to drying and finishing.

Post Tanning and Finishing

3.15 A number of mechanical operations are also carried out to remove moisture, flatten and "set" the grain or increase the area including staking. The leather may be processed on either side to produce suede or nappa (grain) and may include the application of decorative or protective surface coatings (subject to separate guidance). There may be additional operations undertaken (such as fatliquoring to replace fat lost in the process to enhance flexibility and impermeability), buffing and milling depending upon the finished product.

3.16 The processing of bovine hides follows a generally similar pattern except that the hides from the hide market are sold direct to tanners who process to the simply tanned condition (known as wet blue), at which stage the hides may be stored and sold on to other processors. Bovine hides do not normally require degreasing. Simply tanned leather may be further processed or traded in a damp (wet blue) or dry (crust) state. Hides may be processed whole or divided into "sides" and it is normal for them to be "split" horizontally by machine to produce two pieces of leather for further processing. Finally, the leather may be embossed or ironed to give a decorative or shiny effect.

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 VOCs (VOCs) from degreasing and process operations which may lead to offensive odour beyond the process boundary. The odorous emissions are a complex cocktail of chemical species and may contain ammonia, hydrogen sulphide, organic sulphur compounds, and VOCs.

4.2 Odours can be released from raw materials and wastes, or from chemicals added during the processing (such as sulphides and ammonia). Also some processes may involve the degreasing of the hide or skin and in these cases VOCs may be emitted. Particulate matter may be emitted from milling and buffing operations. The emissions will depend upon the range of process operations carried out.

Table 2: Potential release points and their emissions

Source	Emission
Raw material reception, storage and handling	Odour
Fleshing	Odour
Liming and de-hairing	Odour and sulphides
De-liming/bating	Odour comprising largely ammonia and hydrogen sulphide Dust from bating agents
Pickling	Acid fumes and odour from sulphides
Degreasing	VOCs
Tanning	Odour and sulphides
Staking, milling and buffing	Dust
Storage, handling and transport of animal waste	Odour
Storage, treatment and discharge of liquid waste and effluent from the process and odour arrestment plant	Odour largely from sulphides and ammonia
Odour arrestment plant discharge	Odour

4.3 The primary odour generation potential is from raw material, waste and effluent handling and some process operations (particularly those involving the use of ammonia or sulphides). In many cases sufficient control of potentially odorous emissions can be achieved by effective process control such as avoiding cross-contamination of ammonia/acid/sulphide effluent streams and avoiding the use of odorous chemical additives wherever possible. Certain process operations cannot be undertaken without the use of odorous chemicals and whilst process management may be sufficient to control odour emissions, in some cases odour arrestment plant may be necessary to prevent offensive odours beyond the process boundary.

4.4 Where the odour arrestment plant comprises a scrubber, emissions of materials which are added to the scrubber for improved performance (such as acids, hypochlorite, sodium hydroxide etc.) may be released with the plume if the scrubber and mist eliminator are not properly managed.

4.5 Where a thermal oxidiser or other combustion plant is used for the arrestment of odours, the emissions will be characteristic of the combustion releases from the fuel. These will include:-

- sulphur dioxide from the burner, influenced by the sulphur content of the fuel.
- oxides of nitrogen from the combustion plant. The emission depends on the nitrogen content of the fuel, the amount of excess air, the flame temperature and the burner type.
- carbon monoxide, which may be emitted if the combustion process is badly managed.
- metals, VOCs, chlorides and fluorides may also be emitted where waste or recovered oil is used in the combustion plant.

Triviality

4.6 There are some processes where the regulator should consider whether the releases are trivial. In general if the process cannot lead to the emission of an offensive odour, VOCs or particulate matter the process releases may be trivial. Examples of the types of process operations which may be regarded as trivial are:-

- those which do not involve degreasing using organic solvents
- where all skins stored or processed arrive in a preserved state (for example chilled or salted)
- where skins are subject to preservation by refrigeration and there is no processing of raw skins
- where the process does not involve the use of sulphides or ammonia
- where particulate matter arrestment plant discharges within the process buildings.

Guidance on triviality is provided in Annex XIV of Ref. **(a)**.

5 Emission limits, monitoring and other provisions

5.1 Subject to paragraph **5.2**, it should be the aim that any location at or beyond the site boundary is free from offensive odour as percieved by the regulator. This should be achieved by applying the process controls, management controls and arrestment provisions of this note.

5.2 The locality of a process site will influence the assessment of the potential for odour impact. In cases where the site has a low odour impact due to its remoteness from sensitive receptors and the escape of offensive odour beyond the site boundary would be unlikely to cause harm, the provision in this note to arrest odorous emissions may not be necessary to demonstrate BAT. In these circumstances it is expected that the operations should be optimised to minimise odour emissions (as outlined in paragraphs **6.15** to **6.28**) and also that effective process management is applied (as outlined in paragraphs **6.29** to **6.30**). Assessment of the potential for odour impact beyond the site boundary should take account of all predicted wind directions and weather conditions which are typical of the location in question.

- Monitoring of emissions should be carried out according to the method specified in this section or by an equivalent method agreed by the regulator.
- The reference conditions for limits in **Table 3** are 273K, 101.3 kPa, without correction for water vapour content.

Table 3: Emission limits, monitoring and other provisions

Row	Substance	Source	Emission limits/ provisions	Type of monitoring	Monitoring frequency (subject to paragraph 5.20)
1	Odour	Odour emissions from contained and fugitive sources.	Aim that any location at or beyond the site boundary is free from offensive odour (subject to the provisions of paragraph 5.2).	Determination by process assessment (see **5.9** and **5.10**)	Daily
2		Contained process releases.	Where installed any odour arrestment plant installed on contained emissions (ventilation air from the process building and cooking vapour) should have an odour removal efficiency of not less than 95%.	Determination by manual extractive sampling and analysis by dynamic olfactometry in accordance with BS EN13725.	Annual
3	Sulphur dioxide	All processes where oil-fired thermal oxidisers or combustion plant are used for odour control.	Maximum concentration of sulphur in fuel 1% wt/wt	Certification by supplier using test method ASTM D86 distillation	Every 3 months and on change of fuel See **5.16**
4		All processes where oil-fired thermal oxidisers or combustion plant are used for odour control and the fuel used is gas oil as defined in the Sulphur Content of Certain Liquid Fuels Directive (1999/32/EC).	Maximum concentration of sulphur in fuel 0.2% wt/wt (before 1/01/2008) 0.1% wt/wt (from 1/01/2008)		

Table 3: Emission limits, monitoring and other provisions

Row	Substance	Source	Emission limits/ provisions	Type of monitoring	Monitoring frequency (subject to paragraph 5.20)
5	Particulate matter	Emissions from mechanical abrasive processes (except where the final discharge of the arrestment plant is within buildings)	20mg/m^3	Indicative monitoring plus annual extractive test to BS ISO 9096: 2003	Continuous
6	VOCs	Emissions from degreasing operations involving the use of halogenated VOCs.	20mg/m^3 expressed as total carbon excluding particulate matter	Extractive test to BS EN 13526:2002	Annual
7		Emissions from degreasing operations involving the use of VOCs (non -halogenated).	50mg/m^3 expressed as total carbon excluding particulate matter		

5.3 In the case of existing processes where odour arrestment plant has been installed to meet the requirements of the previous guidance notes, the regulator should consider permitting the use of the existing plant until the end of its reasonable operational life provided that emissions from the plant meet the provisions of paragraph **5.1**. The regulator should still require that the available plant is optimised for odour removal and should establish an odour arrestment efficiency based upon operating data. Where emissions from the odour arrestment plant do not meet the provisions of paragraph **5.1**, the plant should be required to be upgraded to the specified efficiency in **Table 3**.

