How to comply with your environmental permit
Additional guidance for:

The Red Meat Processing (Cattle, Sheep and Pigs) Sector (EPR 6.12)

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Contents

Introduction

Introduction

In *"Getting the basics right – how to comply with your environmental permit"* (GTBR) we described the standards and measures that we expect businesses to take in order to control the risk of pollution from the most frequent situations in the waste management and process industries.

This sector guidance note (SGN) is one of a series of additional guidance for Part A(1) activities listed in Schedule 1 of the Environmental Permitting Regulations (the Regulations). We expect you to use the standards and measures in this note **in addition** to those in GTBR to meet the objectives in your permit.

Sometimes, particularly difficult issues arise such as problems with odour or noise. You may then need to consult the "horizontal" guidance that gives in depth information on particular topics. Annex 1 of GTBR lists these.

The IPPC Directive requires that the Best Available Techniques (BAT) are used. When making an application, explain how you will comply with each of the indicative BATs in this sector guidance note. Where indicative BAT is not included, where you propose to use an alternative measure or where there is a choice of options you should explain your choice on the basis of costs and benefits. Part 2 of Horizontal Guidance Note H1 Environmental Risk Assessment (see GTBR Annex 1) gives a formal method of assessing options which you should use where major decisions are to be made.

We will consider the relevance and relative importance of the information to the installation concerned when making technical judgments about the installation and when setting conditions in the permit.

Modern permits describe the objectives (or outcomes) that we want you to achieve. They do not normally tell you how to achieve them. They give you a degree of flexibility.

Where a condition requires you to take appropriate measures to secure a particular objective, we will expect you to use, at least, the measures described which are appropriate for meeting the objective. You may have described the measures you propose in your application or in a relevant management plan but further measures will be necessary if the objectives are not met.

The measures set out in this note may not all be appropriate for a particular circumstance and you may implement equivalent measures that achieve the

Introduction

same objective. In cases where the measures are mandatory this is stated.

In response to the application form question on Operating Techniques, you should address each of the measures described as indicative BAT in this note as well as the key issues identified in GTBR.

Unless otherwise specified, the measures and benchmarks described in this note reflect those of the previous Sector Guidance Note. They will be reviewed in the light of future BREF note revisions. In the meantime we will take account of advances in BAT when considering any changes to your process.

Installations covered

This note applies to activities regulated under the following section of schedule 1 of the Regulations:

Section 6.8—the treatment of animal and vegetable matter and food industries, Part A(1)

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

Carcass is defined in The Fresh Meat (Hygiene and Inspection) Regulations 1995 (see The Fresh Meat (Hygiene and Inspection) Regulations 1995) as:

a) In relation to bovine animals, sheep, goats, solipeds and farmed game, the whole body of a slaughtered animal after bleeding, evisceration, removal of limbs at the carpus and tarsus, removal of the head, tail, udder and flaying.
b) In relation to swine, the whole body of a slaughtered animal after bleeding and evisceration, whether or not the limbs at the carpus and tarsus and head have been removed.

Directly associated activities

As well as the main activities described above, the installation will also include directly associated activities which have a direct technical connection with the main activities and which may have an effect on emissions and pollution. These may involve activities such as:

- the operation of a boiler for process heating
- the operation of refrigeration plant for chilling or freezing.

Key issues

The key issues are:

Accident management

Spills and process leaks may cause pollution of land and water. They may arise from overfilling of vessels, failure of containment, wrong drainage connections and blocked drains, or other reasons. A

Introduction

risk specific to this sector is the widely varying nature of the wastewater, which means that there is a risk of overloading the effluent management system. You must carefully control the release of wastewater from the process to minimise this risk.

Efficient use of raw materials and water

The main sources of waste waters are from meat sprays and rinses and cleaning operations. These operations have to be carried out in accordance with legislation under the Food Safety Act 1990 (for example the Meat Hygiene regulations). This legislation sometimes limits opportunities for reducing water use for these operations.

Reducing water consumption is important, both to conserve a limited resource and to reduce the load on the effluent treatment plant. You can make worthwhile savings by using the techniques described below in Section 1.

Avoidance, recovery and disposal of wastes

Cattle carcasses produced by the cull under the Selective Cull Scheme (SCS) and the Over Thirty Months Scheme (OTMS), and Specified Risk Material (SRM) removed from carcasses in respect of measures against Bovine Spongiform Encephalopathy (BSE), are dyed and then removed from the installation for rendering and or incineration. You should store these and other wastes (including the “fifth quarter”) so that there is no environmental impact.

