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Process Guidance Note 6/05(13)

Statutory guidance for maggot breeding installations

December 2013



Llywodraeth Cymru
Welsh Government



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Revision of the guidance

The electronic version of this publication is updated from time to time with new or amended guidance. **Table 0.1** is an index to the latest changes (minor amendments are generally not listed).

Table 0.1 - Revision of the guidance		

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1. Introduction

Legal basis

- 1.1 This note applies to the whole of the UK. It is issued by the Secretary of State, the Welsh Government, the Scottish Government and the Department of the Environment in Northern Ireland (DoE NI) to give guidance on the conditions appropriate for the control of emissions into the air from maggot breeding processes and installations. It is published only in electronic form and can be found on the [Defra](#) website. It supersedes PG6/05(05) and NIPG6/05(05).
- 1.2 This guidance document is compliant with the [Code of Practice on Guidance on Regulation](#) page 6 of which contains the "golden rules of good guidance". If you feel this guidance breaches the code or you notice any inaccuracies within the guidance, please [contact us](#).
- 1.3 This is one of a series of statutory notes giving guidance on the Best Available Techniques (BAT). The notes are all aimed at providing a strong framework for consistent and transparent regulation of installations regulated under the statutory Local Air Pollution Prevention and Control (LAPPC) regime in [England and Wales](#), [Scotland](#) and [Northern Ireland](#). The note will be treated as one of the material considerations when determining any appeals against a decision made under this legislation. Further guidance on the meaning of BAT can be found for [England and Wales](#), [Scotland](#), and [Northern Ireland](#).
- 1.4 In general terms, what are BAT for one installation in a sector are likely to be BAT for a comparable installation. Consistency is important where circumstances are the same. However, in each case it is, in practice, for regulators (subject to appeal) to decide what are BAT for each individual installation, taking into account variable factors such as the configuration, size and other individual characteristics of the installation, as well as the locality (e.g. proximity to particularly sensitive receptors).
- 1.5 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 Regulations or in Directions from the Government. In the case of this note, at the time of publication there were no such mandatory requirements.

- 1.6 Most of the activities covered by this note will have essentially the same characteristics and it is expected that the model permit and application form in **Appendices 1 and 2** will normally be used in order to simplify for business the process of applying for a permit and to simplify for regulators the process of issuing a permit. (See also the relevant LAPPC charging scheme for reduced application and subsistence charges for simplified permits).

If there are good reasons to consider diverging from normal use of the model permit, the starting point for drafting any additional conditions should be the arrowed bullets in the main body of this note.

Who is the guidance for?

- 1.7 This guidance is for:

Regulators

- local authorities in England and Wales, who must have regard to the guidance when determining applications for permits and reviewing extant permits;
- the Scottish Environment Protection Agency (SEPA) in Scotland,
- district councils or the Northern Ireland Environment Agency (NIEA), in Northern Ireland;

Operators who are best advised also to have regard to it when making applications and in the subsequent operation of their installation;

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 installations in this particular industry sector.

Updating the guidance

- 1.8 The guidance is based on the state of knowledge and understanding, at the time of writing, of what constitute BAT for this sector. The note may be amended from time to time to keep up with developments in BAT, including improvements in techniques, changes to the economic parameters, and new understanding of environmental impacts and risks. The updated version will replace the previous version on the [Defra](#) website and will include an index to the amendments.

- 1.9 Reasonable steps will be taken to keep the guidance up-to-date to ensure that those who need to know about changes to the guidance are informed of any published revisions. However, because there can be rapid changes to matters referred to in the guidance – for example to legislation – it should not be assumed that the most recent version of this note reflects the very latest legal requirements; these requirements apply.

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 potentially-interested organisations.

Policy and procedures

- 1.11 General guidance explaining LAPPC and setting out the policy and procedures is contained in separate documents for [England and Wales](#), [Scotland](#) and [Northern Ireland](#).

When to use another note rather than PG6/05

- 1.12 This note does not cover the incineration of wastes from the breeding of maggots.

2. Timetable for compliance and reviews

Existing processes or activities

- 2.1 This note contains all the provisions from previous editions which have not been removed. Some have been amended. For installations in operation at the date this note is published, the regulator should have already issued or varied the permit having regard to the previous editions. If they have not done so, this should now be done.
- 2.2 The new provisions of this note and the dates by which compliance with these provisions is expected are listed in **Table 2.1**, 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. Permits should be varied as necessary, having regard to the changes and the timetable.

Table 2.1 - Compliance timetable		
Guidance	Relevant paragraph/row in this note	Compliance date
A simple permit and application form have been added in Appendix 1 and Appendix 2 .		
There are no new provisions in this note likely of themselves to result in a need to vary existing permit conditions. For a full list of changes made by this note, excluding very minor ones, see Table 6.1 . See paragraph 2.4 .		

- 2.3 Replacement plant should normally be designed to meet the appropriate standards specified for new installations/activities.
- 2.4 Where provisions in the preceding guidance note have been deleted or relaxed, permits should be varied as necessary as soon as reasonably practicable. It is expected that local authorities will aim to vary existing permits so as to convert them into the model permit format in **Appendix 1** within 12 months of the publication of this note.
- 2.5 For new activities, the permit should have regard to the full standards of this guidance from the first day of operation.
- 2.6 For substantially changed activities, the permit should normally have regard to the full standards of this guidance with respect to the parts of the activity that have been substantially changed and any part of the activity affected by the change, from the first day of operation.

Permit reviews

- 2.7 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 eight years ought normally to be sufficient for the purposes of the appropriate Regulations. Further guidance on permit reviews is contained in the appropriate Guidance Manual for [England and Wales](#) chapter 26, [Scotland, Practical guide](#) section 10, [Northern Ireland Part B Guidance](#) page 9, [Northern Ireland Part C Guidance chapter 17](#). Regulators should use any opportunities to determine the variations to permits necessitated by paragraph 2.2 above in conjunction with these reviews.
- 2.8 Conditions should also be reviewed where complaint is attributable to the operation of the process and is, in the opinion of the regulator, justified.

3. Activity description

Regulations

- 3.1 This note applies to LAPPC installations for maggot breeding processes and installations. The activities for regulation are listed in **Table 3.1**.

Table 3.1 - Regulations listing activities			
LAPPC Activity	England and Wales	Scotland	Northern Ireland
	EPR Schedule 1 reference	PPC Schedule 1 reference	PPC Schedule 1 reference
Part B	Section 6.8 Part B	Section 6.8, Part B	n/a
Part C	n/a	n/a	Section 6.8 Part C

The links are to the original version of the Regulations. A consolidated version is not available on www.legislation.gov.uk

For England and Wales, an [unofficial consolidated version](#) is available but read the first page of that document in order to understand its status and content.

- 3.2 This note refers to maggot breeding processes. These are processes that utilise fish, animal and bird matter for the purpose of breeding maggots (the larval stage of the order Diptera). This note does not apply to maggot breeding processes where the aggregate of fish, animal or bird matter processed per week at the same location is less than 5 kg. In these circumstances the provisions of Part I of the Environmental Protection Act 1990 will not apply and the process will be subject to the statutory nuisance controls of Part III of the Environmental Protection Act 1990.
- 3.3 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 (EC) 1069/2009 and the accompanying implementing Regulation (EC) 142/2011) The Regulations specify the permitted disposal methods for animal by-products, controls and record the movement of animal by- products and also details hygiene requirements in the collection, transport, storage and processing of animal by-products. The animal materials used in the maggot breeding process fall within these controls and the Regulation also provides for the registration of maggot breeding processes. Where there is any conflict between the standards of this note and the EU Regulations 1774/2002 and 142/2011, the tighter standard should prevail because the Regulations are primarily concerned with the control of risks to public and animal health.

