
# BAT Guidance Note on Best Available Techniques for the Slaughtering Sector

(1st Edition)

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# 1. INTRODUCTION

## 1.1 GENERAL

This Guidance Note is one of a series issued by the Environmental Protection Agency (EPA) which provide guidance on the determination of Best Available Techniques (BAT) in relation to:

- applicants seeking Integrated Pollution Prevention and Control (IPPC) licences under Part IV of the Environmental Protection Agency Acts 1992 to 2007,
- existing Integrated Pollution Prevention and Control (IPPC) Licensees, whose licence is to be reviewed under the Environmental Protection Agency Acts 1992 to 2007,
- applicants seeking Waste Licenses under Part V of the Waste Management Acts 1996 to 2008,
- existing Waste Licensees, whose licence is to be reviewed under the Waste Management Acts 1996 to 2008.

This Guidance Note shall not be construed as negating the installation/facility statutory obligations or requirements under any other enactments or regulations.

## 1.2 BAT GUIDANCE NOTE STRUCTURE

This Guidance Note has been structured as follows:

| Section | Details |
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| 1 | Introduction |
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| 6 | BAT Associated Emission Levels |
| 7 | Compliance Monitoring |

Where relevant, references are made to other detailed guidance, such as the reference documents (BREF) published by the European Commission, Agency Guidance Notes for *Noise in Relation to Scheduled Activities*, *The Landspreading of Organic Waste*, and the determination of BAT should be made giving regard to these.

The information contained in this Guidance Note is intended for use as a tool to assist in determining BAT for the specified activities.

# 2. INTERPRETATION OF BAT

## 2.1 STATUS OF THIS GUIDANCE NOTE

This Guidance Note will be periodically reviewed and updated as required to reflect any changes in legislation and in order to incorporate technological advances as they arise.

Techniques identified in these Guidance Notes are considered to be current best practice at the time of writing. The EPA encourages the development and introduction of new and innovative technologies and techniques which meet BAT criteria and look for continuous improvement in the overall environmental performance of the sector's activities as part of sustainable development.

## 2.2 INTERPRETATION OF BAT

BAT was introduced as a key principle in the IPPC Directive 96/61/EC. This Directive has been incorporated into Irish law via the Protection of the Environment Act 2003. To meet the requirements of this Directive, relevant Sections of the Environmental Protection Agency Act 1992 and the Waste Management Act 1996 have been amended to replace BATNEEC (Best Available Technology not Entailing Excessive Costs) with BAT.

Best available techniques (BAT) is defined in Section 5 of the Environmental Protection Agency Acts, 1992 to 2007, and Section 5(2) of the Waste Management Acts 1996 to 2008, as the "most effective and advanced stage in the development of an activity and its methods of operation, which indicate the practical suitability of particular techniques for providing, in principle, the basis for emission limit values designed to prevent or eliminate or, where that is not practicable, generally to reduce an emission and its impact on the environment as a whole", where:

**B** ***'best'*** in relation to techniques, means the most effective in achieving a high general level of protection of the environment as a whole

**A** ***'available techniques'*** means those techniques developed on a scale which allows implementation in the relevant class of activity under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced within the State, as long as they are reasonably accessible to the person carrying on the activity

**T** ***'techniques'*** includes both the technology used and the way in which the installation is designed, built, managed, maintained, operated and decommissioned.

The range of BAT associated emission level values specified in Section 6 indicate those that are achievable through the use of a combination of the process techniques and abatement technologies specified as BAT in Section 5. The licensee must demonstrate to the satisfaction of the Agency, during the licensing process, that the installation/facility will be operated in such a way that all the appropriate preventative measures are taken against pollution through the application of BAT and justify the application of other than the most stringent ELV in the range.

At the installation/facility level, the most appropriate techniques will depend on local factors. A local assessment of the costs and benefits of the available options may be needed to establish the best option. The choice may be justified on:

- the technical characteristics of the facility/installation;
- its geographical location;
- local environmental considerations;
- the economic and technical viability of upgrading the existing installation.

The overall objective of ensuring a high level of protection for the environment as a whole will often involve making a judgment between different types of environmental impact, and these judgments will often be influenced by local considerations. On the other hand, the obligation to ensure a high level of environmental protection including the minimisation of long-distance or transboundary pollution implies that the most appropriate techniques cannot be set on the basis of purely local considerations.

The guidance issued in this Note in respect of the use of any technology, technique or standard does not preclude the use of any other similar technology, technique or standard that may achieve the required emission standards and is demonstrated to the Agency to satisfy the requirement of BAT.

## 2.3 BAT HIERARCHY

In the identification of BAT, emphasis is placed on pollution prevention techniques rather than end-of-pipe treatment.

The IPPC Directive 96/61/EC and the Environmental Protection Agency Acts 1992 to 2007 (Section 5(3)), require the determination of BAT to consider in particular the following, giving regard to the likely costs and advantages of measures and to the principles of precaution and prevention:

(i) the use of low-waste technology,

(ii) the use of less hazardous substances,

(iii) the furthering of recovery and recycling of substances generated and used in the process and of waste, where appropriate,

(iv) comparable processes, facilities or methods of operation, which have been tried with success on an industrial scale,

(v) technological advances and changes in scientific knowledge and understanding,

(vi) the nature, effects and volume of the emissions concerned,

(vii) the commissioning dates for new or existing activities,

(viii) the length of time needed to introduce the best available techniques,

(ix) the consumption and nature of raw materials (including water) used in the process and their energy efficiency,

(x) the need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it,

(xi) the need to prevent accidents and to minimise the consequences for the environment, and

(xii) the information published by the Commission of the European Communities pursuant to any exchange of information between Member States and the industries concerned on best available techniques, associated monitoring, and developments in them, or by international organisations, and such other matters as may be prescribed.

# 3. SECTOR COVERED BY THIS GUIDANCE NOTE

This Guidance Note covers the following activities under the First Schedule to the Environmental Protection Agency Acts 1992 to 2007:

7.4.1 The operation of slaughterhouses with a carcase production capacity greater than 50 tonnes per day.

7.4.2 The slaughter of animals in installations where the daily capacity exceeds 1,500 units and where units have the following equivalents: -

- 1 sheep = 1 unit
- 1 pig = 2 units
- 1 head of cattle = 5 units

and not included in paragraph 7.4.1.

It should be noted that any activities subsequent to the making of standard cuts (carcases, half carcases, half carcases cut into no more than three wholesale cuts, and quarters) are outside the scope of this Guidance Note.

# 4. PROCESS DESCRIPTION, RISK TO THE ENVIRONMENT, AND CONTROL TECHNIQUES

(Note: any reference to BREF in this document means the reference document on *Best Available Techniques in the Slaughterhouses and Animal By-Products Industries*, May 2005.)

## 4.1 DESCRIPTION OF PROCESS

This document covers slaughtering at the levels specified in Section 3 of this document.