Emissions to water, air and land

Slaughterhouses generate relatively large quantities of waste water containing blood, flesh, soluble protein and waste material which is high in biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS) and fats, oils and greases (FOG).

If meat scraps enter floor drains, they begin to break down in the wastewater stream and increase wastewater COD and BOD and release colloidal and suspended fats and solids. **Consequently the most important measure is keeping product and by-product out of waste waters.**

You should also use all appropriate techniques described in Section 1 to reduce your emissions to water.

Hygiene

There is specific legislation (The Fresh Meat (Hygiene and Inspection) Regulations 1995) for hygiene in slaughterhouses. You must comply with this when specifying particular techniques for pollution prevention measures. It will sometimes restrict your choice of technique, especially in measures relating to water use, cleaning, re-use and recycling of water.

Introduction

Animal by-products legislation

The EU Animal By-Products Regulation ((EC) No. 1774/2002) is implemented in England through the Animal By-Products Regulations 2005 (England) and in Wales through the Animal By-Product (Wales) Regulations 2006. These regulations specify the standards to which animal by-products must be treated prior to subsequent handling.

1

Managing your activities

Accident management Energy efficiency

1. Managing your activities

1.1 Accident management

Spillage of high organic strength liquids (e.g. blood) from leaks, spills or the overfilling of vessels are serious environmental risks that can wipe out the ecosystem of a water-course. Such accidents are often compounded by the possibility of overloading the effluent system and by cross-connected drainage systems.

Indicative BAT

You should where appropriate:

1. Ensure that fat, oil and grease (FOG) does not block drains.
2. Identify the major risks associated with the effluent treatment plant (ETP) and have procedures in place to minimise them.
3. Ensure adequate containment of blood storage tanks.

1.2 Energy efficiency

Indicative BAT

You should where appropriate:

1. Consider the following techniques to reduce energy consumption:

- in pig abattoirs, recovering useable heat from the exhaust from the singeing unit
- minimisation of water use. Typically about half of the total water usage at an abattoir is heated to between 40^{o}C and 60^{o}C. Heating this water requires substantial energy consumption, and adds a significant cost
- efficient operation of the refrigeration system – consider heat recovery from refrigeration system, reducing heat load, efficient operation on part load and fast closing doors/alarms on chilled storage areas.

2. Pig scalding

- If you operate a pig abattoir, you should consider using humidified air as the scalding process. Shower scalding has a very high water and energy consumption **and is not BAT.**

Energy efficiency
Efficient use of raw materials and water

3. Pig singeing

- pig singeing ovens should be insulated, with automatic doors
- fuel consumption can be reduced by using solenoid switches to initiate the flame only when carcasses are passing through.

4. You should meet the energy benchmarks shown in Table 1

Table 1 Energy benchmarks

	Heat and electricity (kWh/animal)
90 kg pigs	30 - 125
250 kg cattle	70 - 300

1.3 Efficient use of raw materials and water

Slaughterhouses typically use a lot of water. This is partly due to the hygiene requirements set by UK and EU meat regulations, which require potable water to be used for almost all washing and rinsing operations. You must minimise your water use as far as possible by using the techniques described below, except where this conflicts with hygiene requirements.

The benefits to be gained from reducing water input include:

- reducing the size of (a new) treatment plant, (you should consider this when carrying out a BAT cost-benefit justification of upgrading your effluent treatment plant)
- cost savings where water is purchased from or disposed of to someone else
- associated benefits within the process such as reduced energy requirements for heating and pumping and
- reduced dissolution of pollutants leading in turn to reduced sludge generation in the effluent treatment plant (and consequent disposal costs).

Efficient use of raw materials and water

Indicative BAT

You should where appropriate:

1. Use recirculating systems to recycle water. (Once-through cooling systems should not be used.)
2. Interlock chemical dosing pumps with cleaning operations, so that dosing does not continue after cleaning is complete.
3. Meet the water consumption benchmarks in **Table 2** below

Table 2 benchmark water consumption

Cattle	**700 - 1000 litres per animal**
Pigs	**160 - 230 litres per animal**
Sheep	**100 – 150 litres per animal**

The use of a simple mass balance for water use should help to reveal where reductions can be made. Advice on cost-effective measures for minimising water can be found in the Water efficiency references (see Annex 1).