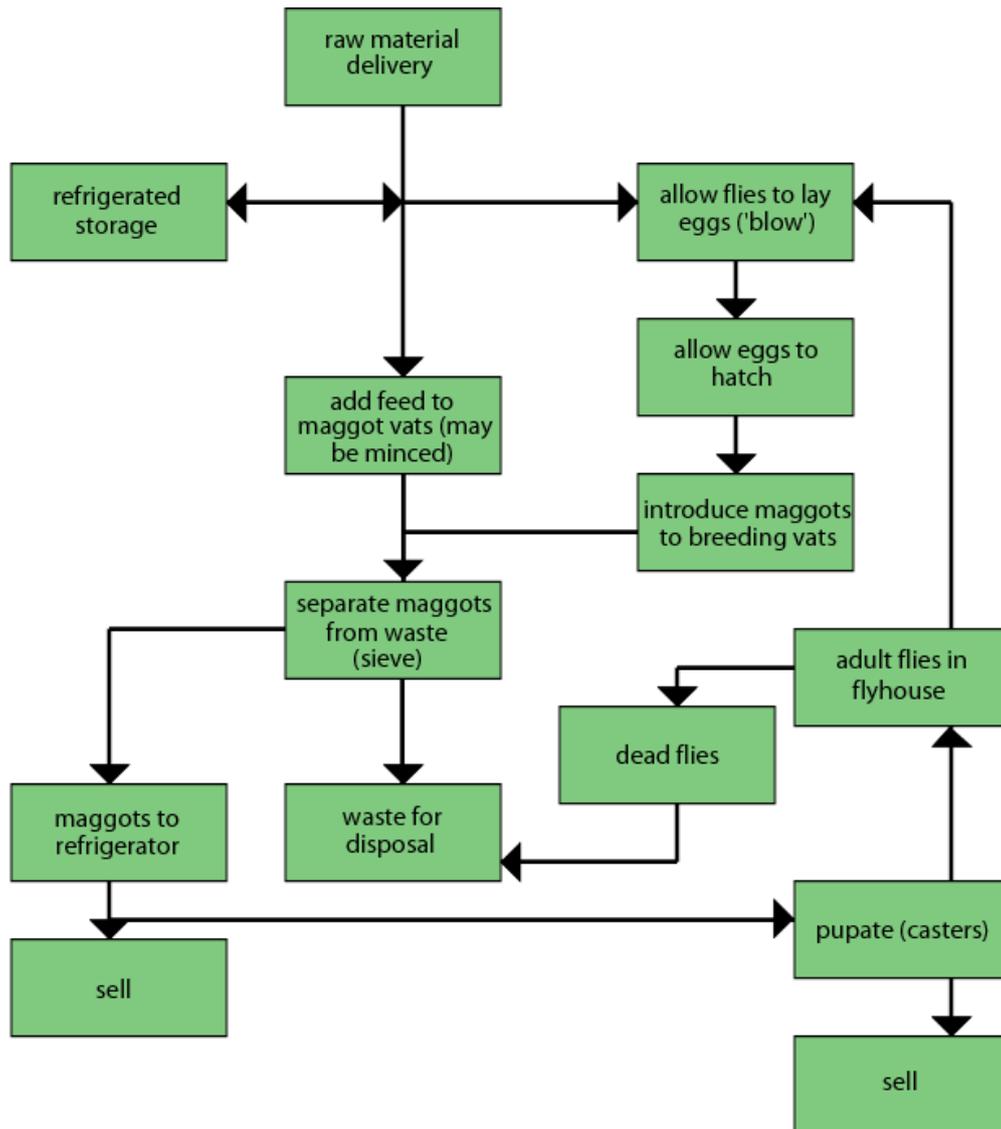
- 3.4 In the context of this note, "process" or "activity" comprises the whole process from receipt of raw materials via production of intermediates to dispatch of finished products, including the treating, handling and storage of all materials and wastes relating to the process.

Breeding of maggots

- 3.5 There are primarily three different types of fly used commercially to produce slightly different maggots, namely the Bluebottle (*Calliphora erythrocephala*), the Greenbottle (*Lucilia sericata*) (which produces larvae known as 'pinkies') and the Housefly (*Musca domestica*) (which produces larvae known as 'squats'). There are other fly larvae which may be used (such as *Sarcophaga*) and this note covers any process for breeding the larvae of the order Diptera. Maggots are largely used as fishing bait but may also be used for feeding to exotic birds and for incorporation into surgical dressings as a wound management aid.
- 3.6 The maggot is the larval stage in the lifecycle of the fly and the larva develops by the use of enzymes to breakdown the protein material in the feed (mainly fish, bird and animal materials) that they consume. A natural by-product of the process is ammonia, other amine/amides, hydrogen sulphide and mercaptans along with a range of other volatile odorous substances. In addition to the odours developed by the maggots feeding habits, the waste animal material which is used also begins to decompose which liberates other volatile odorous substances. Figure 3.1 summarises the process.
- 3.7 The first phase of the process involves adult flies laying eggs into a carrier material. This process is carried out in a flyhouse. The flyhouse is a purpose-made building which is maintained at a controlled temperature and fully insect-proofed (this is largely to stop the fly population which is carefully selected becoming infiltrated by wild flies). The flies are usually fed on sugar or sugary materials and on a regular basis a small amount of fish, bird or animal matter is placed in the flyhouse and exposed to adult flies. The female flies lay eggs in the fish, bird or animal flesh - this process is known as 'blowing'. The flesh and eggs are then held for a short period (typically 24 -36 hours) to allow the eggs to hatch into larva.
- 3.8 The period of the lifecycle is dependent upon the type of fly (houseflies have a shorter lifecycle than bluebottles) and environmental conditions inside the process buildings. Once the eggs hatch, the animal material and small larvae are transferred into shallow bays where the larvae develop. The bays are typically 3- 5m² and each bay can be expected to produce around 50 litres of maggots.
- 3.9 The maggots are then regularly fed animal, bird and fish matter for periods of up to seven days. The rate of production varies considerably based upon environmental conditions, type and quality of feed and fly stock, but typically 1 tonne of animal, bird and fish material will yield between 300 and 500 litres of maggots.

- 3.10 The maggots will quickly pupate (these are also sold as fishing bait and are called 'casters') but will stop feeding before pupation. At this stage, the maggots are separated from the waste feed material by elevating the feed and allowing the maggots to crawl out. Finally the waste material will be screened, by sieving, to separate any residual maggots. The maggots may be coloured by the addition of dyes (or indeed the feed may be coloured), and they are sold for use.
- 3.11 It is common for the process to be operated throughout the year but the peak season for maggot demand and hence maximum production is between June and September. Approximately 25% of the maggots produced in the UK are exported. The majority of maggot breeding processes have a peak production range of between 10,000 and 20,000 litres per week.
- 3.12 Some of the maggots will be pupated and returned to the flyhouse, to replace those flies that die (typically the adult fly will have a lifespan of 8 - 10 days).

Figure 1.1: Typical flow diagram of a maggot breeding operation



4. Emission limits, monitoring and other provisions

- 4.1 Emissions of the substances listed **Table 4.1** should be controlled.
- 4.2 The emission limit values and provisions described in this section are achievable using the best available techniques described in **Section 5**. Monitoring of emissions should be carried out according to the method specified in this section or by an equivalent method agreed by the regulator. Where reference is made to a British, European, or International standard (BS, CEN or ISO) in this section, the standards referred to are correct at the date of publication. (Users of this note should bear in mind that the standards are periodically amended, updated or replaced.) The latest information regarding the monitoring standards applicable can be found at the [Source Testing Association website](#). Further information on monitoring can be found in Environment Agency publications, [M1 and M2](#).
- 4.3 All activities should comply with the emission limits and provisions with regard to releases in **Table 4.1**.

The reference conditions for limits in **Section 4** are: 273.1K, 101.3kPa, without correction for water vapour content, unless stated otherwise.

Table 4.1 should be considered in conjunction with the monitoring paragraphs found later in this section.

Table 4.1 - Emission limits, monitoring and other provisions

Row	Substance	Source	Emission limits/provisions	Type of monitoring	Monitoring frequency
1	Odour	Odour emissions from contained and fugitive sources	Free from offensive odour at any location at or beyond the site boundary, but see paragraphs 4.8 - 4.12.	Olfactory assessment at the site boundary Determination by process assessment (see paragraphs 4.18, 4.19, and 4.24)	Daily Daily, plus more detailed assessment during problems
2	Odour	Contained process releases	Any odour abatement plant should have an odour removal efficiency of not less than 95%. But see paragraphs 4.4 - 4.7	Determination by manual extractive sampling and analysis by dynamic olfactometry in accordance with BS EN13725	On installation of new/replacement odour abatement equipment and/or in the circumstances described in paragraph 4.28 second bullet
3	Droplets, persistent visible emissions	All emissions to air (except steam and condensed water vapour)	No droplets, no persistent visible emissions	Visual observations	* at least once during the working day*
4	Visible smoke	Combustion processes used for abatement of odour	No visible smoke	Visual observations	* at least once during the working day*
5	Sulphur dioxide	All activities using heavy fuel oil or other residual type/ comparable Quality Protocol Processed Fuel Oil	1% wt/wt sulphur in fuel	Sulphur content of fuel is regulated under the Sulphur Content of Liquid Fuels Regulations	
6	Sulphur dioxide	All activities using gas oil/ comparable Quality Protocol Processed Fuel Oil	0.1% wt/wt sulphur in fuel	Sulphur content of fuel is regulated under the Sulphur Content of Liquid Fuels Regulations	

Destruction efficiency testing requires simultaneous sampling at inlet and outlet of abatement plant

Dynamic olfactory results shall be checked by the operator on receipt and sent to the Council within 8 weeks of the monitoring being undertaken.