### 4.1.1 Slaughter of Large Animals

The primary steps involved in the slaughter of large animals such as cattle, pigs, and sheep are:

- Animal reception and lairage (see BREF Section 2.1.2.1)
- Slaughter (see BREF Section 2.1.2.2)
- Bleeding (see BREF Section 2.1.2.3)
- Steps carried out for cattle and sheep only (in general):
  - hide and skin removal (see BREF Section 2.1.2.4)
  - head and hoof removal (clean slaughter) (see BREF Section 2.1.2.5)
- Steps carried out for pigs only:
  - scalding (see BREF Section 2.1.2.6)
  - hair and toenail removal (see BREF Section 2.1.2.7)
  - singeing (see BREF Section 2.1.2.80)
  - rind treatment (see BREF Section 2.1.2.9)
- Evisceration (see BREF Section 2.1.2.10)
- Splitting (see BREF Section 2.1.2.11)
- Chilling (see BREF Section 2.1.2.12)
- Cutting, boning and packing. Apart from the making of standard cuts (carcases, half carcases, half carcases cut into no more than three wholesale cuts, and quarters), these activities are covered by the "Reference Document on Best Available Techniques in the Food, Drink and Milk Industry (January 2006)"
- Viscera treatment (see BREF Section 2.1.2.13)
- Hide and skin treatment (see BREF Section 2.1.2.13)
- Fat melting - carried out in some slaughterhouses (see BREF Section 2.2.1).

### 4.1.2 Slaughter of Poultry

The primary steps involved in the slaughter of poultry are:

- Reception of birds (see BREF Section 2.1.3.1)
- Stunning and bleeding (see BREF Section 2.1.3.2)
- Scalding (see BREF Section 2.1.3.3)

- De-feathering, and head and feet removal (see BREF Section 2.1.3.4)
- Evisceration (see BREF Section 2.1.3.5)
- Chilling (see BREF Section 2.1.3.6)
- Maturation (see BREF Section 2.1.3.7)
- Cutting, boning and packing. These activities are covered by the "*Reference Document on Best Available Techniques in the Food, Drink and Milk Industry* (January 2006)".

### 4.1.3 Slaughterhouse Cleaning

In addition to the above processing steps, cleaning of process equipment, containers, work surfaces, floors, etc., is carried out on a daily basis, both during production and after production (see BREF Section 2.1.5).

### 4.1.4 Storage of Slaughterhouse By-Products

Generated animal by-products are stored awaiting collection for processing or disposal (see BREF Section 2.1.4).

## 4.2 Risk To The Environment

The key environmental issues for slaughterhouses are water consumption, the emission of high organic strength liquids to water, energy consumption associated with refrigeration and water heating, and infectivity in relation to transmissible spongiform encephalopathy (TSE) risk materials. Odours from animal by-product storage and handling and the waste water treatment plant, as well as noise from equipment and animals, can also be local issues.

### 4.2.1 Water Consumption

Significant areas for water consumption within slaughterhouses can include slaughterhouse cleaning, casing cleaning, hide removal, washing of carcases, vehicle washing, cooling, and personal hygiene. Review BREF Section 1.3.1 for more information and BREF Section 3.1.1 for useful data on overall and individual unit operation water consumption per tonne of product.

### 4.2.2 Energy Use

The largest energy consuming process in slaughterhouses is refrigeration. Other energy using areas include water heating, steam generation, and equipment operation. Review BREF Section 1.3.1 for more information and BREF Section 3.1.1 for useful data on overall and individual unit operation energy consumption per tonne of product.

### 4.2.3 Emissions to Air

Emissions to air include SOx, NOx, CO and particulates from boilers. Odour can be a significant local issue, and can arise from the handling and storage of animal by-products, and on-site wastewater treatment. There can be dust emissions associated with poultry reception areas. The potential exists for the release of refrigerant gases and $CO_2$ (see BREF Sections 1.3.1 and 3.1.1).

### 4.2.4 Emissions to Water

Emissions to water from slaughterhouses consist of organic material contributing to BOD, COD, and fats oils and greases, as well as inorganic material such as ammonia and phosphorous. Review BREF Section 1.3.1 for more information and BREF Section 3.1.1 for useful data on overall and individual unit operation emissions to water per tonne of product. The storage and handling of blood, intestinal juices, detergents, waste water, refrigerants, and fuel are potential sources of contamination of soil and groundwater.

### 4.2.5 Waste

Slaughterhouse solid waste can include animal by-products, lairage and vehicle wash solids, sludges from wastewater treatment plants, clean and contaminated packing material, protective clothing and equipment (see BREF Section 3.1.1).

### 4.2.6 Infectivity

The handling of Specified Risk Material (SRM) must be carried out in accordance with Regulation (EC) No. 1774/2002 laying down health rules concerning animal by-products not intended for human consumption (see BREF Sections 1.3.2.3 and 1.5).

### 4.2.7 Noise

The key sources of noise and vibration associated with the slaughtering sector include animal noise, vehicles, carcase splitting, refrigeration compressors, air conditioning and ventilation systems (see BREF Section 3.1.1).

## 4.3 CONTROL TECHNIQUES

The existing or possible measures for eliminating, reducing and controlling emissions in slaughterhouses are described in this Section. References to more detailed descriptions in the BREF document are given. There are also additional techniques outlined in BREF Section 7.7 for which there was a lack of sufficient information for them to be included as techniques to consider in the determination of BAT.

### 4.3.1 General Preventive Techniques

The following general techniques can be applied to all slaughterhouses:

- Environmental management (see BREF Section 4.1.1)
- Monitoring and targeting of electricity, fuel, steam, hot water, cold water, and material consumption within individual unit operations (see BREF Sections 4.1.1, 4.1.4 and 4.1.17)
- Training provision (see BREF Section 4.1.2)
- Planned maintenance programme (see BREF Section 4.1.3).

#### *4.3.1.1 Minimisation of Water Consumption*

The following techniques can minimise water use in all slaughterhouses:

- Dedicated metering of water consumption (see BREF Section 4.1.4)
- Reuse of cooling water and vacuum pump water in permitted applications (e.g. lairage and yard cleaning) (see BREF Section 4.1.6)
- Removal of running water hoses (see BREF Section 4.1.7), of unnecessary taps from the slaughter-line (see BREF Section 4.2.1.13), and the repair of dripping taps and toilets (BREF Section 4.1.7)
- Pressure-controlled water supply (see BREF Section 4.1.8)
- Use appropriate pressure controlled water and nozzles (see BREF Section 4.1.10) and hand operated triggers (see BREF Section 4.1.9) on hoses for cleaning
- Controlled isolation valves in steam and water services to shut off supply to areas/equipment during non-processing periods (see BREF Section 4.1.25)
- Installation of automated water start/stop controls throughout the slaughter-line (see BREF Section 4.2.1.5), and controls for hand and apron cleaning cubicles with a “water off” default, for example by using foot, arm or knee pedals, or movement sensors (see BREF Section 4.2.1.18).

#### *4.3.1.2 Minimisation of Energy Consumption*

The following techniques can minimise energy use in all slaughterhouses:

- Implement the following management systems:
  - Appropriate energy management systems (see BREF Sections 4.1.16 and 4.1.17)
  - Refrigeration management systems incorporating plant surveys, monitoring, maintenance, control and good housekeeping (see BREF Section 4.1.18)
  - Lighting management systems (see BREF Section 4.1.26)
- Management and monitoring of compressed air use (see BREF Section 4.2.1.19), of hot water use (see BREF Section 4.2.1.22), and of ventilation use so that usage corresponds with demand (see BREF Section 4.2.1.20)
- Control refrigeration plant running times to match process requirements (see BREF Section 4.1.19)
- Use of binary ice (ice crystals in suspension in water containing antifreeze) as a cooling fluid (see BREF Section 4.1.20)
- Use of alarmed doors on chill rooms and cooling tunnels where appropriate (see BREF Section 4.1.21)
- Heat recovery from refrigeration plant (see BREF Section 4.1.22)

- Use of thermostatically controlled steam and water blending valves (see BREF Section 4.1.23)
- Use of appropriate controls in steam and hot water services with timers or sensors for different areas (see BREF Section 4.1.25)
- Rationalisation and insulation of steam and hot water pipework where appropriate (see BREF Section 4.1.24)
- Use of backward bowed centrifugal fans which are more efficient (see BREF Section 4.2.1.21).