Efficient use of raw materials and water

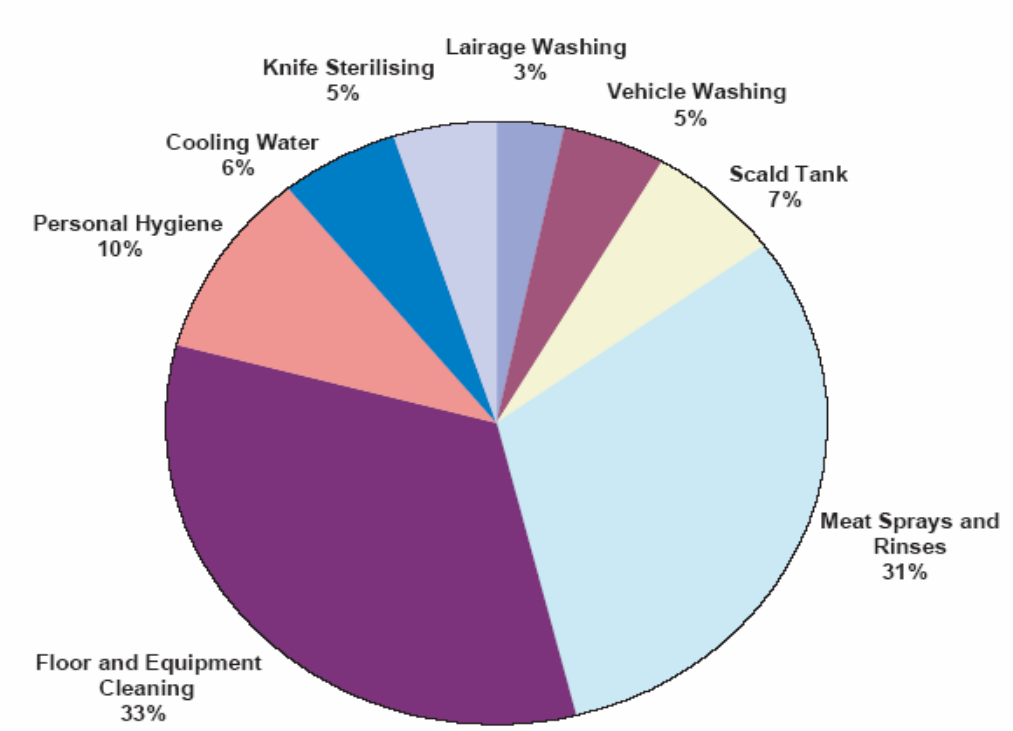

Figure 1 *Typical water balance for areas in a pig abattoir*

You can often identify water reduction opportunities by comparing actual water consumption with equipment suppliers' recommended levels. Particular areas where there may be opportunities to reduce water consumption include:

- cleaning
- meat sprays and rinses
- pig scalding
- vehicle washing
- lairage washdown

Water consumption may also be affected by leaks or damage to the water supply system.

Cleaning

In any abattoir, the major factor affecting water consumption is the amount of floor area used. To comply with the hygiene regulations, all process floor areas must be washed down at least once a day. Water consumption is highly dependent on the layout of individual abattoirs.

Efficient use of raw materials and water

Nevertheless, you may save money by optimising your process and layout.

For example, double skin insulated knife steriliser bowls use less water than conventional bowl type sterilisers, since they minimise heat loss and therefore reduce the rate of overflow required to maintain the required temperature. For a 3 litre bowl this can mean an overflow rate of 15 l/hr compared with 36 l/hr for conventional bowl sterilisers. Also, for spray knife sterilisers you should avoid continually running sprays and only initiate flow when an implement is introduced into the unit. Sprays should be pre-set for a period of time.

Rinsing

Sprays and rinses typically account for about 30% of water consumption at an abattoir. Spray nozzles to direct or focus the water are commonly used to reduce water consumption whilst providing adequate washing efficiency. Regular monitoring of spray nozzle wear should be incorporated into maintenance programmes

Pig scalding

Tank refill/top up should be controlled by simple ball valve or other level sensing device to avoid wastage from overflow.

To reduce water consumption for cleaning the tank, the tank bottom should have a steep gradient towards the outlets. This would facilitate the easier removal of solids from the tank.