Activities burning bio-fuels should have a limit set for sulphur in fuel

Activities burning waste oil not covered by the [quality protocol processed fuel oil](#) must comply with the Chapter IV of the Industrial Emissions Directive (the waste incineration chapter).

Odours - principles of BAT in this note

4.4 The approach promulgated in this note to reflect BAT includes:

- an emission standard for odour (**Table 4.1**, row 1) plus a performance standard for odour abatement plant (**Table 4.1**, row 2)
- containment and abatement of odours
- daily inspections of odour abatement plant
- the preparation and operation of an Odour Response Plan (see paragraph 4.21) which will include an assessment of all emission sources, control methods, odour impacts, abnormal operations and measures to mitigate effects in the case of abnormal conditions
- process assessment, including indicative tests for odour abatement plant (**Table 4.2** and paragraph 4.24), in the case of offensive odours being detected or complaints being received
- odour abatement plant efficiency testing for new and replacement plant and when the second bullet of paragraph 4.28 applies

Existing abatement plant

4.5 In the case of existing processes where odour abatement 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 **Table 4.1**, row 1. The regulator should still require that the available plant is optimised for odour removal and should establish an odour abatement efficiency based upon operating data. Where emissions from the odour abatement plant do not meet the provisions of **Table 4.1**, row 1, the plant should be required to be upgraded to the specified efficiency in **Table 4.1**, row 2.

- In determining the 'reasonable operational life' of odour abatement 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 abatement plant (potential for leaks, unavailability of spares, increased frequency of malfunction or failure) and the odour abatement efficiency (the abatement plant no longer capable of achieving the interim odour abatement efficiency determined as above) as key indicators of plant reaching the end of its operational life.

4.6 It may be the case that operators can demonstrate that lower odour removal efficiencies than those in **Table 4.1**, row 2 will meet the provisions of **Table 4.1**, row 1.

New / replacement abatement plant

- 4.7 Where it can be demonstrated that the provisions of **Table 4.1**, row 1 are being met, new/replacement plant may be operated at odour removal efficiencies lower than the 95% in **Table 4.1**, row 1. To provide such demonstration, operators should determine, using dispersion modelling or alternative appropriate technique, what percentage efficiencies are required to meet that provision.

Odour boundary condition

- 4.8 The following should be applied in relation to odour:

Permits should include specific technical conditions in accordance with this guidance to prevent or generally reduce the escape of offensive odour across the site boundary. As discussed below, whether the emphasis should be on prevention or on reduction depends on the type of process (and thus the type of odour) under consideration.

Subject to what is said below, in the case of maggot breeding - which gives rise to odours that are particularly offensive - conditions should be imposed preventing (rather than just reducing) the escape of offensive odour beyond the site boundary. In these cases the specific technical conditions imposed to prevent such escapes should be supplemented, as a back-up measure, with a general condition (an odour boundary condition) requiring emissions to be free from offensive odour outside the site boundary.

- 4.9 When imposing an odour boundary condition local authorities should take account of the fact that there may be circumstances where offensively odorous emissions are released for reasons which are beyond the direct control of the installation operator, for example, where there is a total breakdown of abatement plant through no fault of the operator. Allowance should be made for such occurrences by providing in the permit that it will not be a breach of the condition in a particular case if the operator can show that he or she took all reasonable steps and exercised all due diligence to prevent the release of offensive odour.

- 4.10 Local authorities will need to investigate incidents where offensive odour escapes across the site boundary to establish whether there has been a breach of any odour boundary condition. The Secretary of State would expect that if a maggot breeding process is properly managed, with the operator taking all reasonable steps and exercising all due diligence, there should be very few escapes of offensive odour beyond the site boundary. Certainly he would expect local authorities to investigate very carefully whether an operator was taking all reasonable steps and exercising all due diligence if there were more than two such occurrences in any 12-month period. In the event of any occurrence the operator should immediately take remedial action to prevent any further escape of offensive odour and he would expect this to be effective within at most two hours. Again, the Secretary of State would expect local authorities to investigate with particular care the management of a maggot breeding activity where remedial action had not been effective within 2 hours.)
- 4.11 There may be cases of maggot breeding where the escape of offensive odours beyond the site boundary would be unlikely to cause any harm (for example, because the area potentially affected by the release of any offensive odour is uninhabited countryside). In such cases it would not be appropriate to require an operator to ensure that no such odours cross the site boundary and no odour boundary condition should be imposed.
- 4.12 In all cases, the assessment of offensiveness should be as perceived by the local authority regulator and should take into account the nature of the odour.

Odorous emissions - general guidance

- 4.13 The following general guidance is provided to assist regulators in assessment of compliance with the odour condition of Table 4.1, row 1.
- 4.14 Whilst it is possible to measure the odour strength using a standardised method (dynamic olfactometry as detailed in BS EN 13725), 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.
- 4.15 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.
- 4.16 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.

4.17 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.

Process assessment - visual checks

4.18 The operator should monitor the performance of the installation for emissions which may result in offensive odours beyond the boundary. 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.

4.19 In addition to the continuous monitoring outlined in **Table 4.2**, the odour control plant should be inspected at least once a day to verify correct operation and to identify any malfunctions. Depending upon the type of abatement plant used, this inspection should include:

- Identification of any leaks in air handling equipment and ductwork. Where a key component of the odour abatement plant cannot be adequately accessed for inspection then arrangements to enable this should be made.
- In the case of scrubbing equipment, thermal oxidisers and other combustion plant, the inspection should include 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 should be inspected as any excessive flow or odour escape is often indicated by scorching of the earth or plant growth dying off.

Visible emissions

4.20 The aim should be to prevent any visible airborne emission from any part of the process. This aim includes all sites regardless of location. Monitoring to identify the origin of a visible emission should be undertaken and a variety of indicative techniques are available.

Abnormal events and the odour response procedure

Prepare

- 4.21 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 abatement plant. The equipment manufacturer should recommend which spares are subject to wear and foreseeable failure and are critical for the correct operation of the odour abatement 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 abatement plant or to offensive odours beyond the site boundary.
- 4.22 The odour response procedure should include analysis of actions in the case of abatement plant breakdown or malfunction. Immediate arrangements should be made to divert odour streams to other suitable abatement plant. Failure to provide suitable temporary abatement 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:
- reducing the scale of operations, for example reducing throughput
 - by-pass emissions to stand-by or alternate odour abatement plant, for example using a boiler as an emergency odour abatement system

In the case of maggot breeding, it is not usually feasible to adjust the process operations as the maggots will continue to feed - however, in cases where there are abnormal conditions leading to offensive odour beyond the boundary which may persist for more than 24 hours, consideration should be given to ceasing the introduction of new blown material and only allowing the completion of maggots already in production until remedial action has been completed.

Respond

- 4.23 The operator should respond to problems which may have an adverse 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, whether or not there is related monitoring showing an adverse result:
 - if there is an emission that is likely to have an effect on the local community; **or**
 - in the event of the failure of key abatement plant, for example, scrubber units.

Process assessment - Indicative tests for odour abatement plant

- 4.24 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 abatement plant performance. **Table 4.2** provides guide values which would indicate problems with abatement plant. Depending upon the type of plant used 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.
 - In the case of biofilters or scrubbers, emissions may be tested for ammonia, amines/amides or mercaptans/hydrogen sulphide. This testing can be carried out using gas detection tubes (further guidance on gas detection tubes is included in **Appendix 4**, paragraph 5).
 - In the case of open top biofilters, the sampling method detailed in **Appendix 4** of this note should be used.