#### *4.3.1.3 Minimisation of Emissions to Air*

The following techniques can prevent or minimise the formation of air emissions and odour in all slaughterhouses:

- Use natural gas in boilers where a natural gas supply is available or biomass fuels (see BREF Section 4.1.40). Otherwise use low sulphur fuel oil (sulphur content <1%)
- Audit odour to identify and characterise sources and determine any action required (see BREF Section 4.1.28)
- Enclose animal by-products during transport, loading/unloading and storage to reduce odour; enclose all odour generating process activities using negative pressure extraction units in such processing, handling and storage areas (see BREF Section 4.1.29)
- Contain potentially odorous materials in enclosed containers, maintain short storage times and use cold storage as deemed necessary (see BREF Section 4.1.27)
- Carry out frequent cleaning of material storage areas to prevent odour (see BREF Section 4.1.31)
- Aerate and cover waste water treatment plants (WWTPs) if appropriate to prevent odour (see BREF Sections 4.1.43.12 and 4.1.43.13).

#### *4.3.1.4 Minimisation of Waste Water*

The following techniques can prevent or minimise the volume and contamination level of emissions to water from all slaughterhouses:

- Screens and/or traps on floor drains and at appropriate strategic points, for example on drains from pig rind treatment, to prevent solid material entering waste water. Self cleaning screens and filters can be used (see BREF Section 4.1.11)
- Overfill protection, and bunding or double skin protection for bulk storage tanks, e.g. containing blood (see BREF Sections 4.1.13, 4.1.14, and 4.1.15)
- Minimise liquid seepage from WWTP and aerate WWTP tanks where appropriate (see BREF Section 4.1.43.12)
- Separation of process and non-process water, and segregation of process waste water into individual process streams with dedicated pre-treatment as appropriate, e.g. fat removal, solids screening (see BREF Section 4.1.5)
- Avoid carcase washing, and where this is not possible, minimise it. Employ clean slaughter techniques to minimise the formation of contamination in the first place (see BREF Section 4.2.1.4). For poultry slaughter, remove carcase washing equipment from the line except after de-feathering and evisceration (see BREF Section 4.2.1.11).

#### *4.3.1.5 Minimisation of Noise*

The following techniques can minimise noise emissions from all slaughterhouses:

- Implement a noise management system incorporating design and monitoring (see BREF Section 4.1.36)
- Carry out routine maintenance to reduce noise emissions (see BREF Section 4.1.37)
- Insulate to reduce noise emissions, including insulation of items of equipment (see BREF Section 4.1.38), as well as insulation of doors to rooms with equipment (see BREF Section 4.1.39).

### 4.3.2 Preventive Techniques for Specific Unit Operations

The following preventive techniques can be applied to the stated specific unit operations in slaughterhouses.

#### *4.3.2.1 Animal Reception*

The following techniques can be applied to animal reception at all slaughterhouses:

- Dry scraping of manure and bedding from delivery vehicles (see BREF Section 4.2.1.1) prior to washing using a high-pressure trigger–operated adjustable water jet (see BREF Section 4.2.1.2).

The following techniques can be applied to animal reception and lairage at large animal slaughterhouses:

- Cease feeding animals 12 hours prior to slaughter, in cooperation with farmer/haulier as necessary, to reduce manure production. Give consideration to any animal welfare requirements (see BREF Section 4.2.2.1.1)
- Minimise animals' time in the slaughterhouse to reduce manure production, whilst respecting animal welfare considerations (see BREF Section 4.2.2.1.2)
- Use demand-controlled animal drinking water supply in the lairage, such as sensor controls, or teats (see BREF Section 4.2.2.1.4)
- Shower pigs in the lairage using timer-controlled or sensor-activated nozzles to reduce water use (see BREF Section 4.2.2.1.5)
- Dry clean the lairage floor using shovels and squeegees and periodically clean it with water (see BREF Section 4.2.2.1.6).

#### *4.3.2.2 Bleeding*

The following techniques can be applied to the bleeding process in all slaughterhouses:

- Optimisation of bleeding and containment of blood collection, including use of separate areas of the bleeding hall for the collection of technical grade blood (where relevant) and of blood for rendering, use of hollow sticking knives as appropriate, use of troughs to collect the second bleed, trough/floor designs to minimise losses and facilitate cleaning, and possible extension of the blood collection system (see BREF Section 4.2.2.2.1)
- Use of squeegees for initial cleaning of blood collection troughs (see BREF Section 4.2.2.2.2).

The following technique can be applied to the bleeding process for poultry:

- Use of inert gases for poultry stunning to reduce dust emissions and blood waste, and improve quality and yield (see BREF Section 4.2.3.2.1).

#### *4.3.2.3 Pig and Poultry Scalding*

The following techniques can be applied to pig and poultry scalding processes:

- Use of vertical scalding for pigs (see BREF Section 4.2.2.3.1) and for poultry (see BREF Section 4.2.3.3.1)
- Insulation and covering of scalding tanks for pigs (see BREF Section 4.2.2.3.2.) and for poultry (see BREF Section 4.2.3.3.2)
- Water level control on pig scalding tanks (see BREF Section 4.2.2.3.3).

#### *4.3.2.4 Poultry De-feathering*

The following techniques can be applied to poultry de-feathering:

- Use of nozzles instead of irrigation pipes for showering poultry during de-feathering (see BREF Section 4.2.3.4.1)
- Use of recycled water, e.g. from scalding, for the carriage of feathers (see BREF Section 4.2.3.4.2).

#### *4.3.2.5 Pig Hair and Toenail Removal*

The following techniques can be applied to pig de-hairing:

- Where applicable water used in pig de-hairing can be recirculated. For hygiene reasons the whole system is enclosed and water collection and recirculation is carried out under hygienic conditions. The system is discharged, cleaned and disinfected at least once a day (see BREF Section 4.2.2.4.1).

#### *4.3.2.6 Pig Singeing*

The following techniques can be applied to pig singeing:

- Avoid the practice of rinsing prior to singeing, or where it is carried out, use flat jet nozzles
- Re-use of cooling water from the singeing kiln in applications such as scalding or dehairing, as permissible (see BREF Section 4.2.2.5.1)
- Heat recovery from pig singeing exhaust gases to preheat water for the scalding tank, or for cleaning (see BREF Section 4.2.2.5.2)
- Post singeing showering with automated flat jet nozzles activated by motion sensors (see BREF Section 4.2.2.5.3).

#### *4.3.2.7 Pig Rind Treatment*

The following techniques can be applied to pig rind treatment:

- Replace irrigation pipes with automated flat jet nozzles activated by motion sensors (see BREF Section 4.2.2.6.1)
- Use optimum brushing direction so that water is thrown onto carcases, not away from them.