Vehicle washing

High pressure low volume sprays (HPLV) decrease water consumption, particularly when used with a metered water dispenser eg timer

Lairage wash down

Lairage manure and wash water is high in nutrients and can be collected for agricultural use as a fertiliser, provided specific conditions explained in the MAFF Water Code (Water efficiency references see Annex 1) are met. The preliminary step should involve dry collection of manure which should reduce the requirement for washing down water.

Efficient use of raw materials and water

Raw material use

Indicative BAT

You should where appropriate:

1. Monitor for leaks of refrigerant.
2. Ensure planned maintenance of the refrigeration system is carried out.
3. Optimise dosing of disinfectants and detergents.
4. Ensure that staff are trained in the handling, making up of working solutions and their application, in particular not setting the concentration of the chemical agent too high.

Table 3 considerations when minimising the use of raw materials

Raw material	Consideration
Bedding	Used bedding (contaminated with animal manure) requires disposal either to land in a "beneficial" manner or to landfill. Scope for preventative measures is limited due to hygiene and welfare requirements.
Preserving agents	Wash down into effluent will affect effluent quality. You should take care to use the correct amount and to prevent spills. Chloride (brine) is not removed or reduced by effluent treatment.
Coolants and refrigerants	
Ammonia	Very potent pollutant in event of spillage into watercourse or sewer Leaks from refrigeration system will result in emissions to air.
Ethylene glycol and water	Has a high oxygen demand in event of spillage into watercourse or sewer.
R404 and R22 (an HCFC).	Leaks from refrigeration system will result in emissions to air and these refrigerants are contributors to ozone depletion.
Detergents and disinfectants	These are pollutants if they are spilled into a watercourse or sewer. Even in the diluted form used for cleaning a proportion of the chemicals will end up in the final effluent.

Avoidance, recovery and disposal of wastes

1.4 Avoidance, recovery and disposal of wastes

In addition to animal waste from the abattoir process, wastes may include refrigerants and oil from chilling and freezer units and packaging from portioning and trimming.

Indicative BAT

You should where appropriate::

1. Demonstrate that the chosen routes for recovery or disposal represent the best environmental option considering, but not limited to, the following:
   a. all avenues for recycling back into the process or reworking for another process
   b. composting
   c. animal feed (if allowed under animal by-product legislation)
   d. other commercial uses
   e. landspreading, but only under the following circumstances:
      - you can demonstrate that it represents a genuine agricultural benefit or ecological improvement
      - you have identified all the pollutants likely to be present. These may be substances from the process, from the materials of which your plant is constructed (e.g. reaching the waste by corrosion/erosion mechanisms), from materials related to maintenance (e.g. detergent). You should consider all these possibilities, for both normal and abnormal operation of the plant. You should validate your conclusions by chemical analysis of the waste
      - you have identified the ultimate fate of the substances in soil

      Note: un-processed meat scraps collected from screening equipment are not listed as a waste which can be exempted and therefore cannot be sent for application by landspreading.
2. You may collect screened waste water and pump it to neighbouring agricultural land for soil injection as a fertiliser (subject to certain restrictions). You can only do this under a landspreading exemption. If you do this, you must take care that surface water run-off from the agricultural land does not cause contamination of local controlled water courses during extremely wet weather. You should ensure that you have adequate storage capacity to store waste water during these conditions, and you must be able to make alternative arrangements if the wet weather persists and the storage capacity at the abattoir is in danger of being exceeded.

2

Operations

Lairage Bleeding

2. Operations

2.1 Lairage

The main issues are:

1. Effluent from washing the lairage floor with high pressure low volume (HPLV) hoses and from vehicle washing.
2. Emissions of ammonia and odour from slurry collection systems.
3. Disposal of solid manure and straw
4. The risk to the environment in the event of overflow or spillage from slurry collection system.

2.2 Bleeding

The Animal By-products Regulations will no longer allow the disposal of untreated blood to sewer or landfill or to recover via applying it to land. This requires you to collect blood for treatment.

The main issues are:

- blood has the highest COD strength of any liquid effluent arising from meat processing operations. Liquid blood has a COD strength of about 400,000 mg/litre and congealed blood has a COD strength of about 900,000 mg/litre. Any spillage reaching a watercourse could have a very severe effect
- odour from blood storage/transfer
- overfilling of blood tank.