- In determining the 'reasonable operational life' of odour arrestment plant, the operator would be expected to continue to maintain and repair the plant to prolong its operational life. The regulator should consider the physical condition of the arrestment plant (potential for leaks, unavailability of spares, increased frequency of malfunction or failure) and the odour arrestment efficiency (the arrestment plant no longer capable of achieving the interim odour arrestment efficiency determined as above) as key indicators of plant reaching the end of its operational life.

5.4 It may be the case that operators can demonstrate that achieving lower odour removal efficiencies than those in **Table 3** will meet the provisions of paragraph **5.1**.

Existing plant

For existing plant, provided the operator can satisfactorily demonstrate that the operation of plant at lower odour removal efficiencies meets the provisions of **5.1** then these lower odour removal efficiencies shall apply.

New/replacement plant

Where it can be demonstrated that the provisions of paragraph **5.1** are being met new/replacement plant may be operated at odour removal efficiencies lower than those in **Table 3**. In such cases operators should determine, using dispersion modelling for example, what percentage efficiencies are necessary to meet the provisions of paragraph **5.1**. New/replacement plant should, however, be designed to have the capacity to operate at the odour removal efficiencies specified in **Table 3** to ensure that the provisions of **5.1** are met should there be an increase in odorous emissions resulting from changes to the process, practical circumstances or local considerations.

Monitoring, investigations and recording

5.5 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. Monitoring of wind speed and direction should normally not be required (AQ 1 (95) provides guidance on this issue). 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.

Information required by the regulator

5.6 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.

- A summary of the data from continuous monitoring of the performance of the odour, particulate matter and VOC control systems in accordance with paragraphs **5.9**, **5.10** and **5.12** respectively should be submitted to the regulator at least every 6 months, identifying the times, dates and duration of alarm events.
- 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.
- 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.

Odorous emissions - general guidance

5.7 The following general guidance is provided to assist regulators in assessment of compliance with the odour condition of Row 1 in **Table 3**.

Whilst it is possible to measure the odour strength using a standardised method (dynamic olfactometry as detailed in BS EN 13725:2003), it is not possible to use dynamic olfactometry to quantify the offensiveness of the odour. It is also not possible to use dynamic olfactometry as a field measurement.

In general odour effects are not caused by one single pollutant or chemical species, odour is a 'cocktail' of chemical species emitted from a process. The nose is an extremely sensitive receptor of odour - it can respond to small variations in concentration over periods of a few seconds and at concentrations of fractions of a part per billion.

Different people respond differently to the same odour, and the nature of any odour can vary (because of meteorology, process changes etc.) both in time and between different areas very close to one another.

Assessment of offensiveness of odour should take account of the nature of the odour, the frequency with which it arises, and its persistence. Local authorities should bear in mind that dispersal of odour may, from time to time, be adversely affected by temporary meteorological conditions

Visible emissions

5.8 Visible emissions should be limited and monitored as follows. Abnormal emissions require action as described in paragraph **5.9**.

- Emissions from combustion processes used for arrestment of odour should be free from visible smoke.
- 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.

Abnormal events

5.9 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 effect on emissions to air.

- 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
- A simple wind direction indicator (such as a windsock or wind vane) should be installed in order that likely emission paths and areas of potential odour impact can be identified in the case of abnormal emissions.

Indicative tests for odour arrestment plant

5.10 If offensive odours are detected beyond the process boundary or complaints received but there is no obvious cause of odour release it may be necessary to check the odour arrestment plant performance. **Table 4** Provides guide values which would indicate problems with arrestment plant. The following are the indicative tests it is envisaged would normally be used:

- In the case of thermal oxidisers or combustion plant, the combustion efficiency is a good indication of performance. Emissions may be tested for carbon monoxide and the indicative guide value in Row 4 of **Table 4** should be used. If emissions exceed this indicative guide value it is likely that the odour destruction efficiency of the arrestment plant is reduced and it should be further investigated to identify reasons for the reduced performance.
- In the case of biofilters or scrubbers, emissions may be tested for ammonia, amines/amides or mercaptans/hydrogen sulphide and the indicative guide values in Rows 1, 2 and 3 of **Table 4** should be used. If emissions exceed this indicative guide value it is likely that the odour destruction efficiency of the odour arrestment plant is reduced and the scrubber/biofilter should be further investigated to identify reasons for the reduced performance. This testing can be carried out using gas detection tubes. This testing can be carried out using gas detection tubes (further guidance on gas detection tubes is included in **Appendix 2**, paragraph 5).
- In the case of open top biofilters, the sampling method detailed in **Appendix 2** of this note should be used.

The table below provides indicative guide values which if exceeded indicate that the odour destruction efficiency of the arrestment plant is reduced and the plant should be further investigated to identify reasons for the reduced performance.

Table 4: Indicative Guide Values

Row	Odour Indicators	Indicative Guide Values
1	Ammonia	1 ppm v/v
2	Organic and inorganic sulphides including mercaptans and hydrogen sulphide (as total sulphur)	1 ppm v/v
3	Emissions of carbon monoxide from thermal oxidisers or combustion plant.	100 mg/m^3 expressed as a 30-minute mean at 273K and 101.3kPa.
N.B. The above values are only to be used in conjunction with the provisions of paragraph **5.10**		

Continuous monitoring - general

5.11 Whilst there are no reliable continuous emission monitoring options for odours, where thermal oxidation or combustion equipment is used for odour control, continuous monitoring of carbon monoxide is an option (see paragraph **5.11**). Where continuous monitoring (as described in **5.14**, **5.15** and **5.16**) is required it should be carried out as follows:

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

Continuous monitoring - odour arrestment plant

5.12 Where odour arrestment plant is used, continuous monitoring (linked to alarms) should be installed in order to demonstrate compliance with the provisions of this note.

5.13 In the case of thermal oxidisers or combustion plant, emissions should be continuously monitored and continuously recorded for carbon monoxide, or the operating temperature may be used as a surrogate measurement. The monitor should be fitted with an audible and visual alarm to activate if the operating temperature falls below 1123K (850^{o}C) or if the carbon monoxide level exceeds the indicative guide value in Row 3 of **Table 4**.