Table 4.2 - Indicative Guide Values		
Row	Odour indicators	Indicative guide values
1	Ammonia	1 ppm v/v
2	Amines and amides	1 ppm v/v
3	Organic and inorganic sulphides including mercaptans and hydrogen sulphide (as total sulphur)	1 ppm v/v
4	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.
<p>Notes: The values are not limits, they are guide values. Paragraph 4.24 says when and how they are usually applied Exceedance triggers further investigation of the odour abatement plant.</p>		

Monitoring, investigating and reporting

- 4.25 The operator should monitor emissions, make tests and inspections of the activity. The need for and scope of testing, (including the frequency and time of sampling), will depend on local circumstances. Continued complaint might be met in part by increased monitoring, even 24 hour monitoring might be appropriate for repeated incidents.
- The operator should keep records of inspections, tests and monitoring, including all non-continuous monitoring, inspections and visual assessments. Records should be:
 - kept on site;
 - kept by the operator for at least two years; **and**
 - made available for the regulator to examine.
 - If any records are kept off-site they should be made available for inspection within one working week of any request by the regulator.

Information required by the regulator

- 4.26 The regulator needs to be informed of monitoring to be carried out and the results. The results should include process conditions at the time of monitoring.
- The operator should notify the regulator at least 7 days before any periodic monitoring exercise to determine compliance with emission limit values. The operator should state the provisional time and date of monitoring, pollutants to be tested and the methods to be used.
 - The results of non-continuous emission testing should be forwarded to the regulator within 8 weeks of 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. The operator should:
 - identify the cause and take corrective action;
 - clearly record as much detail as possible regarding the cause and extent of the problem, and the remedial action taken;
 - re-test to demonstrate compliance as soon as possible; and inform the regulator of the steps taken and the re-test results.

Continuous monitoring - odour abatement plant

- 4.27 Where odour abatement plant is used, continuous monitoring is required, depending upon the type of plant used, as follows:
- 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°C) or if the carbon monoxide level exceeds the indicative guide value in Row 4 of **Table 4.2**.
 - In the case of scrubbing equipment, the 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.

Calibration and compliance monitoring

4.28 Calibration and compliance monitoring should meet the following provisions as appropriate depending upon the type of abatement plant used:

- Odour testing should take place on commissioning of new/replacement plant to demonstrate compliance with the requirements of **Table 4.1**, row 2.
- In addition, it may be necessary to carry out monitoring of emissions of odour at other times where the process is subject to justified complaint of offensive odour and the process assessment carried out in accordance with paragraphs 4.18- 4.24, cannot identify a cause for the odour.
- The destruction efficiency of any odour abatement plant required to meet the emission limits in **Table 4.1** should be tested in accordance with the main procedural requirements of BS.EN13725. This testing should be carried out by dynamic olfactometry based upon manual extractive sampling undertaken simultaneously at the inlet and outlet of the odour abatement plant. At least three samples should be taken from both the inlet and outlet. Where the odour abatement plant comprises an open top biofilter, the guidance in Appendix 4 should assist in developing a sampling protocol.
- The odour abatement plant testing should be carried out when the maggot breeding process is in the peak season, preferably in July or August but in any case between June and September.

4.29 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.

Dilution air may be added for waste gas cooling or improved dispersion.

Representative sampling

- 4.30 Whether sampling on a continuous or non-continuous basis, 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, (see paragraph 4.2).

5. Control techniques

Summary of best available techniques

5.1 **Table 5.1** provides a summary of the best available techniques that can be used to control the process in order to meet the emission limits and provisions in **Section 4**. 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 5.1 - Summary of control techniques

Sources of odour	Control techniques
Loading and unloading processes	Within buildings under negative pressure and vented to odour abatement plant. Enclosed vehicles and containers
Raw material, effluent and waste storage	Within buildings under negative pressure and vented to odour abatement plant. Within enclosed silos or stored under negative pressure and vented to odour abatement plant. Refrigeration of raw materials unless used within 12 hours of arrival at site
Maggot rearing process	Within buildings under negative pressure and vented to odour abatement plant Spillage management Appropriate construction <ul style="list-style-type: none"> • impervious and easy to clean surfaces
Maggot breeding overproduction	Prevent over production
Vehicles	Within buildings: <ul style="list-style-type: none"> • all vehicle parking within buildings • all buildings ventilated to odour abatement plant Washing of vehicle surfaces (material contact) within buildings as above
Ventilated air	Vent to suitable abatement plant: <ul style="list-style-type: none"> • biofilters • thermal oxidisers/combustion plant • scrubbers • located to take account of sensitive receptors
Waste gas from odour abatement plant	Odour - Final dispersion to ensure no offensive odour at sensitive receptors Sulphur oxides - Limit sulphur in fuel. Carbon monoxide - Good combustion

Techniques to control emissions from contained sources

- 5.2 Maggot breeding is carried out in open vats and hence emissions are released into the process building. The containment of potentially odorous emissions is therefore the key to effective control.
- 5.3 The following are examples of relevant odour control techniques:
- containment of odours within process buildings by good design and extract ventilation;
 - good housekeeping and raw material handling practices;
 - containment of odours within process equipment by maintaining material handling and storage facilities leakproof and spillproof as far as possible;
 - control and minimisation of odours from residual materials, effluent and waste;
 - containment of strong odour sources and treatment in odour abatement plant.
- 5.4 Emissions from the process operations covered by this note comprise odours of mixed chemical species. The main principles for preventing odour emissions are:
- containment of the odours in the process equipment;
 - raw material handling operations (as detailed below); and
 - final treatment by abatement of odour emissions.
- 5.5 Containment is achieved by ensuring that all operations with potential releases are carried out within enclosed equipment under a slight negative pressure and other fugitive odours are controlled by building extract ventilation.
- 5.6 Ventilation should be provided to maintain an adequate negative pressure within the raw material reception and storage areas, processing and maggot rearing areas, maggot despatch areas and waste storage areas in order to eliminate the possibility of odours escaping to atmosphere without treatment.
- The ventilation system design and extract point distribution should ensure that negative pressure is maintained in all areas of the buildings. It may be more effective to use increased ventilation rates in areas of the building where operations generate higher intensity odours.

- The necessary ventilation rate will depend upon many factors, including:
 - environmental conditions (higher ventilation rates are required in hot weather);
 - raw material quality and throughput;
 - maggot breeding intensity (higher ventilation rates are required during peak loading);
 - building design and ventilation plant distribution.
- The ventilation rate for an installation is therefore likely to vary throughout the year. As a guide, the range of ventilation rates should achieve between 10 air changes per hour in the winter and up to 25 air changes per hour in the summer.
- The ventilation equipment should be vented to suitable odour abatement plant to meet the provisions of **Table 4.1**.

5.7 Odour abatement plant should be provided and operated at all times, to meet the provisions of section 4 of this note, further information is available from Odour Measurement and Control- An Update published by National Environmental Technology Centre, Culham, Abingdon. Oxon OX14 3DB (ISBN 0-85624-8258).

5.8 Examples of the type of abatement plant which are suitable include biological earth filters, peat and heather beds, high efficiency biological scrubbers, multi-stage chemical scrubbers, thermal incinerators and other forms of combustion plant. Adsorption equipment is not anticipated to offer adequate odour removal due to the types of chemical species in the odour and the risk of odour breakthrough and re-entrainment. It may be appropriate to provide a number of smaller biofilters rather than one large bed to achieve more even gas flows throughout the filter. This will also provide standby facilities in case of breakdown or failure of one bed if the biofilter capacity is designed for this purpose.

5.9 Odour abatement plant needs to be optimised to meet the odour destruction efficiency provisions of **Table 4.1**. Depending upon the type of abatement 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°C). In the case of boilers, care is needed in their use for odour abatement as the operating temperature and residence time may not have been designed for odour abatement 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 abatement 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 4.1**. 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.
- Mist eliminators should be fitted where there is a potential for such occurrence.
- 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 maggot breeding 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°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 **Table 4.1**. However the recommended residence time for peat and heather filters is a minimum of 60 seconds for lower intensity odours.