Indicative BAT

You should where appropriate:

1. Collect blood hygienically for human consumption or for use in pet food. The objective is to collect as much blood as possible for reuse or separate disposal to reduce the loading on the effluent treatment system.
2. Ensue efficient bleeding processes and maximum blood collection in the blood trough. Blood troughs should be long enough to collect blood draining from the carcass for at least 5½ to 6 minutes after the animal's throat has been cut.
3. Ensure the blood trough is fitted with a double drain – one opening for the blood to be pumped to a tanker for disposal and the other for wash water. A removable plug seals the opening when not in use. You should examine whether additional blood collection sumps at other parts of the process, e.g. the legging platform where the back legs are skinned, would assist the collection.
4. During end of shift cleaning, squeegee blood that has coagulated on the base/walls of the

Head, hide and hoof removal Pig scalding

trough towards the drain and as much as possible pump to the blood tanker. The blood trough should be pitched and curved to facilitate squeegeeing of partially congealed blood into the drain. When as much blood as possible has been collected, the plug in the drain can be removed and the whole trough washed down with water which is typically discharged to the site wastewater drainage system.

2.3 Hide, head and hoof removal for cattle and sheep

The main issue is:

1. Noise, mainly from saws, hoists, pullers, blowers and conveyors

2.4 Pig scalding

Shower scalding has a very high water and energy consumption and the technology is not widely used. It is not BAT.

Debris and sludge builds up in the scalding tank during the day. Common practice in many abattoirs is to empty the water and sludge directly into the site waste water drainage system at the end of the day. This can overload the effluent treatment system.

Measurements of hair and toe-nail loosening have shown that the scalding quality of the steam condensation system is comparable to that of a traditional vat scalding system. Furthermore, steam condensation has a number of advantages over traditional vat scalding:

- no water in the lungs and no water penetration in the sticking wound leading to improved hygiene levels
- low water and energy consumption
- short start-up time and reduced risk of over-scalding during stops on the slaughter line

A more efficient method of scalding uses humidified air where the heat is transferred to the carcass surface through the condensation of steam. The heat and moisture are transferred to the scalding air by atomisation of hot water in the circulating air flow. This process can maintain a constant temperature and 100% humidity under varying loads, which is crucial for good scalding performance.

The main issues are:

1. Water use - continuous make-up water is required to balance “drag-out”, which drips onto the floor and into the effluent system. Automated chambers are more water efficient than manual operation.

Pig Scalding
Pig hair and toenail removal and pig singeing

2. Energy use.
3. Waste waters from scald tanks or from in line scalding cabinets can have temperatures up to 75°C. If discharged while hot, it will melt fat caught on the screening systems, leading to a shock loading on the downstream treatment.

Indicative BAT

You should consider the following techniques and use where appropriate:

1. Minimise drag out by collection and draining back to tank.
2. Use a conveyor system to drag the carcass through, and a longer tank with counter current water filtration and recycling, to reduce the requirement for make up water and reduce the volume of effluent produced.
3. Where vat scalding is used, the tank(s) should be insulated and covered with a lid to avoid heat and evaporation losses.
4. Avoid discharging waste waters from scald tanks whilst hot.
5. Ensure that the discharge of the scald tank into the effluent treatment system cannot overload or bypass the treatment plant

2.5 Pig hair and toenail removal and pig singeing

The main issues are:

1. Water use.
2. Energy use - heat recovery from the singeing exhaust.
3. Odour.

Indicative BAT

You should consider the following techniques and use where appropriate:

1. Reuse of cooling water.
2. Reuse of singeing unit cooling water for rinses in the dehairing and brushing processes.
3. Heat recovery from the singeing exhaust.
4. Efficient extraction leading to a suitably designed stack.

Evisceration and gut room processes

2.6 Evisceration and gut room processes

For cattle and sheep, the paunch is cut open on a table and the manure is removed using either a wet or dry process. There are significant differences in the amount of effluent produced between wet and dry processes.

	Litre effluent per paunch
Wet	145 - 390
Dry	7 - 91

The main issues are:

- water use and emissions to water
- odour.

Indicative BAT

1. Wash the dry paunch contents using counter current water filtration and recycling, which will further reduce the requirement for make up water and reduce the volume of effluent produced.
2. Paunch manure should not be discharged to the effluent collection system. In addition to the high oxygen demand (COD > 100,000 mg/litre), undigested solids are not easily degraded in biological systems and tend to build up as sludge in the system, thus reducing treatment efficiency.
3. Paunch manure (from cattle) is an ideal medium for composting or vermiculture. This should be investigated as a preferred alternative to disposal.
4. Where maceration is used to reduce the volume of waste, then the macerator and washing equipment should be maintained regularly to ensure that the blades are in good condition and to optimise the speed and separation of the blades. This will optimise the efficiency of the cutting operation and reduce the amount of waste offal which becomes mixed in with the wash water.