- In the case of scrubbing equipment, pH or Redox of the liquor and liquor flow should be continuously monitored. All liquid scrubbers should be fitted with an audible and visual alarm to activate if the liquor circulation fails or if the pH or Redox falls outside the operating range established during commissioning testing.
- If a bioscrubber is used, in addition to flow and pH or Redox monitoring, the pressure drop across the scrubber packing should be continuously monitored. The monitor should be fitted with an audible and visual alarm to activate if the pressure drop falls outside the operating range established during commissioning testing.

- If a biofilter is used the pressure drop across the biofilter should be continuously monitored. This can be achieved by measuring the delivery pressure on the main fan. The monitor should be fitted with an audible and visual alarm to activate if the pressure drop falls outside the operating range established during commissioning testing. If the process has more than one fan for different process areas and these fans are not operated when the areas are not in use (for example during the winter period when production levels are low) the value used for alarming may need to be variable depending upon the volume of air being treated and process conditions. In this case, where the alarm level is varied, the set point of the alarm should be recorded.
- The operating levels of the pH, Redox and pressure drop where monitored should be recorded daily.
- The cooling liquid flow of all direct or indirect condensers used for pre-treatment of emissions (including spray tower scrubbers) should be continuously monitored.

Odorous emissions - monitoring installation performance

5.14 The operator should monitor the performance of the installation for emissions which may result in offensive odours beyond the boundary of the site. This assessment should include inspections of the process, buildings and equipment to check that emissions are being contained and treated to meet the standards of this note.

- In addition to the continuous indicative monitoring outlined in paragraph **5.12**, the odour arrestment equipment should be inspected at least once a day to verify correct operation and to identify any malfunctions. Depending upon the type of arrestment plant used, this inspection should include:
- The odour arrestment plant should be inspected at least once a day to verify correct operation and to identify any malfunctions. This inspection should include:
  - identification of any leaks in air handling equipment and ductwork
  - in the case of scrubbing equipment, thermal oxidisers and other combustion plant, verification of the operation of the continuous monitoring equipment, any blockages and also identification of any leaks of either odorous air or liquid.
  - in the case of biofilters, the surface should be inspected to identify any cracking of the surface or voids in the bed, leaks around the edge of the filter or air handling equipment, review of the moisture content (considering both flooding and drying out) and looking for signs of compaction or uneven flow.
  - in the specific case of soil biofilters, the growth of plants and weeds. Excessive flow or odour escape is often indicated by scorching of the earth or plant growth dying off.
- The results of all inspections should be recorded and action should be taken immediately in the case of abnormal emissions. Additional guidance on abnormal emissions is included in paragraphs **5.9** and **5.10**.

Continuous monitoring - particulate arrestment plant

5.15 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.

- Emissions from particulate arrestment plant (except where the final discharge of the arrestment plant is within buildings) where exhaust airflow exceeds 100m^3/min should be continuously indicatively monitored for particulate matter. (By continuous indicative monitoring is meant monitoring to indicate the relative performance and/or process variation. Such monitoring does not provide data to demonstrate compliance with numerical emission limit.) The indicative monitor should be fitted with a visual and audible alarm which activates at a reference agreed with the regulator.

Continuous monitoring - VOC arrestment plant

5.16 Continuous monitoring of the performance of the VOC arrestment plant system linked to alarms is required to demonstrate compliance with the provisions of this note.

- In the case of thermal oxidisers or combustion plant, scrubbers or biofilters the provisions of **5.13** should apply.
- In the case of carbon adsorption plant used for solvent recovery, the pressure drop across the carbon bed should be continuously monitored. The monitor should be fitted with an audible and visual alarm to activate if the pressure drop falls outside the operating range established during commissioning testing.
- In order to review adsorption plant efficiency, particularly in respect of solvent breakthrough, emissions from the recovery plant should either be continuously monitored for VOCs or concentrations should be measured in waste gases prior to and after the adsorption bed on a weekly basis to indicate adsorption efficiency of the plant. This efficiency measure will identify potential adsorption media deterioration.
- The cooling liquid flow of all direct or indirect condensers used for solvent recovery should be continuously monitored.

Solvent Management Plan

5.17 A Solvent Management Plan of the total mass of organic solvent inputs and outputs used for degreasing should be made and submitted to the regulator annually in the form of a mass balance. This mass balance can be used to detail annual solvent consumption and also can be used to demonstrate the recovery efficiency of the solvent recovery equipment. Further guidance on the preparation of Solvent Management Plans is included in the EU Solvent Emission Directive 1999/13/EEC.

- In calculating the recovery efficiency of the solvent recovery equipment, I_2, as detailed below, should be at least 95% of the mass of the input I_1.

  I_1 is the quantity of organic solvents used for degreasing (both purchased and recovered).

  I_2 is the quantity of organic solvents recovered from the process and re-used as solvent input into the process.

Calibration and compliance monitoring

5.18 Calibration and compliance monitoring should meet the following provisions as appropriate:

- No monitoring result should exceed the emission concentration limits specified in **Table 3**.
- Subject to paragraph **5.21**, the destruction efficiency of any odour arrestment plant required to meet the provisions in **Table 3** should be tested at least once a year. This testing should be carried out by dynamic olfactometry based upon manual extractive sampling undertaken simultaneously at the inlet and outlet of the odour control equipment. At least three samples should be taken for both the inlet and outlet. Where the odour control equipment comprises an open top biofilter, the guidance in **Appendix 2** should assist in developing a sampling protocol.
- In addition, it may be necessary to carry out monitoring of emissions of odour at other times where the process is subject to complaint of offensive odour and the investigations carried out in accordance with paragraph **5.9**, **5.10** and **5.12** cannot identify a cause for the odour.
- Non-continuous emissions monitoring of particulate should be carried out once a year according to the main procedural requirements of BS ISO 9096: 2003, with averages taken over operating periods excluding start-up and shutdown. Sampling equipment should be capable of collecting particulate matter of 0.1 microns diameter or less, with an efficiency of at least 75%. This provision is not neccessary where the final discharge of the arrestment plant is within buildings or the volume of discharged air is less than 100m^3/min or where emissions do not exceed the relevant emission limit in Rows 5 and 6 of **Table 2** without the use of arrestment plant.
- Non-continuous emissions monitoring of volatile organic compounds should be carried out once a year where organic solvent degreasing systems are used, for example using a flame ionisation detector. The testing should be should be carried out according to the main procedural requirements of BS EN 13526:2002.

5.19 Where oil-fired thermal oxidisers or combustion plant is used for arrestment of odours, a fuel supplier's certificate of fuel analysis should be submitted to the regulator at least once every three months where the oil supplier remains constant, and as soon as possible following a change in oil supplier.

- Where waste or recovered oil is burned a certificate of fuel analysis from the supplier together with the necessary calculations, should be submitted to the regulator at least once every three months where the oil supplier remains constant, and as soon as possible following a change in oil supplier; receipt of oils should be logged. To enable calculation of the emission to be carried out from the analysis it will also be necessary to undertake some stack gas sampling at the installation for metals, chlorides, sulphur dioxide and fluorides.
- In the event of a change in oil supplier, the regulator should be notified in writing forthwith.