#### *4.3.2.8 Poultry Evisceration*

The following techniques can be applied to poultry evisceration:

- Use of water efficient shower heads and a reduction in the number of shower heads available (see BREF Section 4.2.3.5.1).

#### *4.3.2.9 Chilling*

The following techniques can be applied to chilling of all carcases:

- Avoid showering carcases before chilling in the chilling tunnel, where permissible. If showering is necessary, use automated or hand operated trigger nozzles, and wash required areas only (see BREF Section 4.2.2.8.3).

The following techniques can be applied to chilling of pig carcases:

- Blast-chilling/shock-cooling tunnel - for chilling pigs (see BREF Section 4.2.2.8.1)
- Water-spraying/mist-cooling for cooling pig carcases (see BREF Section 4.2.2.8.2).

The following techniques can be applied to chilling of poultry carcases:

- Air-chilling of poultry carcases to reduce water consumption and food contamination rates (see BREF Section 4.2.3.6.1)
- Controlling the supply of water to immersion/spin chillers for poultry (see BREF Section 4.2.3.6.2).

#### *4.3.2.10 Animal By-Products Collection, Handling and Storage*

The following techniques can be applied to animal by-products collection, handling and storage in all slaughterhouses:

- Continuous collection of by-products along the length of the slaughter-line using dry methods such as troughs, drip trays, squeegees, shovels, vacuum suction, etc. (see BREF Section 4.2.1.6), or using wet suction in certain applications such as the slaughter, dressing and evisceration areas, in the lairage, or on delivery vehicles (see BREF Section 4.2.1.10)
- Use of a double drain from the bleed hall to the blood collection tank/waste water treatment plant with a control valve system (see BREF Section 4.2.1.7)
- Regulation and minimisation of water use for moving intestines (see BREF Section 4.2.2.7.2)
- Segregated storage of different kinds of by-products, with potentially odorous wastes in enclosed containers and/or buildings. Use of negative pressure in storage and handling areas (see BREF Section 4.1.29)
- To reduce decomposition of animal by-products, maintain short storage times with daily transport off-site where possible, and the use of cold storage as deemed necessary (see BREF Section 4.1.27)
- Where it is not possible to treat blood before its decomposition starts to cause odour and/or quality problems, refrigerate it as quickly as possible and for as short a time as possible, to minimise decomposition (see BREF Section 4.2.1.8)
- The trimming of all hide/skin material not destined for tanning immediately after removal from the animal, except if there is no outlet for the use of, or heat recovery from, the trimmings (see BREF Section 4.2.2.9.10).

#### *4.3.2.11 Viscera Treatment*

The following techniques can be applied to viscera treatment in large animal slaughterhouses:

- Dry emptying of stomach contents (paunch) of cattle using machines or manual techniques (see BREF Section 4.2.2.9.2)
- Dry collection of the contents of the small intestines of pigs (which are to be used as casings) (see BREF Sections 4.2.2.9.3 and 4.2.2.9.4)
- Dry collection of mucosa from pigs' small intestines (see BREF Section 4.2.2.9.8)
- Automatic controls on water supply lines to small and large intestine washing, including valves, water efficient nozzles and automatic stop controls (see BREF Sections 4.2.2.9.6 and 4.2.2.9.5)
- Minimisation of water usage during tongue and heart rinsing through use of appropriate washing machines, water control valves, and timer controls (see BREF Section 4.2.2.9.9)
- Use of a mechanised fat trap on warm water from intestine cleaning (see BREF Section 4.2.2.9.7).

#### *4.3.2.12 Hide and Skin Treatment*

The following techniques can be applied to hide and skin treatment in large animal slaughterhouses:

- Short term storage of cattle hides at 10 - 15 ºC in hygienic conditions for storage periods of 8 – 12 hours (see BREF Section 4.2.2.9.11)
- Drum salting, if appropriate, of sheep/lamb skins, and of cattle hides for storage periods of more than 8 days (see BREF Sections 4.2.2.9.12 and 4.2.2.9.13). Salt dosing should be adjusted based on carcase weight
- Preservation of cattle hides by refrigeration for storage periods of between 8 – 12 hours and 5 – 8 days (see BREF Section 4.2.2.9.15). Avoids the use of salt although it does consume energy
- Preservation of hides and skins by cooling with flaked or crushed ice (see BREF Section 4.2.2.9.16)
- Dry collection of salt residues from hide/skin preservation (see BREF Section 4.2.2.9.14).

#### *4.3.2.13 Fat Melting*

The following techniques can be applied to any fat melting carried out in slaughterhouses:

- The use of fresh fat or, where this is not possible, the refrigeration of fat before use (see BREF Section 4.3.1.4)
- Maintain negative pressure in fat melting processing, handling and storage areas where appropriate (see BREF Section 4.3.1.2).

#### *4.3.2.14 Installation and Equipment Cleaning and Sterilising*

The following techniques can be applied to cleaning and sterilising operations at all slaughterhouses:

- Design and construction of vehicles, equipment and premises for easy cleaning (see BREF Section 4.1.30)
- Dry collection of floor waste using shovels, squeegees, self-propelled sweepers, vacuum suction (see BREF Section 4.2.1.9), and cyclonic vacuum cleaners (see BREF Section 4.2.4.4)
- Use of wet suction of by-products/waste prior to wet cleaning (see BREF Section 4.2.1.10). Double tube wet vacuum collection systems allow separate blood and rendering material capture
- Pre-clean blood and meat juice contamination with cold water (see BREF Section 4.2.4.2)
- Selection of detergents which cause the minimum impact on the environment (see BREF Section 4.1.42.2), including avoidance/reduction in the use of cleaning and disinfection agents containing active chlorine (see BREF Section 4.1.42.3), or the use of enzyme-containing detergents (see BREF Section 4.2.4.1)
- Management of quantities of water and detergents consumed, including use of controlled dispensing devices set at optimum dosing rates, the use of spray application, or dry foam (see BREF Section 4.1.42.1)
- Use of CIP (cleaning in place) systems on equipment (see BREF Section 4.2.4.3)
- Insulated knife sterilisers (see BREF Section 4.2.1.14) and sterilise knives using low-pressure steam instead of hot water (see BREF Section 4.2.1.17)
- Double knife sterilisation tanks (see BREF Section 4.2.1.16)
- Chest-opening saw sterilisation in cabinets with automated hot water nozzles (see BREF Section 4.2.2.7.1).

### 4.3.3 Treatment Techniques

#### *4.3.3.1 Treatment of Air Emissions*

The following techniques can be used for all slaughterhouses to treat air emissions and odour:

- Use of biofilters on exhaust air to remove odour from low concentration, high volume streams (see BREF Section 4.1.33)
- Use of bioscrubbers on exhaust air to remove odour from low concentration, high volume streams (see BREF Section 4.3.3.8)
- Use of activated carbon filters on exhaust air to remove odour (see BREF Section 4.1.34)
- Dispersion of odours by capturing air and exhausting through a stack of sufficient height (see BREF Section 4.1.35)
- Cover and vent WWTPs to abate odour where appropriate (see BREF Section 4.1.43.12)
- Dust abatement at bird reception in poultry slaughterhouses, using fabric filters (see BREF Section 4.2.3.1.2), a wet scrubber (see BREF Section 4.2.3.1.3), or a washable metal mesh (see BREF Section 4.2.3.1.4).