Cutting, portioning and trimming
Secondary processing

2.7 Cutting, portioning and trimming

The main issues are:

1. Product loss to waste.
2. Emissions to water.

Indicative BAT

1. Keep meat wastes out of the wastewater stream to reduce effluent loading.
2. Carefully examine cutting and trimming operations for opportunities to intercept meat wastes before they enter the drains.
3. Handle and transfer meat efficiently, to avoid wastage.
4. Floor drain grates and catch pots in the drainage system should be in place.

2.8 Secondary processing

This includes:

- carcass reception
- defrosting, deboning, fat removal, trimming
- fat rendering
- grinding
- ingredient application
- pasteurizing, cooking, smoking, pickling
- canning
- packaging, freezing

The main issues are:

1. Emissions to air from direct fired cookers etc including cooking odours and emissions from smokehouses
2. Emissions to water - you should keep meat wastes out of the wastewater stream to reduce effluent loading. You should carefully examine cutting and trimming operations for opportunities to intercept meat wastes before they enter the drains.

Indicative BAT

1. The measures outlined above for cutting should be implemented.

Cleaning

2.9 Cleaning

Cleaning is a major consumer of water within an abattoir, and is thus a major source of effluent. Hygiene and food safety requirements limit the measures that can be used to reduce water consumption, optimise the use of cleaning agents and re-use cleaning waters. Nevertheless there are steps that can be taken to reduce the environmental impact of the cleaning process.

Indicative BAT

You should where appropriate:

1. Stop staff from removing floor-drain grates and flushing meat scraps directly down the drain during cleaning. Even if there is a subsequent screen or catch pot to trap solids, when these meat scraps enter the wastewater stream they are subjected to turbulence, pumping and mechanical action which breaks the meat down. This releases high COD substances into solution, along with colloidal and suspended fats and solids. Subsequent wastewater treatment and effluent disposal to foul sewer can be expensive.
2. Keep meat wastes out of the wastewater stream to reduce effluent loading. This will reduce the COD and suspended solids concentration of the waste water from cleaning.
3. Review your management practices for blood segregation and clean-up operations taking into account the following techniques:
   - installing trays to collect waste as it falls to the floor
   - checking drains regularly to ensure that catch pots are in place
   - emptying catch pots into a waste bin and replacing in the drains before beginning to clean an area
   - dry pre-cleaning of process areas before wet cleaning
   - avoiding unnecessary hosing of blood and meat scraps into the drains
   - ensuring catch pots are in place during cleaning (for example by installing lockable catch pots)
   - fitting hoses with spray nozzles, and optimising water pressure at jets, nozzles and orifices
   - using flat jet nozzles to provide maximum impact and velocity. A spray of up to 60° provides wide coverage and a sweeping effect to propel solids towards floor drains
   - use of an automatic water supply shut off on trigger operated spray guns or hoses.
   - using cold water for first rinse as warm water will make protein materials adhere to surfaces.

3

Emissions and monitoring

Emissions to air
Emissions to water

3. Emissions and monitoring

3.1 Emissions to air

In most pig abattoirs the singeing unit is exhausted through a hood just above roof level directly to atmosphere. In some cases, the exhaust may include an extraction fan. This is a hot emission (estimated to be 600 – 800°C) which contains fine burnt hair particles.

Some operations, like smoking, have potential to produce odour. Odour issues are covered in GTBR as well as below.

3.2 Emissions to water

A wide variety of techniques is available for the control of releases to water or sewer, and the BREF on Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector (see Annex 1) should be consulted. Section 3.3 of the BREF has details of available water treatment techniques and Section 4.3.1 contains recommendations on what might constitute BAT for a variety of treatment techniques for releases to water.

In addition to the BREF and the techniques noted below, guidance on cost-effective effluent treatment techniques can be found in releases to water references (Annex 1).

If the abattoir has on-site hide salting facilities, substances emitted will include chloride.

Some of the larger abattoirs have installed biological treatment plants that convert soluble and colloidal materials into bio-solids. These are usually activated sludge plants and can be high-rate or conventionally loaded plants preceded by sedimentation or dissolved air flotation (DAF), or extended aeration plants or oxidation ditches treating screened effluent. Biosolids produced by the treatment plant may be dewatered prior to land spreading as soil conditioner, or digested to yield biogas.