5.20 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

5.21 Where there is consistent compliance with the odour removal efficiency standard in **Table 3**, regulators may consider reducing the frequency of testing required by paragraph **5.18**. When determining 'consistent compliance' factors to consider include:

(a) the number of arrestment plant continuous indicative monitor alarms.

(b) the number and frequency of complaints regarding offensive odour.

(c) how the indicative surrogate performance monitoring of the odour arrestment plant reflects actual equipment performance. For example, the operating temperature and carbon monoxide emissions of a thermal oxidiser or combustion equipment are a good surrogate indicator compared to the pressure drop across a biofilter which is a less reliable surrogate indicator.

(d) the variability of monitoring results, for example, results which range from 5 - 19 mg/m^3 , against an emission limit of 20 mg/m^3 might not qualify for a reduction in monitoring

(e) the margin between the results and the emission limit, for example, results which range from 95 - 96% destruction when the limit is 95% destruction efficiency might not qualify for a reduction in monitoring.

- As the odour arrestment performance of a biofilter is very dependant upon operating conditions and biomass loading, it is not appropriate that reduced monitoring be applied where a biofilter is used.
- Consistent compliance should be demonstrated using the results from at least three or more monitoring exercises carried out over a period of at least two years.
- Any significant process or arrestment equipment changes which might have affected the destruction efficiency of the equipment should be taken into account.
- The continuous indicative monitoring required by paragraph **5.12** is to demonstrate correct functioning of the odour arrestment plant. In this context it is not appropriate that reduced monitoring be applied.

5.22 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

5.23 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.

6 Control techniques

6.1 The process is largely carried out in open vessels and equipment and hence emissions are released into the process building. Therefore the containment of potentially odorous emissions is the key to effective control. The operator should be advised of odours perceived by the regulator as soon as possible.

6.2 In most cases the management of chemicals used within the process (including avoiding the use of ammonia and sulphides wherever possible and avoidance of cross-contamination of effluent streams) will be sufficient to control odorous emissions without the need for odour arrestment plant. The potential for prevention of the emission of odours by process change should be considered on an on-going basis. It is possible to substantially reduce odour generation by process optimisation and control.

6.3 The following are examples of relevant odour control techniques:

(a) containment of odours within process buildings by good design and extract ventilation

(b) good housekeeping and raw material handling practices

(c) containment of odours within process equipment by maintaining material handling and storage facilities leakproof and spillproof as far as possible

(d) control and minimisation of odours from residual materials, effluent and waste

(e) containment of strong odour sources and treatment in odour control equipment.

Summary of best available techniques

6.4 The following table provides a summary of the best available techniques that can be used to control the process or installation 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 5: Summary of control techniques

Source	Substance	Control techniques
Loading and unloading of untreated hides and skins	Odour	Within buildings Enclosed vehicles and containers
Raw material, effluent and waste storage		Separation of sulphide and ammonia effluents Spillage management including tank level management
De-hairing process		Within enclosed process vessels where necessary, under negative pressure and vented to odour arrestment plant Spillage management
Vehicles		Washing of vehicle surfaces (material contact) within buildings as above
Ventilated process air		Vent to suitable arrestment plant • biofilters • thermal oxidisers/combustion plant • scrubbers • located to take account of sensitive receptors

Table 5: Summary of control techniques

Source	Substance	Control techniques
Waste gas from odour arrestment plant	Odour	Dispersion of any residual odorous releases
	Sulphur oxides	Limit sulphur in fuel
	Carbon monoxide	Good combustion
Waste gases from degreasing operations	VOCs	Arrestment by recovery using adsorption and condensation preferred

Techniques to control emissions from contained sources

6.5 Emissions from the process operations covered by this note comprise odours of mixed chemical species but providing that raw and waste materials are correctly stored and handled, the major odour sources are ammonia and sulphides used in de-hairing and liming. Examples of techniques which can be used to minimise emissions from these sources include:

- pH control of sulphide liquors to retain sulphides in solution
- oxidation of sulphides to sulphate
- carbon dioxide deliming to reduce ammonia use
- "hair save" techniques to reduce sulphide use and total ammonia in the effluent.

Where these releases cannot be avoided, they should be subject to containment and, where necessary, final treatment to ensure that they do not result in offensive odours beyond the process boundary. This containment is achieved by ensuring that all operations with potential releases are carried out within enclosed process vessels to prevent fugitive emissions.

6.6 In cases where local exhaust ventilation is provided for occupational health and safety reasons on processes which may liberate significant odours such as the de-hairing process using sulphides, this ventilation air will usually require odour arrestment. The required ventilation rate will depend upon many factors (such as environmental conditions, building and vessel design and construction, raw material quality, effectiveness of containment). The ventilation equipment should be vented to suitable odour arrestment plant to meet the provisions of **Table 3**.

6.7 Suitable odour arrestment plant should be provided and operated at all times where necessary, to meet the provisions of **Section 5** of this note (further information is available at Ref. h). Examples of the type of arrestment plant which are suitable include biofilters, high efficiency biological scrubbers, multi-stage chemical scrubbers, thermal incinerators and other forms of combustion plant.

6.8 Where odour arrestment plant is required it needs to be optimised to meet the odour destruction efficiency provisions of **Table 3**. Depending upon the type of arrestment plant used, this optimisation will include the following:

- In the case of thermal oxidisers or combustion plant the operating temperature of the system will need to be maintained above 1123K (850^{o}C). In the case of boilers, care is needed in their use for odour arrestment as the operating temperature and residence time may not have been designed for odour arrestment and there is the potential for quenching in the boiler. In addition, a minimum firing rate for the boiler to ensure that the boiler conditions are always optimised for odour removal should be established. The measurement of odour arrestment efficiency of the boiler can be used to demonstrate the correct operating parameters of the boiler.