#### *4.3.3.2 Treatment of Waste Water*

The following techniques can be used to treat waste water from all slaughterhouses:

- Prevent stagnant waste water through the use of sufficient gradients in the collection system and in the waste water treatment plant (WWTP) (see BREF Section 4.1.43.3)
- Pre-screen solids at the slaughterhouse (see BREF Sections 4.1.11 and 4.1.43.4), followed by a solids screen within the WWTP. Various WWTP screen types are described in BREF Sections 4.1.43.5 to 4.1.43.8
- Remove fat from waste water, using a fat trap (see BREF Section 4.1.43.9)
- Use of a flotation plant for fat and solids removal, such as dissolved air flotation (DAF), air flotation or mechanical flotation (see BREF Section 4.1.43.10)
- Use of a waste water equalisation tank for the feed to the biological treatment system (see BREF Section 4.1.43.11)
- Use of biological treatment systems to biodegrade organic substances, and in certain cases to remove nitrogen:
  - anaerobic pre-treatment (see BREF Section 4.1.43.14)
  - aerobic digestion. Can also remove nitrogen through the use of anoxic zones (see BREF Section 4.1.43.15)
  - sequencing batch reactors (SBR). Can also remove nitrogen through the use of anoxic periods, and can remove some phosphorus (see BREF Section 4.2.6.2)
  - moving bed trickling filter. Can also be used to treat air simultaneously (see BREF Section 4.2.6.3)
  - treatment of waste water and waste (stomach contents and blood) using tailored microorganisms (see BREF Section 4.2.7.1)
- Use of tertiary treatment systems to remove phosphorus, such as addition of coagulants and precipitation (see BREF Section 2.3.1.3).

#### *4.3.3.3 Treatment of Waste*

The following techniques can be applied to treat/dispose waste from all slaughterhouses:

- Rendering. Applicable for animal by-products that cannot be recovered, screening solids from slaughter processing areas, and high fat sludges (see BREF Section 4.3.3)
- Composting. Applicable for manure, collected/screened solids from the lairage area, DAF sludge and stomach contents (paunch) (see BREF Section 4.3.11)
- Anaerobic digestion. Applicable for animal by-products that cannot be recovered, flotation plant sludge, manure, and stomach contents (paunch) (see BREF Section 4.3.10)
- Landspreading/injection. Applicable for manure and for collected/screened solids from the lairage area (see BREF Section 4.3.9).

These routes and their conditions of application are regulated by ABP Regulation 1774/2002/EC and guidelines issued by the Department of Agriculture & Food.

# 5. BEST AVAILABLE TECHNIQUES FOR THE SLAUGHTERING SECTOR

## 5.1 INTRODUCTION

As explained in Section 2, this Guidance Note identifies BAT but obviously does so in the absence of site-specific information. Accordingly, it represents the requirements expected of any new activity covered by the Note, and ultimately the requirements expected of existing facilities, but exclude additional requirements, which may form part of the granting of a licence for a specific site.

The technical feasibility of the measures listed below has been demonstrated by various sources. Used singly, or in combination, the measures represent BAT solutions when implemented in the appropriate circumstances. These circumstances depend on nature of process, plant scale, fuels used, etc.

## 5.2 BAT - GENERAL PREVENTIVE MEASURES

For all slaughterhouses, BAT is to do the following having regard to BREF Section 5:

- Operate an appropriate environmental management system (see BREF Section 5.1.1.1), including training (see BREF Section 4.1.2)
- Use a planned maintenance programme (see BREF Section 4.1.3).

### 5.2.1 Minimisation of Water Consumption

For all slaughterhouses, BAT is to do the following:

- Apply dedicated metering of water consumption (see BREF Section 4.1.4)
- Remove all running water hoses and repair dripping taps and toilets (see BREF Section 4.1.7)
- Remove all unnecessary taps and showerheads from the slaughter-line (see BREF Section 4.2.1.13)
- Use pressure controlled water and nozzles (see BREF Section 4.1.8), on hoses and where necessary hot water supplied from thermostatically controlled steam and water valves (see BREF Section 4.1.23)
- Install automated water start/stop controls throughout the slaughter-line (see BREF Section 4.2.1.5), and controls for hand and apron cleaning cubicles with a “water off” default (see BREF Section 4.2.1.18)
- Use automatic isolation valves in water supplies to shut off water to areas/equipment during non-processing periods (see BREF Section 4.1.25)
- Use adjustable jet nozzle water saving connections as described in the relevant unit operations in Section 5.3 of this document
- Reuse water in permitted applications (see BREF Section 4.1.6).

### 5.2.2 Minimisation of Energy Consumption

For all slaughterhouses, BAT is to do the following:

- Implement the following management systems:
  - an appropriate energy management system (see BREF Sections 4.1.16 and 4.1.17)
  - an appropriate refrigeration management system (see BREF Section 4.1.18)
  - hot water management and monitoring (see BREF Section 4.2.1.22)
  - compressed air use management and monitoring (see BREF Section 4.2.1.19)
  - ventilation use management and monitoring (see BREF Section 4.2.1.20)
  - a lighting management system (see BREF Section 4.1.26)
- Control refrigeration plant running times (see BREF Section 4.1.19)
- Use chill room door closing switches where appropriate (see BREF Section 4.1.21)
- Recover heat from refrigeration plant where appropriate (see BREF Section 4.1.22)
- Use thermostatically controlled steam and water blending valves as far as possible (see BREF Section 4.1.23)
- Use isolation control valves in steam and water services (see BREF Section 4.1.25)
- Rationalise and insulate steam and water pipework where appropriate (see BREF Section 4.1.24)
- Use backward bowed centrifugal fans in ventilation and refrigeration systems (see BREF Section 4.2.1.21).

### 5.2.3 Minimisation of Emissions to Air

For all slaughterhouses, BAT is to do the following:

- Replace fuel oil with natural gas, where possible or biomass fuels (see BREF Section 4.1.40). Otherwise, use low sulphur fuel oil
- Audit odour (see BREF Section 4.1.28)
- Enclose animal by-products during transport, unloading and storage. Enclose all odour generating process activities using negative pressure extraction units in such processing, handling and storage areas (see BREF Section 4.1.29)
- Contain potentially odorous materials in enclosed containers, maintain short storage times, and use cold storage as deemed necessary (see BREF Section 4.1.27); clean materials storage areas frequently (see BREF Section 4.1.31); and cover WWTP if appropriate (see BREF Sections 4.1.43.12 and 4.1.43.13).

### 5.2.4 Minimisation of Emissions to Water

For all slaughterhouses, BAT is to do the following:

- Avoid carcase washing and where this is not possible, minimise it, combined with clean slaughter techniques (see BREF Section 4.2.1.4). Reduce water consumption in poultry slaughter, by removing carcase washing equipment from the line except after de-feathering and evisceration (see BREF Section 4.2.1.11)
- Use screens and/or traps on floor drains (see BREF Section 4.1.11)

- Separate process and non-process waste water (see BREF Section 4.1.5).

### 5.2.5 Protection of Surface and Groundwater

For all slaughterhouses, BAT is to do the following:

- Apply overfill protection on bulk storage tanks (see BREF Section 4.1.13)
- Use bunds or double skinned tanks for bulk storage tanks (see BREF Sections 4.1.14 and 4.1.15)
- Seal the base and sides of WWTP tanks (see BREF Section 4.1.43.12).