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

Materials handling

Techniques to control fugitive emissions

- 5.11 All animal matter should be transported from the source of arising to the maggot breeding site as quickly as practicable. The design and use of vehicles and containers should be such as to prevent spillage and the emission of any offensive odour or substance prescribed for air.
- 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. Refrigeration at the process site and during transit will reduce odorous emissions.
 - Animal matter should be received and stored prior to processing in a designated enclosed area which should be equipped with extraction to abatement plant to meet the provisions of **Table 4.1** of this note. Vehicles containing raw materials should only be parked within this designated area.
 - Animal matter should be introduced into the maggot breeding bays as soon as is practicable after receipt. If this cannot be affected within a reasonable time period (in most cases within 12 hours), the material should be placed into frozen or refrigerated storage facilities.
 - Vehicles and containers should be emptied in the designated, enclosed reception area and surfaces which have been in contact with animal matter should be cleaned as soon as possible after delivery in this designated area. Other surfaces of vehicles and containers may be cleaned in a separate, designated area subject to the provisions of 'building construction' (paragraph 5.13), 'process operations' (paragraph 5.14) and 'effluent and waste' (paragraph 5.18).

Good hygiene for odour control

- 5.12 European regulations laying down health rules as regards animal by-products and derived products not intended for human consumption, (Regulation (EC) 1069/2009 and the accompanying implementing Regulation (EC) 142/2011) apply to this sector and are enforced for reasons other than odour control.

Animal by-products legislation is not a reason for including conditions in a permit issued using this guidance note. However the effect of the animal by-products controls assist considerably in odour control at maggot breeding.

Detailed hygiene conditions for odour control reasons are not usually required in the permit.

Building construction

- 5.13 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.

All floors of animal material reception, storage and processing areas, maggot breeding 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 sedimentation tanks and interceptors to prevent the transmission of material likely to impair the free flow of any receiving sewerage system.

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, storage and maggot breeding areas. All doors for personnel access and egress should be self-closing and doors for vehicle access should only be opened to allow vehicles to enter or exit.

Areas of the building into which vehicles enter should be of sufficient size to accommodate the whole vehicle, including lowered tailgates, and to allow doors to close once the vehicle is inside the building. In addition, consideration should be given to the installation of an airlock where necessary to ensure compliance with Row 1 of Table 2 during vehicle access or off-loading.

An audible alarm should sound whenever the vehicle access doors are open, to warn of the potential for odour escape.

The separate processing operations should be undertaken in segregated areas of the building, for example raw material receipt, storage, processing, maggot rearing, maggot storage and waste storage. In particular, raw material receipt and storage should be segregated completely from maggot storage and despatch.

Process operations

- 5.14 Process operations should be carried out to minimise releases of odour.

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. It should be noted that there might be health and safety considerations when using these techniques where infected raw materials are involved. Spillages should be contained and cleared as soon as reasonably practicable.

- The loading of maggots into delivery vehicles should be carried out in a designated area with exhaust ventilation discharging to suitable abatement plant.

- Stocks of dusty materials, including sawdust, should be stored in closed containers or an enclosed store to prevent wind entrainment. The transportation and handling of dusty materials should be carried out by methods which do not give rise to dust emissions, for example in closed containers with minimisation of disturbance of such materials.
- The transfer of animal material to the processing equipment and maggot breeding bays should be undertaken in such a manner as to prevent spillage and minimise disturbance of material, and such areas should be enclosed. All points of transfer should be designed to be leak proof with suitable means for cleaning. During transfer between the various storage and process operations, animal materials should not be transferred outside buildings unless in enclosed containers.
- Areas where receipt, storage, processing and maggot rearing is carried out should be totally enclosed. This includes fly houses. These areas should be fully weatherproof.
- It is essential that a high standard of hygiene be maintained in the fly house. Although relatively small quantities of animal matter are fed to the flies and exposed for 'blowing', this may be a source of odours particularly if forced mechanical ventilation is supplied to the fly house. All ventilation from fly houses should be vented to suitable abatement plant where necessary to meet the provisions of **Table 4.1**.
- Ventilation should be provided in accordance with paragraph 5.6. As regards the exhaust flow rate within the building, attention is drawn to the need to ensure compliance with the requirements of the legislation and standards applicable to the workplace environment, particularly with respect to occupational exposure limits. A properly designed and installed ventilation system at the maggot breeding bays will provide more effective containment of odours.

A small level of production above the plant's capacity will cause a large increase in emissions.

- Over-production should be prevented.

- 5.15 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 abatement 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.

Dry cleaning methods of cleaning maggot beds may be preferred as maggots can climb out of wet structures more easily than dry.

The cleaning and disinfecting of all drainage areas and collecting tanks, yards and roads should be undertaken regularly and at least once a week.

- 5.16 A senior manager who recognises the importance of controlling the odours produced by maggot breeding should be designated to be specifically responsible for all aspects of liaison with the regulator and where applicable with members of the general public.
- 5.17 As the maggot rearing process is not readily controlled and cannot be effectively stopped in the case of the absence of containment ventilation and abatement, the operator should make provision for stand-by power generation in the case of interruption of power supply.

Effluent and waste

- 5.18 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.

All effluent arising within buildings including floor washings should be drained to an effluent treatment plant or storage tank.

All cesspits, storage tanks and septic tanks should be vented to suitable odour abatement plant where necessary to meet the provisions of **Table 4.1**. 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 abatement 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 abatement 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 overflowing.

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.

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.

- 5.19 The solid waste remaining on completion of the maggot breeding process is still capable of the emission of offensive odours.
- The waste should be stored within an enclosed dedicated store or container within the process building whilst awaiting removal for either disposal or further processing.
 - The storage area should be ventilated and the ventilation plant should discharge to suitable abatement plant to meet the provisions of **Table 4.1**.
 - All waste should be removed as soon as the waste container is full and at least once per week or more frequently where necessary to ensure compliance with **Table 4.1**.
 - Waste should not be moved from the maggot rearing area to another building or outside unless in sealed containers. (Covered skips should not be regarded as sealed containers).

Air quality

Dispersion & dilution

- 5.20 Pollutants that are emitted via a stack require sufficient dispersion and dilution in the atmosphere to ensure that they ground at concentrations that are deemed harmless. This is the basis upon which stack heights are calculated using HMIP Technical Guidance Note (Dispersion) 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.

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

- 5.21 Where an emission consists purely of air and particulate matter, (i.e. no products of combustion or any other gaseous pollutants are emitted) the above provisions relating to stack height calculation for the purpose of dispersion and dilution should not normally be applied. Revised stack height calculations should not be required as a result of publication of this revision of the PG note, unless it is considered necessary because of a breach or serious risk of breach of an EC Directive limit value or because it is clear from the detailed review and assessment work that the permitted process itself is a significant contributor to the problem.
- 5.22 Where offensive odour is likely outside the process site boundary the assessment of stack or vent height should take into account the need to render harmless residual offensive odour.

Ambient air quality management

- 5.23 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 permitted 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 permitted 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. Paragraph 59 of the [Air Quality Strategy 2007 \[Volume 1\]](#) gives the following advice:

“...In drawing up action plans, local authority environmental health/pollution teams are expected to engage local authority officers across different departments, particularly, land-use and transport planners to ensure the actions are supported by all parts of the authority. In addition, engagement with the wider panorama of relevant stakeholders, including the public, is required to ensure action plans are fit-for-purpose in addressing air quality issues. It is vital that all those organisations, groups and individuals that have an impact upon local air quality, buy-in and work towards objectives of an adopted action plan.”

Stacks, vents and process exhausts

- 5.24 Liquid condensation on internal surfaces of stacks and exhaust ducts might lead to corrosion and ductwork failure or to droplet emission. Adequate insulation will minimise the cooling of waste gases and prevent liquid condensation by keeping the temperature of the exhaust gases above the dewpoint. A leak in a stack/vent and the associated ductwork, or a build up of material on the internal surfaces may affect dispersion:
- Flues and ductwork should be cleaned to prevent accumulation of materials, as part of the routine maintenance programme.
- 5.25 When dispersion of pollutants discharged from the stack (or vent) is necessary, the target exit velocity should be 15m/s under normal operating conditions, however, lower velocities than 15m/s are acceptable provided adequate dispersion and dilution is achieved (see also the paragraph below regarding wet plumes). In order to ensure dispersion is not impaired by either low exit velocity at the point of discharge, or deflection of the discharge, a cap, or other restriction, should not be used at the stack exit. However, a cone may sometimes be useful to increase the exit velocity to achieve greater dispersion.
- 5.26 An exception to the previous paragraph is where wet arrestment is used as the abatement. Unacceptable emissions of droplets could occur from such plant where the linear velocity in the stack exceeds 9m/s.
- 5.27 To reduce the potential of droplet emissions a mist eliminator should be used. Where a linear velocity of 9m/s is exceeded in existing plant consideration should be given to reducing this velocity as far as practicable to ensure such droplet entrainment and fall out does not happen.