You should refer to the BREF notes for slaughterhouses when assessing your own techniques against BAT. The factors that should normally be considered are given below.

Emissions to water

Indicative BAT

You should where appropriate:

1. Keep raw materials and product out of the wastewater system wherever possible. Waste water from process areas at abattoirs is normally screened to remove hairs, meat scraps and gross solids to reduce BOD and prevent drains becoming blocked. e.g. The outlets from the pig scald tanks should pass through a screen or sedimentation trap before discharge to the waste water treatment system as whole, to reduce the loading and in some cases shock loading of the discharge of this unit.
2. Use a balancing tank or pond (equalisation or balancing), with a hydraulic retention time of 6 – 12 hours, which can improve treatment in the following ways:
   - by allowing waste streams to be combined e.g. acid and alkali streams from the regeneration of deionisers; or high BOD and low BOD waste streams. This can reduce consumption of reagents
   - by making the flow rate less variable. This can reduce the size of the treatment plant needed, as it only has to handle the average flow and not the peak flow.
3. Provide contingency measures to prevent accidental discharges from overloading or damaging the treatment plant. These will often include providing a diversion tank into which potentially damaging wastewater can be diverted. This should typically have a capacity of 2 – 3 hours at peak flow rate. The wastewater should be monitored upstream of the treatment plant to allow automatic diversion to the tank. The contents of the diversion tank may be gradually re-introduced into the wastewater stream, or removed for off-site disposal. If you do not provide a diversion tank, you must tell us what equivalent measures you use to protect your treatment plant.
4. If you operate an activated sludge plant, you must manage the following issues carefully:
   - the development of bulking sludges
   - the carrying of excessive biomass inventories
   - the formation of biologically stable foam
   - the inhibition of microbial activity by biocidal substances from cleaning/sterilising agents.
5. At sites with biological treatment plant ensure the surface water drains are not routed to the treatment plant.

Fugitive emissions
Odour

3.3 Fugitive emissions

Fugitive emissions include refrigerants from chilling and freezing equipment as a result of

- losses from pipe joints, shaft seals and gaskets
- deliberate venting of refrigerants to the air.

Indicative BAT

You should where appropriate:

1. Regularly inspect pipe joints, shaft seals and gaskets in the refrigeration plant using proprietary leak detection equipment.
2. Ensure that a system log book is kept which records:
   - quantity of refrigerant and oil added to or removed from the system(s)
   - leakage testing results
   - location and details of specific leakage incidents.

3.4 Odour

Indicative BAT

In addition to good housekeeping, the key factors in controlling odour from the storage of blood / by-products are exposure time and temperature. For example the storage of solids below 5^0C and blood below 10^0C is reported to reduce odour problems.

In addition to the requirements in “Getting the basics right”, the following should be used where appropriate in this sector:

1. Minimise manure production by controlling feeding rate prior to transportation of animals to site
2. Storage of putrescible waste /by-products/ in sealed containers
3. Frequent cleandown of waste containers to prevent build-up of malodorous material
4. Frequent e.g. daily removal off site of blood/ by-products
5. Refrigeration of blood/ animal by-products / putrescible material if extended on-site storage is carried out.
6. Enclosure of potentially odorous operations e.g.
   - macerator equipment used to chop and wash inedible offal
   - effluent treatment plant

Odour
Noise and vibration
Monitoring

7. Install odour abatement e.g. activated carbon filter on the blood storage tank vents.
8. Back vent road tankers through the odour abatement unit during blood collection
9. Use of screens/catchpots to prevent meat scraps / fats from entering drainage system
10. Ensure that effluent treatment plant is adequately maintained . Where present, aeration tanks should be kept aerated and mixed at all times except where maintenance necessitates shut-down of the aeration system. Implement alternative operational arrangements during shut-down to avoid odour nuisance.
11. Control of hydraulic retention times and desludging in effluent systems to prevent malodours.

3.5 Noise and vibration

Indicative BAT

1. Although cattle and sheep are generally fairly quiet, pigs may be noisy, particularly during unloading and marshalling operations. If there is a potential for impact on the neighbours then these operations should be carried at reasonable hours of day.

3.6 Monitoring

Monitoring of process variables

Some process variables may affect the environment. Examples might be:

- monitoring useage of chemicals
- plant efficiency where it has an environmental relevance
- energy consumption across the plant and at individual points of use in accordance with the energy plan.