- In the case of scrubbing equipment, it is likely that multi-stage scrubbing will be necessary to meet the odour destruction efficiency provisions of **Table 3**. In order to optimise the performance of the scrubber, it is important to ensure that it is well designed (adequate gas/liquid contact), well maintained, that the odours are sufficiently reactive with the scrubbing liquor to remove the odour and also that the reaction products do not themselves produce a volatile odour. In addition, additives to the liquor need to be automatically dosed with control by pH/Redox (over-dosing can lead to secondary odours from the scrubber associated with the chemical reagent). The scrubber will require regular inspection to identify possible blockage by salts which are typically formed when treating emissions from boiled green offal processes.
- Scrubbing equipment should be fitted with a mist eliminator.
- If a bioscrubber is used, it is important to ensure that it is well designed (adequate gas/liquid contact), well maintained and that potential odours from scrubbing liquor are well managed. The scrubber will require regular inspection to identify possible blockage by biomass. In addition the pH of the liquor will need to be controlled as the microbial activity of the biomass will be adversely affected by high alkalinity (which is a potential problem with emissions from certain pet food manufacturing processes).
- Biofiltration can be undertaken using packaged, enclosed biofilters or open biomass (such as peat/heather). If a peat and heather biofilter is used, it is essential to control the pH of the biomass as the microbial activity will be adversely affected by high alkalinity (which is a potential problem with the high levels of ammonia). In this case it may be necessary to pre-treat the emissions for example by water scrubbing (this will also have the beneficial effect of humidifying the air). In order to optimise the performance of the biofilter, the biomass must be maintained below 30^{o}C, must be kept moist, must have a gas flow at all times and leakage through edges and fissures must be avoided. Biofilters will require regular treatment to overcome consolidation - this may be regular surface turning or deconsolidation by digging-out the bed.
- The required residence time for the biofilters will depend upon many design conditions and will have to be sufficient to meet the provisions of Rows 2 and 3 of **Table 3**. However the recommended residence time for peat and heather filters is a minimum of 60 seconds for lower intensity odours.
- If a bioscrubber is used, it is important to ensure that it is well designed (adequate gas/liquid contact), well maintained and that potential odours from scrubbing liquor are well managed. The scrubber will require regular inspection to identify possible blockage by biomass.

6.9 The use of odour masking agents and counteractants should not be permitted (other than as a scrubber liquor additive).

Degreasing

6.10 Organic solvent based degreasing processes should be undertaken in enclosed or covered vessels to minimise emissions of volatile organic compounds. The emissions from solvent degreasing operations should be controlled by condensation and recovery of the solvents in an enclosed system or by the use of carbon adsorption and recovery.

- Where degreasing is carried out in a fully enclosed degreasing system, as an alternative to the provisions of **Table 3** Rows 6 and 7, it is acceptable to demonstrate that the recovery efficiency of the solvent recovery system is at least 95%. Demonstration of the efficiency will involve measurement of emissions and the preparation of a solvent management plan (see Solvent Emissions Directive EC/1999/13).

- Recovered solvents and separated fats should not be burned unless the combustion unit is designed for the purpose and meets the requirements of the Waste Incineration Directive (EC/2000/76).
- Volatile organic compounds with the risk phrase R45 (may cause cancer), R46 (may cause heritable genetic damage), R49 (may cause cancer by inhalation), R60 (may impair fertility) or R61 (may cause harm to the unborn child) should not be used for degreasing.

Particulate matter

6.11 Emissions of particulate matter from mechanical abrasion operations should be contained, extracted and arrested if necessary to meet the visible emission provisions or the limits described in **Table 3** for particulate matter.

6.12 The methods of removal of collected particulate matter from arrestment plant should be undertaken carefully to avoid re-entrainment of dust. The removal of collected particulate matter from the filter housing should preferably be an automated operation into an enclosed container for disposal. Where the particulate matter control equipment includes a rotary valve, the rotation of the valve should be continuously monitored and alarmed.

Techniques to control fugitive emissions

Materials handling

6.13 All hides and skins should be transported from the source of arising to the processing site as quickly as practicable. The design and use of vehicles and containers should be such as to prevent the emission of any offensive odour or substance prescribed for air. Where skins are transported which have not been previously treated (ie. green skins which have not been pickled, chilled, iced or salted) the vehicles and containers used in the collection of the skins should be covered. Containers used for the carriage of pickled skins in liquor should be designed and used to minimise liquid spillage.

- All vehicles, containers, trailers and equipment used for the collection, transfer and handling of the aforementioned raw materials and for holding waste should be readily cleansable, impervious and kept clean.
- All tanks for liquid material storage should be fitted with level indicators or high level alarms to warn of potential overfilling. All such tanks should be vented to odour arrestment plant where necessary to meet the provisions of Row 1 of **Table 3**.

6.14 All surfaces and equipment liable to come into contact with animal material or waste and all walls of areas where such materials are handled should be impervious, capable of being readily cleansed and should be kept clean. The use of wooden process vessels should be permitted.

- All floors of animal material reception, storage and processing areas and designated vehicle or container cleaning areas should be of impervious construction laid to fall to trapped drainage inlets. Drains should be provided where necessary, with sedimen-tation tanks and interceptors to prevent the transmission of material likely to impair the free flow of any receiving sewerage system.
- Skins should be received and stored prior to processing in a defined, designated storage area. If green skins are not processed within 24 hours of arrival on site, they should be stored in enclosed buildings. If such storage gives rise to offensive odour which can be perceived beyond the site boundary, the buildings should be vented to suitable arrestment equipment and be kept under negative pressure, for example by the fitting of self-closing doors. Vehicles and containers should be emptied into the aforementioned designated area, and should be cleaned as soon as possible after delivery in a further designated area. The location of storage areas for both green skins and conserved skins should take account of the need to minimise emissions of offensive odour.

- Buildings should be constructed of suitable materials (for example brick or concrete walls and sealed metal sheet roofing) and the integrity of the buildings should be regularly inspected and maintained to prevent the uncontrolled escape of air from the raw material receipt, processing and storage areas. All doors for personnel access and egress should be self-closing or automatically operated and doors for vehicle access should only be opened to allow vehicles to enter or exit.

Process operations

6.15 Process operations should be carried out to minimise releases of odour. Where possible submersible pumps should be used to minimise the potential for odour escape.

- Precautions should be taken to minimise the spillage of liquids from processing baths, particularly from paddle processes with the exception of liquid discharged from rotary treatment vessels specifically designed to discharge treatment liquor during the rotary process. All spillages should be contained within the process buildings.
- It is essential during handling of liquid spillages and effluent that acid and sulphide effluents produced are separated to prevent the uncontrolled reaction and liberation of substances prescribed for air to air.
- Careful process design and operation to avoid the liberation of odorous chemicals and to control effluent and waste materials should avoid the need for ventilation within the raw material handling and processing areas. In cases where local exhaust ventilation is provided the required ventilation rate will depend upon many factors (such as environmental conditions, building and vessel design and construction, raw material quality, effectiveness of containment). The ventilation equipment should be vented to suitable odour arrestment plant to meet the provisions of **Table 3**. A properly designed and installed local exhaust ventilation system close to the points of odour generation and the use of enclosed vessels will provide more effective containment of odours.
- Adequate provisions should be made for the containment of liquid and solid spillages. All spillages should be cleared as soon as possible and in the case of solid materials this should be achieved by the use of vacuum cleaning, wet methods, or other appropriate techniques. Dry sweeping of dusty spillages should not be permitted in circumstances where sweeping may lead to particulate matter emissions to the air. In addition consideration should be given to the risk of reaction if spillage removal involves the mixing of chemically reactive materials.