### 5.2.6 Prevention of Noise Emissions

For all slaughterhouses, BAT is to do the following:

- Implement a noise management system (see BREF Section 4.1.36)
- Reduce noise at source, e.g. roof extract fans, WWTP blowers and refrigeration plant (see BREF Sections 4.1.3, 4.1.36, 4.1.37, 4.1.38 and 4.1.39).

### 5.2.7 Integration of Same Site Activities

For slaughterhouses and animal by-products installations operating on the same site, BAT is to do the following:

- Re-use heat and/or power produced in one activity in other activities (see BREF Sections 4.4.1 and 4.4.2)
- Share abatement techniques, where these are required, e.g. WWTPs, air treatment.

## 5.3 BAT - Preventive Measures for Specific Unit Operations

For all slaughterhouses, in addition to the general measures in Section 5.2, BAT is to do the following for all relevant unit operations.

### 5.3.1 Animal Reception

For animal reception in all slaughterhouses, BAT is to do the following:

- Dry scrape delivery vehicles (see BREF Section 4.2.1.1) prior to cleaning with a high-pressure trigger–operated water jet (see BREF Section 4.2.1.2).

In addition, for all large animal slaughterhouses, BAT is to do the following:

- Stop feeding animals 12 hours prior to slaughter (see BREF Section 4.2.2.1.1), combined with minimising animal time in the slaughterhouse to reduce manure production (see BREF Section 4.2.2.1.2)
- Use demand-controlled drinking water in the lairage (see BREF Section 4.2.2.1.4)
- Use controls for pig showering in the lairage (see BREF Section 4.2.2.1.5)

- Dry clean the lairage floor and periodically clean it with water (see BREF Section 4.2.2.1.6).

### 5.3.2 Bleeding

For bleeding in all slaughterhouses, BAT is to do the following:

- Optimise bleeding and containment of blood collection (see BREF Section 4.2.2.2.1), and use squeegees for initial cleaning of blood collection trough (see BREF Section 4.2.2.2.2).

In addition, for bleeding in poultry slaughterhouses, BAT is the following:

- Stun birds in their modules and transport containers using inert gases (see BREF Section 4.2.3.2.1).

### 5.3.3 Pig and Poultry Scalding

For pig and poultry scalding, BAT is to do the following:

- Steam scald pigs (vertical scalding) (see BREF Section 4.2.2.3.1) and steam scald poultry (see BREF Section 4.2.3.3.1)
- In those existing pig slaughterhouses, where it is not yet economically viable to change to steam scalding, insulate and cover pig scalding tanks (see BREF Section 4.2.2.3.2) and control pig scalding tank water level (see BREF Section 4.2.2.3.3)
- In those existing poultry slaughterhouses, where it is not yet economically viable to change to steam scalding, insulate scalding tanks (see BREF Section 4.2.3.3.2).

### 5.3.4 Poultry De-feathering

For poultry de-feathering, BAT is to do the following:

- Use nozzles instead of irrigation pipes to shower poultry during de-feathering (see BREF Section 4.2.3.4.1)
- Use recycled water for the carriage of feathers (see BREF Section 4.2.3.4.2).

### 5.3.5 Pig Hair and Toenail Removal

For pig de-hairing, BAT is to do the following:

- Re-use cold water within pig de-hairing machines (see BREF Section 4.2.2.4.1) and replace irrigation pipes with flat jet nozzles (see BREF Section 4.2.2.4.2).

### 5.3.6 Pig Singeing

For pig singeing, BAT is to do the following:

- Avoid rinsing prior to singeing, or use flat jet nozzles
- Re-use cooling water from pig singeing kilns (see BREF Section 4.2.2.5.1)
- Recover heat from singeing exhaust gases (see BREF Section 4.2.2.5.2)
- Shower pigs after singeing using flat jet nozzles (see BREF Section 4.2.2.5.3).

### 5.3.7 Pig Rind Treatment

For pig rind treatment, BAT is to do the following:

- Replace irrigation pipes with automated flat jet nozzles for rind treatment (see BREF Section 4.2.2.6.1)
- Use optimum brushing direction.

### 5.3.8 Poultry Evisceration

For poultry evisceration, BAT is to do the following:

- Use water efficient shower heads to wash poultry during evisceration (see BREF Section 4.2.3.5.1).

### 5.3.9 Chilling

For chilling in all slaughterhouses, BAT is to do the following:

- Avoid showering carcases before chilling in the chilling tunnel, where permissible. If necessary, use automated or hand operated trigger nozzles, and wash required areas only (see BREF Section 4.2.2.8.3).

For chilling in pig slaughterhouses, BAT is to do the following:

- Use either water-spray/mist-cooling or a blast-chilling/shock-cooling tunnel to cool pigs (see BREF Sections 4.2.2.8.1 and 4.2.2.8.2).

For chilling in poultry slaughterhouses, BAT is to do the following:

- Chill poultry by immersion/spin chilling and control, regulate and minimise water consumption (see BREF Section 4.2.3.6.2).

### 5.3.10 Animal By-Products Collection, Handling and Storage

For animal by-products in all slaughterhouses, BAT is to do the following:

- Continuous, dry and segregated collection of by-products along the length of the slaughter-line (see BREF Sections 4.2.1.6 and 4.1.12), or using wet suction in certain applications (see BREF Section 4.2.1.10)
- Optimise bleeding and the collection of blood (see BREF Section 4.2.2.2.1) including use of a double drain from the bleed hall (see BREF Section 4.2.1.7)
- Enclose animal by-products during transport, unloading and storage (see BREF Section 4.1.29)
- Segregated storage of animal by-products (see BREF Section 4.2.5.1) for short periods and refrigerate as deemed necessary (see BREF Section 4.1.27)
- Refrigerate/cool blood (see BREF Section 4.2.1.8) as quickly as possible and for as short a time as possible to minimise decomposition.

In addition, for large animal slaughterhouses, BAT is the following:

- Trim unwanted material from hides/skins, unless there is no outlet for material or energy recovery (see BREF Section 4.2.2.9.10)
- Regulate and minimise water used for moving intestines (see BREF Section 4.2.2.7.2).

### 5.3.11 Viscera Treatment

For viscera treatment in large animal slaughterhouses, BAT is to do the following:

- Empty stomachs dry (see BREF Section 4.2.2.9.2)
- Collect small intestine contents dry (see BREF Section 4.2.2.9.3), whether intended for casings or not (see BREF Section 4.2.2.9.4)
- Regulate and minimise water consumption during small and large intestine washing (see BREF Sections 4.2.2.9.5 and 4.2.2.9.6), and during tongue and heart rinsing (see BREF Section 4.2.2.9.9)
- Use a mechanised fat trap to remove fat from intestine cleaning water (see BREF Section 4.2.2.9.7).