Management

Management techniques

- 5.28 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**
 - ensuring that spares and consumables - in particular, those subject to continual wear – are held on site, or available at short notice from guaranteed local suppliers, so that plant breakdowns can be rectified 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.

Appropriate management systems

- 5.29 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 installations 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.

- 5.30 Regulators should use their discretion, in consultation with individual operators, in agreeing the appropriate level of environmental management. Simple systems which ensure that LAPPC considerations are taken account of in the day-to-day running of a process may well suffice, especially for small and medium-sized enterprises. Regulators are urged to encourage operators to have an EMS for all their activities, but it is outside the legal scope of an LAPPC permit to require an EMS for purposes other than LAPPC compliance. For further information/advice on EMS refer to the appropriate chapter of the appropriate Guidance Manual for [England and Wales](#), [Scotland](#) and [Northern Ireland](#).

Training

- 5.31 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.
- All staff whose functions could impact on air emissions from the activity should receive appropriate training on those functions. This should include:
 - awareness of their responsibilities under the permit;
 - steps that are necessary to minimise emissions during start-up and shutdown;
 - actions to take when there are abnormal conditions, or accidents or spillages that could, if not controlled, result in emissions.
 - The operator should maintain a statement of training requirements for each post with the above mentioned functions and keep a record of the training received by each person. These documents should be made available to the regulator on request.

Maintenance

5.32 Effective preventative maintenance plays a key part in achieving compliance with emission limits and other provisions. All aspects of the process including all plant, buildings and the equipment concerned with the control of emissions to air should be properly maintained. In particular:

- The operator should have the following available for inspection by the regulator:
 - a written maintenance programme for all pollution control equipment; **and**
 - a record of maintenance that has been undertaken.

6. Summary of changes

The main changes to this note, with the reasons for the change, are summarised in **Table 6.1**. Minor changes that will not impact on the permit conditions e.g. slight alterations to the Process Description have not been recorded.

Table 6.1 - Summary of changes			
Section / paragraph / row	Change	Reason	Comment
Section 1: Introduction			
	Simplification of text	Make note clearer	
	Addition of links	Change to electronic format	Removes need for extensive footnotes/ references
Paragraphs 1.6 & 1.7	Introductory text to the simplified permitting regime	New to Part B	
Section 3: Activity description			
Paragraph 3.3	Amended legislative reference relating to the disposal of certain animal by-products	Regulation 1069/2009 has repealed Regulation 1774/2002 (Animal by-products Regulation).	
Section 4: Emission limits, monitoring and other provisions			
Whole section	Used to be Section 5 in previous note	Section 4 in previous note deleted	
Section 5: Control techniques			
	Used to be Section 6 in previous note	Section 4 in previous note deleted leading to re-numbering of sections	
Paragraph 5.19	New text relating to good hygiene conditions	Prevents reiteration in the simple permit of hygiene conditions that are better covered via the ABP Regulations	
Appendix 1			
	Inclusion of a new Appendix detailing a model simplified permit	Simplification of permitting process	
Appendix 2			
	Inclusion of a new Appendix detailing a model application form for a simplified permit	Simplification of permitting process	

7. Further information

Sustainable consumption and production (SCP)

Both business and the environment can benefit from adopting sustainable consumption and production practices. Estimates of potential business savings include:

- £6.4 billion a year UK business savings from resource efficiency measures that cost little or nothing;
- 2% of annual profit lost through inefficient management of energy, water and waste;
- 4% of turnover is spent on waste.

When making arrangement to comply with permit conditions, operators are strongly advised to use the opportunity to look into what other steps they may be able to take, for example, having regard to the efficient use of auxiliary fuels, such as gas and electricity. Regulators may be willing to provide assistance and ideas, although cannot be expected to act as unpaid consultants.

Health and safety

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

- requirements of a permit should not put at risk the health, safety or welfare of people at work or those who may be harmed by the work activity;
- equally, the permit 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 relevant environmental legislation relate to the concentration of pollutant released into the air from prescribed activities;
- exposure limits under health and safety legislation relate to the concentration of pollutant in the air breathed by workers;
- these limits may differ since they are set according to different criteria. It will normally be quite appropriate to have different standards for the same pollutant, but in some cases they may be in conflict (for example, where air discharged from a process is breathed by workers). In such cases, the tighter limit should be applied to prevent a relaxation of control.

Further advice on responding to incidents

The UK Environment Agencies have published [guidance](#) on producing an incident response plan to deal with environmental incidents. Only those aspects relating to air emissions can be subject to regulation via a Part B (Part C in NI) permit, but regulators may nonetheless wish to informally draw the attention of all appropriate operators to the guidance.

It is not envisaged that regulators will often want to include conditions, in addition to those advised in this PG note, specifying particular incident response arrangements aimed at minimising air emissions. Regulators should decide this on a case-by-case basis. In accordance with BAT, any such conditions should be proportionate to the risk, including the potential for harm from air emissions if an incident were to occur. Account should therefore be taken of matters such as the amount and type of materials held on site which might be affected by an incident, the likelihood of an incident occurring, the sensitivity of the location of the installation, and the cost of producing any plans and taking any additional measures.

Appendix 1 - Model Permit

This Appendix contains a model permit for maggot breeding installations – see [insert relevant para from introduction] of this note and paragraph 3.6 of the [General Guidance Manual on Policy and Procedures](#).

Notes:

- text in the model permit written in italics is advice to regulators.
- text in the model permit in [square brackets] offers choice to regulators or indicates where information needs to be inserted from the application;
- text bracketed with asterisks (eg *Alarms shall be tested at least once a week*.) may be omitted by a regulator where the past performance of the plant gives the local authority sufficient reassurance about operator compliance – “earned recognition”;
- the model permit has been drafted for local authorities in England and Wales. Regulators in Scotland and Northern Ireland will need to amend the legal heading and, where appropriate, references to ‘Council’;
- references to ‘installation’ will need to be substituted with ‘mobile plant’ in relevant cases, and other amendments made accordingly;
- the purpose of the activity description is to set down the main characteristics of the activity, including any directly associated activities, so it is clear to all concerned what is being authorised by the permit and therefore what changes would need further approval. Regulators are advised to include a description of any key items of abatement and monitoring equipment the operator intends to use or is using;
- it should normally be sufficient for records relating to simplified permits to be kept for no more than [24] months. Where, however, as a result of a ‘low risk’ rating, inspections are undertaken less often, regulators may want to specify a period which ensures the records are available at the next inspection.

[] COUNCIL
POLLUTION PREVENTION AND CONTROL ACT 1999
Environmental Permitting Regulations 2010 (as amended)

Permit ref. no:

Name and address of person (A) authorised to operate the installation ('the operator'):

Registered number and office of company: (if appropriate)

Address of permitted installation (B)

The installation boundary and key items of equipment mentioned in permit conditions are shown on the plans attached to this permit.

Activity description

Conditions

The operator (A) is authorised to operate the activity¹ at the installation (B) subject to the following conditions.

1. The operator shall:
 - prevent offensive odour beyond the site boundary as perceived by the regulator (subject to condition 2) *(for remote sites “site boundary” can be amended)*
 - contain processing operations within a building and prevent the release of uncontrolled emissions
 - extract odorous air
 - treat extracted air in odour abatement plant
 - maintain a written odour response plan

Emissions

2. There shall be no offensive odour beyond the site boundary as perceived by the regulator. It shall not be a breach of this condition in a particular case if the operator can show that they took all reasonable steps and exercised all due diligence to prevent the release of offensive odour. *(for remote sites “site boundary” can be amended)*
3. The emission requirements and methods and frequency of monitoring set out in Table 1 shall be complied with.