6.16 Good housekeeping should be practised at all times. The adoption of good cleaning and working practices as a routine will reduce process odour emissions and consequently lead to higher nominal arrestment plant efficiency. A proper cleaning programme should be instituted. This should cover all structures, equipment and internal surfaces and containers used for animal matter processing and collection and waste storage. The cleaning and disinfecting of all drainage areas and collecting tanks, yards and roads should be undertaken regularly and at least once a week.

6.17 A senior manager who recognises the importance of controlling the odours produced by the hide and skin process should be designated to be specifically responsible for all aspects of liaison with the regulator and where applicable with members of the general public.

Effluent and waste

6.18 The effluent produced has the potential to generate a significant odour. All effluent should therefore be carefully handled and treatment should be carried out in a manner which will minimise the emission of offensive odours and will render any emission inoffensive and harmless.

- All effluent arising outside buildings that contain processing and treatment plant should be drained via interceptor traps to the normal sewerage system or to an effluent treatment plant or storage tank.
- It is essential during handling of liquid spillages and effluent that acid and sulphide effluents produced are separated to prevent the uncontrolled reaction and liberation of substances prescribed for air to air.
- All effluent arising within buildings including floor washings should be drained to an effluent treatment plant or storage tank.
- Any waste material which is minced on-site (such as fleshings) and discharged with effluent should not be discharged to the normal sewerage system but should be discharged to an effluent treatment plant or storage tank.
- Separated sludge produced by effluent treatment in establishments processing hides or skins received with the wool or hair intact, which has not been dewatered and is not in the process of being dewatered, should not be stored on site for more than 48 hours and should be stored in enclosed skips.
- All effluent storage tanks should be vented to suitable odour arrestment plant where necessary to meet the provisions of Row 1 of **Table 3**. A minimum extracted air volume should be maintained to the tank at all times (depending upon the tank design it may be necessary to isolate the tank from the odour arrestment plant during emptying to avoid tank damage). Care should be taken in emptying the effluent tanks to minimise odour release - consideration should be given to venting the collecting tanker to the odour arrestment plant.
- All effluent storage tanks should be emptied regularly and at least once every week.
- All effluent tanks should be fitted with level indicators or high level alarms to warn of potential overfilling.
- All tanks and effluent storage systems including cesspits and septic tanks should be adequately covered and effluent treatment systems should be properly maintained in accordance with the maintenance programme included in the Odour Response Procedure (paragraph **6.29**).
- All effluent tanks should be protected by a bund to contain spillages and the tanker connection point should also be provided with bunding or spillage containment kerbs. Provision should be made for effective and rapid cleaning of any area of spillage. High pressure jetting or steam cleaning are effective methods of cleaning and, where used, sufficient hosing points should be made available. Spillages should be contained and cleared immediately.

6.19 All potentially odorous wastes should be stored within an enclosed storage area, tank or container whilst awaiting removal for either disposal or further processing.

- The storage area should be provided with extract ventilation to suitable arrestment plant where necessary to meet the provisions of Row 1 of **Table 3**.
- All waste should be removed as soon as the waste container is full and at least once per week. High odour intensity waste should be moved more frequently where necessary to ensure compliance with Row 1 of **Table 3**.

- Waste should not be moved from process buildings to another building or outside unless in sealed containers. (Covered skips should not be regarded as sealed containers).

Air quality

Ambient air quality management

6.20 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.

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.

Dispersion and dilution

6.21 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.

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.

6.22 The assessment of stack or vent height should take into account the need to ensure that no offensive odour is emitted beyond the boundary.

Stacks, vents and process exhausts

6.23 Liquid condensation on internal surfaces of stack flues 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 ductworks should be leakproof.

6.24 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 greater than 15 m/sec during normal operating conditions.
- 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

6.25 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

6.26 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

6.27 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 permit;
  - 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

6.28 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.

All external pipework used for scrubbing liquor, cleaning water, irrigation water and process liquid transfer should be protected against frost.

Odour Response Procedure

6.29 The operator should prepare an Odour Response Procedure as outlined in **Appendix 3**. This is a summary of the foreseeable situations which may compromise his/her ability to prevent and/or minimise odorous releases from the process and the actions to be taken to minimise the impact. It is intended to be used by operational staff on a day-to-day basis and should detail the person responsible for initiating the action.

- The Odour Response Procedure should include a list of essential spares for the odour arrestment plant. The plant manufacturer should recommend which spares are subject to wear and foreseeable failure and are critical for the correct operation of the odour arrestment plant (such as pumps, nozzles etc.) and these should be held on site. It may be acceptable for certain spares to be available on guaranteed short delivery if the absence of a supply at the site would not lead to complete failure of the odour arrestment plant or to offensive odours beyond the site boundary.

6.30 The Odour Response Procedure should include analysis of actions in the case of arrestment plant breakdown or malfunction. Immediate arrangements should be made to divert odour streams to other suitable arrestment plant. Failure to provide suitable temporary arrestment plant may lead to the suspension of the process and consequently emergency standby arrangements should be detailed in the Odour Response Procedure. This may include:

- suspending process operations
- reducing the scale of high odour intensity process operations, for example stopping cooking operations or reducing throughput
- by-pass emissions to stand-by or alternate odour arrestment plant, for example using a boiler as an emergency odour arrestment system

7 Summary of changes

Reasons for the main changes are summarised below.

Table 6: Summary of changes

Section and paragraph	Change	Reason	Comment
Emission limits, monitoring and other provisions			
Table 3 Row 2	Inclusion of a standard for odour arrestment efficiency	To set a quantitative standard for odour removal	Reflects BAT
Table 3 Rows 3 and 4 plus **5.19**	Inclusion of provisions to limit the sulphur content of fuel where a thermal system is used for odour arrestment	To minimise oxides of sulphur releases.	Reflects BAT
Table 3 Rows 5, 6 and 7	Reduction of emission limits for VOCs and introduction of a limit for particulate matter	To minimise VOC and dust releases.	Reflects BAT
Paragraph **5.9** and **5.10**	Assessment of process and releases in the case of odours being detected, abnormal conditions or complaints	To identify causes and solutions to possible odour releases	Clarification of previous guidance
Paragraph **5.6**, **Table 4**	Absolute limits for releases of ammonia, amines and mercaptans changed to indicative guide values of 1ppm.	These values are achievable using BAT. The limits of **Table 3** Rows 1 and 2 are a more effective control	Weekly monitoring removed from previous note. Reflects BAT.
Paragraph **5.12**	Inclusion of continuous monitoring provisions for odour arrestment plant	BAT for operational control - also clarification of previous guidance and addition of thermal systems	Recording of monitors continuously replaced with alarm recording
Paragraph **5.14**	Daily inspection of odour arrestment and air handling plant	To identify abnormal activities	Replaces requirement for daily olfactory assessment
Paragraph **5.16**	Inclusion of continuous monitoring provisions for particulate matter arrestment plant	BAT for operational control	Reflects BAT
Paragraph **5.16**	Inclusion of continuous monitoring provisions for VOC arrestment plant	BAT for operational control	Reflects BAT
Paragraph **5.17**	Requirement for a Solvent Management Plan	Monitoring and management of solvent use	Reflects BAT and EC/1999/13
Paragraph **5.18**	Testing of odour arrestment efficiency annually and inclusion of BS EN method	Reflects BAT - quantifies odour plant performance	New methods available
Control Techniques			
Paragraph **6.7**	Details on design and operation of odour arrestment plant	Additional guidance	Reflects BAT
Paragraph **6.8**	Provision for mist eliminator for scrubbers	To prevent droplets	Clarification of previous guidance
Paragraph **6.10**	Restriction of use of VOCs with risk phrases R45, R46, R49, R60 and R61	New guidance incorporated by Solvent Emissions Directive EC/1999/13	Reflects BAT