### 5.3.12 Hide and Skin Treatment

For hide and skin treatment in large animal slaughterhouses, BAT is to do the following:

- Process fresh hides and skins as soon as they are available
- Drum salt all sheep/lamb skins (see BREF Section 4.2.2.9.12)
- Where it is not possible to process cattle hides within 8 – 12 hours (actual length of time will depend on local conditions), immediately store hides at a temperature of 10 - 15 ºC (see BREF Section 4.2.2.9.11)
- Where it is not possible to process cattle hides within a period of between 8 – 12 hours and 5 – 8 days (actual length of time will depend on local conditions), immediately refrigerate hides at 2 ºC (see BREF Section 4.2.2.9.15)
- Where cattle hides have to be stored for longer than 8 days, immediately drum-salt hides and skins (see BREF Section 4.2.2.9.12)
- Dry collect salt residues from drum salting (see BREF Section 4.2.2.9.14).

### 5.3.13 Fat Melting

For any fat melting carried out in slaughterhouses, BAT is to do the following:

- Use fresh fat (see BREF Section 4.3.1.4) or refrigerate before use
- Maintain negative pressure in storage handling and processing areas as appropriate (see BREF Section 4.3.1.2)
- Avoid overnight fat melting where temperature/time requirements cannot be fulfilled.

### 5.3.14 Installation and Equipment Cleaning and Sterilising

For all slaughterhouses, BAT is to do the following for cleaning and sterilising of the installation and equipment:

- Design and construct premises that is easy to clean; use vehicles and equipment designed for easy cleaning (see BREF Section 4.1.30)
- Collect floor waste using dry methods (see BREF Sections 4.2.1.9, 4.2.4.4, and 4.1.12), follow by wet cleaning using a pressure-controlled, dedicated water supply

(see BREF Section 4.1.10), using hoses with hand-operated triggers (see BREF Section 4.1.9) and, where necessary, hot water

- Pre-clean blood and meat juice contamination with cold water (see BREF Section 4.2.4.2)
- Select detergents which cause minimum impact on the environment (see BREF Section 4.1.42.2), without compromising the efficacy of cleaning
- Manage and minimise the quantities of water and detergents consumed (see BREF Section 4.1.42.1)
- Avoid, where possible, the use of cleaning and disinfectant agents containing active chlorine (see BREF Section 4.1.42.3)
- Where the equipment is suitable, operate a cleaning-in-place system (see BREF Section 4.2.4.3)
- Insulate and cover knife sterilisers (see BREF Section 4.2.1.14), combined with sterilising knives using low-pressure steam (see BREF Section 4.2.1.17).

In addition, for large animal slaughterhouses, BAT is to do the following:

- Sterilise chest-opening saws in a cabinet with automated hot water nozzles (see BREF Section 4.2.2.7.1).

## 5.4 BAT – Measures for Treatment, Abatement and Disposal

### 5.4.1 Treatment of Waste Water

For all slaughterhouses, BAT is to minimise the quantity and load of waste water generated using the measures outlined in Section 5.2 and 5.3 of this document, then treat waste water as follows:

- Prevent waste water stagnation (see BREF Section 4.1.43.3)
- Pre-screen solids at the slaughterhouse (see BREF Sections 4.1.11 and 4.1.43.4)
- Provide waste water holding capacity in excess of routine requirements (see BREF Section 4.1.43.1)
- Use a fat trap (see BREF Section 4.1.43.9)
- Use a flotation plant, possibly combined with the use of flocculants (not recommended for new systems), to remove solids at the WWTP (see BREF Section 4.1.43.10)
- Use a waste water equalisation tank (see BREF Section 4.1.43.11)
- Prevent odour emissions from waste water treatment tanks by aerating and covering them where necessary (see BREF Sections 4.1.43.12 and 4.1.43.13)
- Use appropriate biological treatment (see BREF Sections 2.3.1.2, 4.1.43.14, 4.1.43.15, 4.2.6.2, and 4.2.6.3)
- Remove nitrogen and phosphorus (see BREF Sections 2.3.1.2 and 4.1.43.15)
- Remove WWTP sludges produced and subject them to further animal by-product uses. These routes and their conditions of application are regulated by ABP Regulation 1774/2002/EC
- If anaerobic treatment is carried out, use the methane gas produced for the production of heat and/or power

- Subject the effluent from biological treatment to tertiary treatment, where required (see BREF Section 2.3.1.3).

### 5.4.2 Treatment and Disposal of Waste

For all slaughterhouses, BAT is to minimise the quantity and load of waste generated using the measures outlined in Section 5.2 and 5.3 of this document, then treat/dispose of waste generated as follows:

These routes and their conditions of application are regulated by ABP Regulation 1774/2002/EC and guidelines issued by the Department of Agriculture & Food.

- Render waste water screening solids from slaughter processing areas (see BREF Section 4.3.3)
- Use anaerobic digestion (see BREF Section 4.3.10) or composting (see BREF Section 4.3.11) for DAF and waste water treatment plant sludge
- Compost (see BREF Section 4.3.11) or landspread/inject (see BREF Section 4.3.9) manure, DAF sludges, stomach contents (paunch) and collected/screened solids from the lairage area.

### 5.4.3 Treatment of Air Emissions

For all slaughterhouses, BAT is to minimise the formation of air emissions and odours using the measures outlined in section 5.2 and 5.3 of this document, and then, if necessary, use:

- A biofilter (see BREF Section 4.1.33)
- A bioscrubber (see BREF Section 4.3.3.8)
- An activated carbon filter (see BREF Section 4.1.34)

For poultry slaughterhouses, BAT is to do the following:

- Use dust abatement at bird reception, unloading and hanging stations using fabric filters (see BREF Section 4.2.3.1.2), a wet scrubber (see BREF Section 4.2.3.1.3), or a washable metal mesh (see BREF Section 4.2.3.1.4)

Further information on a number of waste gas and wastewater treatment techniques can be found in the BREF document on C*ommon Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector*, EIPPCB, February 2003.

# 6. BAT ASSOCIATED EMISSION LEVELS

## 6.1 EMISSION LEVELS FOR DISCHARGES TO AIR

The BAT associated emission levels for emissions to air are as follows:

**Table 6.1 BAT associated emission levels for emissions to air**

| Constituent Group or Parameter | Emission Level ($mg/m^3$) | Mass Threshold (g/hr) Note 1 |
|---|---|---|
| Ammonia | 30 | 150 |
| Amines and amides | 5 | |
| Total hydrogen sulphide, sulphides and mercaptans (expressed as S) | 3 - 5 | 15 |
| Total Organic Carbon (as C) | 50 | 500 |
| Total Particulate (including emissions from material handling) | 5 - 50<br>150 | >200<br>At mass flow up to 200g/hr |
| Other | -- | Note 2 |

Note 1: The Mass Flow Threshold is calculated in g/hr or kg/hr and is determined to be the maximum emission, which can occur over any one-hour period of plant operation. Where the Mass Flow in the raw gas exceeds the mass flow threshold given in the Table, abatement will be required to reduce the emission to below the appropriate emission level or mass flow threshold.

Note 2: Any relevant polluting substances as specified in Schedule to S.I. No. 394 of 2004: EPA (Licensing)(Amendment) Regulations, 2004.

### 6.1.1 Odour Emission

Activities at the installation shall be carried out in a manner such that emissions of odours do not result in significant impairment of, and/or significant interference with amenities or the environment beyond the installation boundary. Reference shall be made to the Environmental Protection Agency's publication *Odour impacts and odour emission control measures for intensive agriculture (2001).*

## 6.2 EMISSION LEVELS FOR DISCHARGES TO WATER

The following table sets out emission level values that are achievable using BAT for wastewater treatment. However establishing emission limit values within a licence for direct discharges to surface water from wastewater treatment plant and stormwater discharges must ensure that the quality of the receiving water is not impaired or that the current Environmental Quality Standards (EQS) are not exceeded.