Indicative BAT

The following should be used:

1. Identify process variables that may affect the environment and monitor as appropriate
2. Assess whether monitoring the parameters in Table 4 below would enable you to minimise your environmental impact or reduce the risk of an accident.

Monitoring

Table 4 Process variables that may need monitoring

Process variable	Comment	Monitoring frequency
Salt	Abattoirs which have on-site hide salting facilities should monitor the consumption of salt as excess will wash down into the effluent	Weekly
Refrigerant	Quantity of refrigerant and oil added to or removed from the system	Each charge or drain
Detergent and disinfectant	You should monitor the consumption of detergent and disinfectant to check that correct dilutions and application procedures are being followed	Weekly
Bleeding times	Blood has a very high BOD. By monitoring bleeding times you can check that the maximum quantity of blood has been collected for sale or separate disposal and will not overload the effluent treatment plant	
Efficiency of blood collection	At single species abattoirs, the efficiency of the blood collection procedures can be assessed by monitoring the quantity of blood collected per animal processed	Quarterly
Energy consumption	Energy consumption across the abattoir and at individual points of use in accordance with the energy plan	Normally continuous and recorded
Water use	Fresh water use across the activities and at individual points of use should be monitored as part of the water efficiency plan	Continuous and recorded
Levels in the blood collection tank	The risk of accidents can be reduced by installing a high level alarm on the blood tank linked to an automatic cutoff for the blood trough pumps	Continuous
Levels in the effluent treatment plant tanks	Tanks used in effluent treatment plants should be fitted with high level alarms to prevent overfilling	Continuous
Effluent quality	Many DAF plants include continuous monitoring of effluent quality, out of specification alarms and automatic by-pass systems routed to a stand-by effluent sump which can be used to store effluent if the DAF plant breaks down	Continuous and recorded

4

Annexes

Annex 1- Other relevant guidance, abbreviations and glossary

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4. Annexes

Annex 1- Other relevant guidance, abbreviations and glossary

For a full list of available Technical Guidance and other relevant guidance see Appendix A of GTBR (see http://publications.environment-agency.gov.uk/pdf/GEHO0908BOTD-e-e.pdf?lang=_e).

In addition to the guidance in GTBR the following guidance is relevant to this sector:

Reference 1

Water efficiency:

- *Simple measures restrict water costs*, ENVIROWISE, GC22
- *Effluent costs eliminated by water treatment*, ENVIROWISE, GC24
- *Saving money through waste minimisation*: Reducing water use, ENVIROWISE, GG26
- *Optimum use of water for industry and agriculture dependent on direct abstraction: Best practice manual*. R&D technical report W157, Environment Agency (1998), WRc Dissemination Centre, Swindon (tel: 01793 865012)
- *Cost-effective Water Saving Devices and Practices* ENVIROWISE GG067
- *Water and Cost Savings from Improved Process Control* ENVIROWISE GC110
- *Tracking Water Use to Cut Costs* ENVIROWISE GG152

(ENVIROWISE Helpline 0800 585794 *Envirowise website is www. envirowise.gov.uk)*

Reference 2

Releases to water:

- BREF on Waste Water and Waste Gas Treatment. – www.jrc.es/pub/english.cgi/0/733169 or eippcb.jrc.es
- *A4 Effluent Treatment Techniques*, TGN A4, Environment Agency, ISBN 0-11-310127-9
- *Cost-effective Separation Technologies for Minimising Wastes and Effluents* ENVIROWISE GG037
- *Cost-effective Membrane Technologies for Minimising: Wastes and Effluents* ENVIROWISE GG044

Annex 1-Other relevant guidance, abbreviations and glossary

Abbreviations and glossary

Abatement Plant	Equipment used to remove polluting substances from a discharge to air or water
BOD	Biological Oxygen Demand. This is the amount of oxygen required by biological organisms to deal with the organic substances in a discharge to water. It is a measure of the potential of the discharge to harm the ecosystem of the receiving water.
COD	Chemical Oxygen Demand. This is the amount of oxygen required to chemically destroy the organic substances in a discharge to water. It is a measure of the potential of the discharge to harm the ecosystem of the receiving water.
DAF	Dissolved Air Flotation. This is a process in which suspended solids in waste water are chemically treated to form a flocculated structure that can be floated to the surface of a reactor by introducing fine bubbles of air.
FOG	Fats, Oils and Greases.

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