Buildings, ventilation

4. Buildings containing processing operations (including raw material storage, maggot rearing, breeding, despatch, waste and fly houses) shall: *(delete bullets that do not apply)*
 - prevent the uncontrolled release of air from raw materials receipt, processing and storage.
 - [maintain a [negative pressure]/[chilled atmosphere] inside raw materials reception and storage areas of the building];
 - have a designated area for loading raw material wastes into vehicles, and shall collect air and exhaust it to the odour abatement plant;
 - [be large enough for raw material delivery vehicles to be unloaded inside closed doors]

Odour abatement plant

5. The operator shall ensure that extracted air is discharged through odour abatement plant;
6. The odour abatement equipment shall be inspected not less than once a day for at least the following: a) leaks or blockages in air handling equipment, ductwork and abatement equipment; [b) continuous monitors for abatement equipment]; [and c) surface cracking, voids, leaks, compaction, moisture content, and plant/weed growth on biofilters].

Odour response procedure

7. The operator shall have a written odour response procedure.

¹ listed in [] in Part 2 of Schedule 1 to the Environmental Permitting Regulations PG6/05 (13)

8. In the case of abnormal emissions, malfunction or breakdown leading to abnormal emissions the operator shall:
 - investigate and undertake remedial action immediately;
 - adjust the process or activity to minimise those emissions; and
 - promptly record the events and actions taken
9. The operator shall, in the case of abnormal emissions, inform the regulator without delay if there is an emission likely to have an effect on the local community

Good hygiene for odour control

Note: for the purposes of this Condition, the phrase “raw materials” is taken to mean previously unprocessed animal protein.

10. To minimise emissions of odour, the operator shall ensure that:
 - the buildings, equipment and containers that hold raw materials and waste raw materials can be, and are, cleaned effectively, and are kept in good condition;
 - liquids drain appropriately;
 - raw materials are unloaded and stored appropriately;
 - waste raw materials are stored appropriately;
 - vehicles and containers are cleaned appropriately;
 - vehicles and containers in contact with raw materials shall be cleaned within the designated delivery area as soon as possible after delivery
 - vehicles containing raw materials shall only be parked within the designated delivery area(s)
11. ~~delete if no defrosting~~ [During defrosting necessary precautions shall be taken to prevent odorous emissions]

Storage of dusty materials

12. Dusty materials shall be kept in containers or in fully enclosed areas.

[Effluent and] Wastes capable of causing an odour

13. [Cesspits, effluent storage tanks and septic tanks shall be adequately covered.] [They and the waste storage and the collecting tanker shall be continuously vented to odour abatement plant].
14. Waste shall be removed from site frequently. When waste is moved outside the process building it shall be in sealed containers.

Monitoring provisions

15. The emission requirements and methods and frequency of monitoring set out in Table 1 shall be complied with.
16. Adverse monitoring results shall be investigated
17. A simple wind direction indicator shall be in operation.

Records and training

18. Written or computer records of all tests and monitoring shall be kept by the operator until the next inspection, or for at least [24] months whichever is the longer. They shall be made available for examination by the regulator. *Records shall be kept of operator inspections, including those for odorous emissions.*
19. Staff at all levels shall receive the necessary training and instruction to enable them to comply with the conditions of this permit. *Records shall be kept of relevant training undertaken*.

The following two conditions are not needed for PPC permits which transferred automatically into the environmental permitting regime by virtue of regulation 69(6) of the 2007 Regulations and regulation 108(4) of the 2010 Regulations. Where permits are issued on or after 6 April 2008 the conditions will not automatically apply and need specific inclusion in the permit where required.

Best available techniques

20. The best available techniques shall be used to prevent or, where that is not practicable, reduce emissions from the installation in relation to any aspect of the operation of the installation which is not regulated by any other condition of this permit.

Process changes

21. If the operator proposes to make a change in operation of the installation, he must, at least 14 days before making the change, notify the regulator in writing. The notification must contain a description of the proposed change in operation. It is not necessary to make such a notification if an application to vary this permit has been made and the application contains a description of the proposed change. In this condition 'change in operation' means a change in the nature or functioning, or an extension, of the installation, which may have consequences for the environment.

Permit writer to delete rows that do not apply

Table 1 - Emission limits, monitoring and other provisions

Row	Substance	Source	Emission limits/provisions	Type of monitoring	Monitoring frequency
1	Odour	Odour emissions from contained and fugitive sources.	Free from offensive odour at any location at or beyond the site boundary (subject to the provisions of condition 2).]	Olfactory assessment at site boundary Determination by process assessment	*Daily* *Daily* plus see note a
2		Contained Process Releases.	Any odour abatement plant should have an odour removal efficiency of not less than [95%].	Determination by manual extractive sampling and analysis by dynamic olfactometry.	On installation of new / replacement odour abatement equipment If notified by the regulator following certain events:(see note a)
3	Droplets, persistent visible emissions	All emissions to air (except steam and condensed water vapour)	No droplets, no persistent visible emissions	Visual observations	*At least once during the working day*
4	Visible smoke	Combustion processes used for abatement of odour	No visible smoke	Visual observations	*At least once during the working day*

Notes:

- a) When offensive odours are detected beyond the process boundary or complaints are received, but there is no obvious cause of odour release then the operator shall check the odour abatement plant performance using Table 2 guide values and check the process operational controls. If notified by the regulator to do so, then odour removal efficiencies shall be retested
- b) All extractive monitoring shall be representative, and shall use standard methods.
- c) Destruction efficiency testing requires simultaneous sampling at inlet and outlet of abatement plant
- d) Dynamic olfactory results shall be checked by the operator on receipt and sent to the Council within 8 weeks of the monitoring being undertaken.

[5]	[Sulphur dioxide]	[All activities using heavy fuel oil or other residual type/comparable Quality Protocol Processed Fuel Oil]	[1% wt/wt sulphur in fuel]	[Sulphur content of fuel is regulated under the Sulphur Content of Liquid Fuels Regulations]
[6]	[Sulphur dioxide]	[All activities using gas oil/ comparable Quality Protocol Processed Fuel Oil]	[0.1% wt/wt sulphur in fuel]	[Sulphur content of fuel is regulated under the Sulphur Content of Liquid Fuels Regulations]

Delete if oil is not burnt Activities burning bio-fuels should have a limit set for sulphur in fuel
 Activities burning waste oil not covered by the [quality protocol for processed fuel oil](#) must comply with Chapter IV of the industrial emissions Directive.

Permit writer to delete rows that do not apply to the specific site

Table 2 - Odour abatement plant - Indicative guide provisions for monitoring

Type of Odour abatement plant	Indicative Guide Substance and Value	Type of monitoring	Monitoring frequency
Thermal oxidiser or combustion plant use as odour abatement plant	Emissions of carbon monoxide (CO) at 100mg/m ³ (expressed as a 30 minute mean at 273K and 101.3Pa). Or temperature - 850°C	Carbon monoxide – recording, indicative monitor with visible and audible alarms Temperature - Monitor and audible and visual alarms	Continuous
Scrubbing equipment	Liquor flow	Monitor and alarms (audible and visual)	Continuous Record daily
	pH or Redox potentials established during commissioning	Monitor record and alarms (audible and visual)	Continuous Record daily
Bioscrubber additionally needs	Pressure drop across scrubber packing established during commissioning	Monitor and alarms (audible and visual)	Continuous Record daily
	pH	Control	
	Blockage	Inspect	Regularly
Biofilter	Pressure drop across biofilter established during commissioning (delivery pressure of main fan is one suitable parameter)	Monitor and alarms (audible and visual) Record trigger levels if level is varied (for example, winter/summer settings, change in number of fans in use)	Continuous Record daily
Biobed	Moisture <ul style="list-style-type: none"> • even flow • cracking • steam venting – temp of day 	Visual inspections might look for: even flow, is it damp, quantity of water going in, meters installed in biobed is unlikely.	Daily
Biobed with peat/heather packing additionally needs	pH		
Condensers for pre-treatment of emissions	Cooling liquid flow	monitor	Continuous

Notes

Testing of odour abatement plant should be carried out, if possible, when the process is operated at peak production

Sample collection provisions for biobeds are in **Appendix 3**

If emissions exceed this indicative guide value it is likely that the odour destruction efficiency of the odour abatement 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. (further guidance on gas detection tubes is included in **Appendix 3**, paragraph 5)

Right to Appeal

You have the right of appeal against this permit within 6 months of the date of the decision. The Council can tell you how to appeal [*or supply details with the permit*]. You will normally be expected to pay your own expenses during an appeal.

You will be liable for prosecution if you fail to comply with the conditions of this permit. If found guilty, the maximum penalty for each offence if prosecuted in a Magistrates Court is £50,000 and/or 6 months imprisonment. In a Crown Court it is an unlimited fine and/or 5 years imprisonment.