All discharges to sewer are subject to approval from the Water Services Authority.

Compliance with the Water Framework Directive (2000/60/EC) is required where relevant, in particular Article 16.

**Table 6.2: BAT Associated Emission Limit Values for Discharges to Water***

| Constituent Group or Parameter | Emission Level | Notes |
|---|---|---|
| pH | 6 - 9 | |
| Number of Toxicity Units (TU) | 5 | 1 |
| $BOD_5$ | >90% removal[3], or 20 - 40mg/l | |
| COD | >75% removal[3], or 125 - 250mg/l | |
| Suspended Solids | 60mg/l | |
| Total Ammonia (as N) | 10mg/l | |
| Total Nitrogen (as N) | >80% removal[3], or 15 - 40mg/l | 2,4 |
| Total Phosphorus (as P) | >80% removal[3], or 2 - 5mg/l | 4 |
| Oils, Fat and Grease | 10 - 15mg/l | |
| Mineral Oil (from interceptor) | 20mg/l | |
| Mineral Oil (from biological Treatment) | 1.0mg/l | |
| Other | -- | 5 |

* All values refer to daily averages based on a 24-hour flow proportional composite sample, except where stated to the contrary and for pH, which refers to continuous values. Levels apply to effluent prior to dilution by uncontaminated streams, e.g. storm water, cooling water, etc.

* Temperature measured downstream of a point of thermal discharge must not exceed the unaffected temperature by more than 1.5°C in salmonid waters and 3°C in cyprinid waters (Freshwater Fish Directive 79/659/EEC).

Note 1: The number of toxic units (TU) = 100/x hour EC/LC50 in percentage vol/vol so that higher TU values reflect greater levels of toxicity. For test regimes where species death is not easily detected, immobilisation is considered equivalent to death.

Note 2: Total Nitrogen means the sum of Kjeldahl Nitrogen, Nitrate N and Nitrite N.

Note 3: Reduction in relation to influent load.

Note 4: Limits will depend on the sensitivity of the receiving waterbody.

Note 5: Any relevant polluting substances as specified in Schedule to S.I. No. 394 of 2004: EPA (Licensing)(Amendment) Regulations, 2004.

## 6.3 EMISSIONS TO LAND

In the assessment of the impact of landspreading of organic waste, reference shall be made to the relevant Environmental Protection Agency's guidance and any guidance from the Department of Agriculture and Teagasc.

# 7. COMPLIANCE MONITORING

The methods proposed for monitoring the emissions from this sector are set out below. Licence requirements may vary from those stated below due to site location considerations, sensitivity of receiving waters, and scale of the operation.

## 7.1 MONITORING OF EMISSIONS TO AIR

- Annual monitoring of boiler stack emissions for SOx, NOx, CO and particulates, as required by the licence, taking account of the nature, magnitude and variability of the emission and the reliability of the controls.
- Monitoring of boiler combustion efficiency in accordance with the manufacturer's instructions at a frequency determined by the Agency.
- Quarterly monitoring of air emissions from odour abatement equipment for ammonia, total amines and hydrogen sulphide and mercaptans, or as determined by the Agency.
- Odour monitoring should be conducted at the nearest odour sensitive receptor locations at a frequency determined by the Agency.
- Olfactory (sniff) assessment for odours should be carried out daily or as directed by the Agency at a minimum at four boundary locations and at the nearest odour sensitive locations.

## 7.2 MONITORING OF AQUEOUS EMISSIONS

- For uncontaminated cooling waters, continuous monitoring of temperature and flow.
- Continuous monitoring of flow discharge from wastewater treatment plant and any other parameters deemed necessary by the Agency.
- Daily monitoring of flow, volume, pH, temperature and any other relevant parameters deemed necessary by the Agency, taking account of the nature, magnitude and variability of the emissions and the reliability of the control technique.
- Establish existing conditions prior to start-up of key emission constituents and salient flora and fauna.
- Monitoring of influent and effluent for the waste water treatment plant to establish % BOD reduction and early warning of any difficulties in waste water treatment, or unusual loads.
- The potential for the treated effluent to have tainting and toxic effects should be assessed and if necessary measured by established laboratory techniques.
- Periodic biodegradability checks where appropriate on effluents to municipal waste treatment plants, both prior to start-up and thereafter.

## 7.3 MONITORING OF EMISSIONS TO GROUNDWATER

There should be no direct emissions to groundwater, including during the extraction and treatment of groundwater.

## 7.4 MONITORING OF SOLID WASTE

- The recording in a register of the types, quantities, date and manner of disposal/recovery of all wastes.
- Leachate testing of sludges and other material as appropriate being sent for landfilling.
- Annual waste minimisation report showing efforts made to reduce specific consumption together with material balance and fate of all waste materials.

# Appendix 1

# PRINCIPAL REFERENCES

## 1. E.C.

1.1. Reference Document on Best Available Techniques in the Slaughterhouses and Animal By-Products Industries (May 2005).

1.2. Reference Document on Best Available Techniques in the Food, Drink and Milk Industry (January 2006).

1.3. Council Directive 96/61/EC of 24 September 1996 concerning Integrated Pollution Prevention and Control.

## 2. IRELAND

2.1. Integrated Pollution Control Licensing BATNEEC Guidance Note for the Slaughter of Animals (EPA No. LC 17 (9/96)).

2.2. Integrated Pollution Control Licensing BATNEEC Guidance Note for Noise in Relation to Scheduled Activities (EPA No. LC 8 (1995)).

2.3. Integrated Pollution Control Guidance Note Storage and Transfer of Materials for Scheduled Activities.

2.4. Guidance Note For Noise in Relation to Scheduled Activities 2$^{ND}$ Edition (EPA (2006)).

# Appendix 2

## GLOSSARY OF TERMS AND ABBREVIATIONS

| | |
|---|---|
| BAT | Best Available Technique |
| BOD | Biochemical Oxygen Demand |
| BREF | Reference document on Best Available Techniques in the Slaughterhouses and Animal By-Products Industries, published by the European Commission, November 2003 |
| °C | Degree Celsius |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| COD | Chemical Oxygen Demand |
| DAF | Dissolved Air Floatation |
| ELV | Emission Limit Value |
| kg | Kilogramme |
| K | Degree Kelvin (0 °C = 273.15 K) |
| $m^3$ | Cubic metre |
| mg | Milligramme |
| MJ | Megajoule (1 MJ = 1000 kJ = $10^6$ joule) |
| $N_2$ | Nitrogen |
| $Nm^3$ | Normal cubic metre (101.3 kPa, 273 K) |
| $NH_3$ | Ammonia |
| $NH_4$ | Ammonium |
| NO | Nitrogen monoxide |
| $NO_2$ | Nitrogen dioxide |
| $NO_x$ | Nitrogen oxides |
| $O_2$ | Oxygen |
| $SO_2$ | Sulphur dioxide |
| $SO_x$ | Sulphur oxides |
| SRM | Specified Risk Material |
| t | Tonne (metric) |
| TSE | Transmissible Spongiform Encephalopathy |
| VOC | Volatile Organic Compounds |
| WWTP | Waste Water Treatment Plants |