Table 6: Summary of changes

Section and paragraph	Change	Reason	Comment
Paragraph **6.29**	Provision for an Odour Response Procedure	Abnormal conditions are a key odour risk and there needs to be a documented procedure in advance of the problem	Expanding previous guidance
Appendix 3	Additional guidance on the preparation of an odour response procedure	To provide additional guidance for operators and regulators	Reflects current knowledge

8 Definitions and further information

This guidance	Process Guidance Note PG6/21(04)
Previous guidance	Previous guidance Note PG6/21 (96) which in turn replaced PG6/21 (92)
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	shall have the same meaning as in Integrated Pollution Prevention and Control, A Practical Guide.
Process	the term "process(es)" shall mean both "processes" under the Environmental Protection Act 1990 and "installations" and "activities" 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 Environmental Protection Act 1990 relate to the concentration of pollutant released into the air from prescribed processes
- 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:

Project Acorn which has been developed by the British Standards Institution and the DTI with assistance from a range of partners in business to help SMEs implement an EMS by offering a five-stage approach which can lead to accreditation to one of the formal standards. The aim is to achieve an EMS standard specifically for SMEs. Contact the Project Co-ordinator at the British Standards Institution on telephone 0208 996 7665 or via the web site **www.bsi.org.uk**

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 website 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 2002 SI 3043
- The Air Quality (Wales) Regulations 2002 WSI 3182 (W.298)
- The Air Quality (Scotland) Regulations 2002 SSI 297

(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) Odour Measurement and Control- An Update published by National Environmental Technology Centre, Culham, Abingdon. Oxon OX14 3DB. ISBN 0-85624-8258.

(h) BS EN 13725:2003 - "Air Quality - Determination of Odour Concentration by Dynamic Olfactometry"

(i) IPPC H4 - Horizontal Guidance For Odour: Part 1 - Regulation and Permitting, Part 2 - Assessment and Control, (To be published by EA, EHS, SEPA.)

Web addresses

Here are some web addresses that may be useful;

Some energy and environmental measures can increase industry profits. Envirowise show how at **www.envirowise.gov.uk** (or freephone 0800 585794).

Local Authority Unit of the Environment Agency for England and Wales, who draft this guidance, **www.environment-agency.gov.uk/business/lapc**

When satisfied with the draft, the Secretary of State issues this guidance. The Department's web site is at **www.defra.gov.uk/environment/index.htm**

National Assembly for Wales web-site **www.wales.gov.uk/**

At **www.aeat.co.uk/netcen/** the Department for Environment, Food and Rural Affairs, Local Air Pollution Policy team have more information about LAPC and LAPPC.

The Scottish Environment Protection Agency (SEPA) web address is **www.sepa.org.uk/**

In Northern Ireland the Environment and Heritage Service are on the web at **www.ehsni.gov.uk/EnvironProtect/**

Net Regs provide sectoral guidance to help make sense of environmental regulations at **www.environment-agency.gov.uk/netregs**

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

(The processes for local air pollution 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.)

6.8 The treatment of animal and vegetable matter and food industries

Part A (1)

(a) Tanning hides and skins at plant with a treatment capacity of more than 12 tonnes of finished products per day.

(b) Slaughtering animals at plant with a carcass production capacity of more than 50 tonnes per day.

(c) Disposing of or recycling animal carcasses or animal waste, other than by rendering or by inceration falling within Section 5.1 of this part of this Schedule, at plant with a treatment capacity exceeding 10 tonnes per day of animal carcasses or animal waste or, in aggregate of both.

(d) Treating and processing materials intended for the production of food products from-

(i) animal raw materials (other than milk) at plant with a finished product production capacity of more than 75 tonnes per day;

(ii) vegetable raw materials at plant with a finished product production capacity of more than 300 tonnes per day (average value on a quarterly basis).

(e) Treating and processing milk, the quantity of milk received being more than 200 tonnes per day (average value on an annual basis).

(f) Processing, storing or drying by the application of heat of the whole or part of any dead animal or any vegetable matter (other than the treatment of effluent so as to permit its discharge into controlled waters or into a sewer unless the treatment process involves the drying of any material with a view to its use as an animal feedstuff) if -

(i) the processing, storing or drying does not fall within another Section of this Schedule or Part A(2) of this Section and is not an exempt activity: and

(ii) it may result in the release into water of any substance listed in paragraph 13 of Part 2 of this Schedule in a quantity which, in any period of 12 months, is greater than the background quantity by more than the amount specified in relation to the substance in that paragraph.

Part A (2)

(a) Disposing of or recycling animal carcasses or animal waste by rendering at plant with a treatment capacity exceeding 10 tonnes per day of animal carcasses or animal waste, 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.

Part B

(b) Processing, storing or drying by the application of heat of the whole or part of any dead animal or any vegetable matter (other than the treatment of effluent so as to permit its discharge into controlled waters or into a sewer unless the treatment process involves the drying of any material with a view to its use as an animal feedstuff) if -

(i) the processing, storing or drying does not fall within another Section of this Schedule or Part A(1) or Part A(2) of this Section and is not an exempt activity: and

(ii) the processing, storing or drying may result in the release into the air of a substance described in paragraph 12 of Part 2 of this Schedule or any offensive smell noticeable outside the premises on which the process is carried out.

(c) Breeding maggots in any case where 5 kg or more of animal or of vegetable matter or, in aggregate, of both are introduced into the process in any week.