Our enforcement of your permit will be in accordance with the [Regulators' Compliance Code](#)

Appendix 2 - Application form for a simple permit to operate a maggot breeding activity

Application for a permit for a maggot breeding activity

Local Authority Pollution Prevention and Control
Pollution Prevention and Control Act, 1999
Environmental Permitting (England and Wales) Regulations 2010

Introduction

When to use this form

Use this form if you are applying for a permit to a Local Authority to operate a maggot breeding installation as defined in Schedule 1 to the Environmental Permitting Regulations.

The appropriate fee must be enclosed with the application to enable it to be processed further. When complete, send the form and the fee and any additional information to:

[Insert local authority address]

If you need help and advice

We have made the application form as straightforward as possible, but please get in touch with us at the local authority address given above if you need any advice on how to set out the information we need.

For the purposes of Section G of the form, a relevant offence is any conviction for an offence relating to the environment or environmental regulation.

For Local Authority use

Application reference	Officer reference	Date received

LAPPC application form - to be completed by the operator

A The basics

A1 Name and address of the installation

Postcode:	Telephone:
-----------	------------

A2 Details of any existing environmental permit or consent

(for waste operations, include planning permission for the site, plus established use certificates, a certificate of lawful existing use, or evidence why the General Permitted Development Order applies.)

--

A3 Operator details

(The 'operator' = the person who it is proposed will have control over the installation in accordance with the permit (if granted).)

Name:
Trading name, if different:
Registered office address:
Principal office address, if different:
Company registration number:

A4 Any holding company?

Is the operator a subsidiary of a holding company within the meaning of section 1159 of the Companies Act 2006? If "yes" please fill in details of the ultimate holding company.

Yes No

Name: Trading name, if different:
Registered office address: Principal office address, if different:
Company registration number:

A5 Who can we contact about your application?

It will help to have someone who we can contact directly with any questions about your application. The person you name should have the authority to act on behalf of the operator - This can be an agent or consultant.

Name and position: _____
Telephone: _____
Email: _____

B The installation

B1 Are you a maggot breeding activity ?

Yes No

B2 Why is the application being made?

new installation

change to existing installation means it now needs a permit

B3 Site maps – please provide:

A location map with a red line round the boundary of the installation

Document reference: _____

A site plan or plans showing where all the relevant activities are on site:

- a) where the processing plant will be installed
- b) the areas and buildings/structures designated for materials and waste storage and the type of storage
- c) the conveyors and transfer points
- d) any directly associated activities or waste operations.

To save applying for permit variations, you can also show where on site you might want to use for storage etc in the future.

Document reference: _____

B4 Are there any sites of special scientific interest (SSSIs) or European protected sites nearer than any of the following distances to the proposed installation?

2km - for an installation which includes Part B combustion or incineration

Yes No

0.5km for all other Part B activities

Yes No

If 'yes', is the installation likely to have a significant effect on the special scientific interest or European protected sites?

Yes No

If 'yes', please write on a separate sheet or enclose a relevant document explaining what the implications are for the purposes of the Conservation (Natural Habitats etc) Regulations 1994 (see appendix 2 of Annex XVII of the [general guidance manual](#))

Document reference: _____

B5 Will emissions from the activity potentially have significant environmental effects (including nuisance)?

Yes No

If 'yes', please list the potential significant local environmental effects (including nuisance) of the foreseeable emissions on a separate document.

Document reference: _____

If 'yes', please enclose a copy of any environmental impact assessment which has been carried out for the installation under planning legislation or for any other purpose.

Document reference: _____

C The details

C1 Is odour abatement equipment installed? [informs condition 5]

Yes No

If yes what type is it?

Chemical scrubber Yes No

Bio-bed Yes No

Bio-scrubber Yes No

Thermal oxidiser Yes No

Other *please describe*.....

Does the thermal oxidiser burn oil Yes No

C2 Are all processing operations carried out within one building?

Yes No

C3 Briefly describe the building is constructed

Walls

Floor

Ceiling

C4 Can the building hold a negative pressure?

Yes No

C5 Is extract ventilation fitted to the building and is it powerful enough to hold a negative pressure

Yes No

C6 Can raw materials be unloaded from vehicles inside the building with the building doors closed?

Yes No

C7 Where do you store waste materials?

.....

C8 Do you move waste materials outside the process building?

Yes No

If yes, in sealed containers?

Yes No

C9 Do you have a written odour response procedure?

Yes No

C10 Do you have a written inspection procedure?

Yes No

C11 Do you have a written cleaning procedure?

Yes No

D Anything else?

Please tell us of anything else you would like us to take account of:

Document reference: _____

E Application fee

You must enclose the [relevant fee](#) with your application.

If your application is successful you will also have to pay an annual subsistence charge, so please say who you want invoices to be sent to.

Name and position:

Telephone:

Email:

F Protection of information

F1 Any confidential or national security information in your application?

If there is any information in your application you think should be kept off the public register for confidentiality or national security reasons, please say what and why. [General guidance manual](#) chapter 8 advises on what may be excluded. *(Do not include any national security information in your application. Send it, plus the omitted information, to the Secretary of State or Welsh Ministers who will decide what, if anything, can be made public.)*

Document reference : _____

F2 Please note: data protection

The information you give will be used by the Council to process your application. It will be placed on the relevant public register and used to monitor compliance with the permit conditions. We may also use and or disclose any of the information you give us in order to:

- consult with the public, public bodies and other organisations;
- carry out statistical analysis, research and development on environmental issues;
- provide public register information to enquirers;
- make sure you keep to the conditions of your permit and deal with any matters relating to your permit;
- investigate possible breaches of environmental law and take any resulting action;
- prevent breaches of environmental law;
- offer you documents or services relating to environmental matters;
- respond to requests for information under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004; (if the Data Protection Act allows)
- assess customer service satisfaction and improve our service.

We may pass on the information to agents/representatives who we ask to do any of these things on our behalf.

F3 Please note: it is an offence to provide false information

It is an offence under regulation 38 of the EP Regulations, for the purpose of obtaining a permit (for yourself or anyone else), to:

- make a false statement which you know to be false or misleading in a material particular;
- recklessly make a statement which is false or misleading in a material particular;
- intentionally to make a false entry in any record required to be kept under any environmental permit condition;
- with intent to deceive, to forge or use a document issued or required for any purpose under any environmental permit condition.

If you make a false statement:

- we may prosecute you; **and**
- if you are convicted, you are liable to a fine or imprisonment (or both).

G Declarations A and B for signing, please

These declarations should be signed by the person listed in answer to question A3. Where more than one person is identified as the operator, all parties should sign. Where a company or other body corporate is the operator, an authorised person should sign and provide evidence of authority from the board.

Declaration A: I/We certify

EITHER - As evidence of my/our competence to operate this installation in accordance with the EP Regulations, no offences have been committed in the previous five years relating to the environment or environmental regulation.

OR - The following offences have been committed in the previous five years which may be relevant to my/our competence to operating this installation in accordance with the regulations:

Signature:_____ Name:_____

Position:_____ Date:_____

Declaration B:

I/We certify that the information in this application is correct. I/We apply for a permit in respect of the particulars described in this application (including the listed supporting documentation) I/we have supplied.

(Please note that each individual operator must sign the declaration themselves, even if an agent is acting on their behalf.)

Signature:_____ Name:_____

Position:_____ Date:_____

Signature:_____ Name:_____

Position:_____ Date:_____

Signature:_____ Name:_____

Position:_____ Date:_____

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 abatement 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 abatement 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 abatement 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 A**.

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 A - 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Poor performance of bio-filtration 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 abatement 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	<ul style="list-style-type: none"> • 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‡	<ul style="list-style-type: none"> • 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
<p>‡ 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.</p>	

Appendix 4 - Method for sampling of emissions from biological (earth, peat and heather) filters using gas detection tubes

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.
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.
3. The enclosure itself should be approximately 0.5 m³ - 1 m³ 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 can 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.
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).
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 4.2**. 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 4.2**.
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 EN13725 - "Air Quality - Determination of Odour Concentration by Dynamic Olfactometry" and "Odour Measurement and Control:-An Update" published by National Environmental Technology Centre, Culham, Abingdon. Oxon OX14 3DB. ISBN 0-85624--8258.