Interpretation of Section 6.8

"animal" includes a bird or a fish; and

"exempt activity" means-

(i) any activity carried out on a farm or agricultural holding other than the manufacture of goods for sale;

(ii) the manufacture or preparation of food or drink for human consumption but excluding-

(1) the extraction, distillation or purification of animal or veg-etable oil or fat otherwise than as a process incidental to the cooking of food for human consumption;

(2) any process involving the use of green offal or the boiling of blood except the cooking, of food (other than tripe) for human consumption;

(3) the cooking of tripe for human consumption elsewhere than on premises on which it is to be consumed;

(iii) the fleshing, cleaning and drying of pelts of fur-bearing mammals;

(iv) any activity carried on in connection with the operation of a knacker's yard as defined in article 3(1) of the Animal By-Products Order 1999;

(v) any activity for the manufacture of soap not falling within Part A (1) of Section 4.2;

(vi) the storage of vegetable matter not falling within any other Section of this Schedule;

(vii) the cleaning of shellfish shells;

(viii) the manufacture of starch;

(ix) the processing of' animal or vegetable matter at premises for feeding a recognised pack of hounds registered under article 13 of the Animal By-Products Order 1999;

(x) the salting of hides or skins, unless related to any other activity listed in this Schedule;

(xi) any activity for composting animal or vegetable matter or a combination of both, except where that process is carried on for the purposes of cultivating mushrooms;

(xii) any activity for cleaning, and any related process for drying or dressing, seeds, bulbs, corms or tubers;

(xiii) the drying of grain or pulses;

(xiv) any activity for the production of cotton yarn from raw cotton or for the conversion of cotton yarn into cloth:

"food" includes-

(i) drink;

(ii) articles and substances of no nutritional value which are used for human consumption; and

(iii) articles and substances used as ingredients in the preparation of food; and

"green offal" means the stomach and intestines of any animal, other than poultry or fish, and their contents.

Appendix 2: Method for sampling of emissions from biological (earth, peat and heather) filters using gas detection tubes

METHOD FOR SAMPLING OF EMISSIONS FROM BIOLOGICAL (EARTH, PEAT AND HEATHER) FILTERS USING GAS DETECTION TUBES

8.1 Routine monitoring of emissions from biological filters can be readily undertaken using gas detection tubes. However, it is important to ensure that a number of representative samples are obtained and that care is taken in the interpretation of results. The number of samples necessary will depend upon the gas distribution within the biological filter.

8.2 It is essential that samples are taken from a representative volume of emitted gas as near surface dispersion will significantly affect measured concentrations. Therefore, it is necessary to reduce dispersion and obtain a volume of gas from which to sample. This can be achieved by placing a purpose-made enclosure on top of the filter bed and allowing the emitted gases to accumulate.

8.3 The enclosure itself should be approximately 0.5 m^3 - 1 m^3 in volume, preferably with a 1 m square open base. The top of the enclosure should have an opening of approximately 50 mm diameter to facilitate sampling. The enclosure call be simply fabricated using a timber frame and plywood or hardboard sides and top with mastic or other suitable sealant applied to the side and top joints.

8.4 It will be extremely difficult to achieve a seal at the filter bed surface, however the enclosure should be located in order to minimise leakage from the points of contact with the filter bed. The enclosure should remain at the sample location for at least 10 minutes prior to sampling to ensure that a representative sample of emissions is obtained (allowing the volume of the enclosure to be purged three times).

8.5 The gas detection tubes should be used in accordance with the manufacturer's instructions and results should be evaluated against the indicative guide values in **Table 4**. Amines and amides are a common interference with gas detection tubes for ammonia and therefore results obtained from ammonia gas detection tubes should be compared to a 2 ppm v/v indicative guide value. It may be necessary to monitor for hydrogen sulphide and mercaptans separately depending upon the detector tube specification and in this case the sum of the individual results should be compared with the indicative guide value in Row 3 of **Table 4**.

8.6 This method is only suitable for open biomass type biofilters where no final discharge vent or stack exists.

Additional information is available in BS EN 13725 - "Air Quality - Determination of Odour Concentration by Dynamic Olfactometry" and "Odour Measurement and Control-:\n Update "published by National Environmental Technology Centre, Culham, Abingdon. Oxon OX14 3DB. ISBN 0-85624--8258.

Appendix 3: Guidance on the Preparation of an Odour Response Procedure

What is an Odour Response Procedure?

An Odour Response Procedure is a summary, provided by the operator, of the foreseeable situations which may compromise his ability to prevent and/or minimise odorous releases from the process and the actions to be taken to minimise the impact. It is intended to be used by operational staff on a day-to-day basis and should detail the person responsible for initiating the action.

The procedure is intended primarily to document foreseeable events which are outside of the control of the operator and those that are preventable by maintenance and operational control (for example pump failure, biofilter compaction or filter breakthrough). The procedure should include a maintenance programme for all odour arrestment plant and other odour containment measures (such as building structure, ventilation plant).

What is the Format for the Odour Response Procedure?

The Odour Response Procedure should be a written document which is available on-site and should be submitted to the regulator. The regulator may wish to set conditions in the permit/authorisation which reflect the undertakings given in the Procedure (for example maximum arrestment plant by-pass times, reduced throughput etc).

What should be included in the Odour Response Procedure?

There are four main reasons for releases which may lead to emissions of offensive odour which are:

1. changes in process conditions leading to more odour generation or a change in the odour characteristics

2. conditions which result in fugitive releases due to reduced odour containment

3. failures or reduced performance of odour arrestment plant

4. factors affecting the dispersion between the source and the receptor.

The occurrence of 2 and 3 above can be limited by the production of, and compliance with, an effective plant and building maintenance programme. Examples of other issues which should be considered in each of these categories are given in the Table below.

In order to prepare an assessment of possible abnormal conditions and the options for mitigation of the odour, the operator will need to consider:

- the activity which produces the odour and the point of odour release
- possible process or control failures or abnormal situations
- potential outcome of a failure in respect of the likely odour impact on local sensitive receptors
- what actions are to be taken to mitigate the effect of the odour release and details of the persons responsible for the actions at the site

Table 7: Examples of issues to consider relating to odour release

Factors leading to odour release	Examples of issues to consider
Those which have potential to affect the process and the generation of odour	• Materials input - seasonal variation in weather may affect odour of materials particularly if putrescible. • Process parameters such as changes in temperature/pressures • Rate of throughput or increased hours of operation • High levels of ammonia within the process buildings (possibly due to high ambient temperatures).
Those which affect the ability to arrest/minimise odour	• Poor performance of biofiltration or poisoning (may be the result of poor maintenance or mis-operation) • Flooding of the biofilter due to abnormally high rainfall • External failure of other utilities, e.g. water supply, gas supply for combustion plant where the operator has signed up to an interruptible gas supply • Mechanical breakdown of arrestment plant such as pumps, fans etc • Power failure • Compaction of the biofilter or surface fissures • Saturation of a carbon filter bed and subsequent breakthrough of odours • Below optimum temperature of a thermal oxidiser or boiler etc • Saturation of scrubber liquor, blocked injection nozzles etc.
Those which affect the ability to contain odour	• Building damage which affects integrity due to for example storms • Power failure • Failure of automatic doors, i.e. in open position • Failure in procedures to maintain containment (human error)
Those affecting dispersion between the source and sensitive receptors‡	• Short term weather patterns which fall outside of the normal conditions for that area and are highly unusual (not just the normal meteorological pattern) - inversions and other conditions unfavourable to dispersion should have been considered in designing the process • Weather - wind direction, temperature, inversion conditions if these are normal variants of local weather • Loss of plume buoyancy/temperature
‡ The process design should incorporate control measures to ensure that under the normal range of meteorological conditions for the area, no emissions result in offensive odour that is detectable beyond the process boundary.	