

How to comply with your environmental permit  
Additional guidance for:

# Treating and Processing Poultry (EPR 6.11)



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Published by:  
Environment Agency  
Rio House  
Waterside Drive,  
Aztec West Almondsbury,  
Bristol BS32 4UD  
Tel: 0870 8506506  
Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

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# 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.

In relation to birds, carcass is defined in The Poultry Meat, Farmed Game Bird Meat and Rabbit Meat (Hygiene and Inspection) Regulations 1995 as:

- the whole body of a bird after bleeding, plucking and evisceration, whether or not the heart, liver, lungs, gizzard, crop, kidneys, legs at the tarsus, head,

oesophagus or trachea have been removed

- average carcass weights are taken to be: for broilers and boiling fowls 2kg; for turkeys 5kg.

## 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 storage and handling of raw materials; the storage and despatch of finished products, waste and other materials
- waste treatment or recycling.

## Key issues

The key issues are:

### Accident management

There are risks of pollution of land and water from spills and process leaks. These may arise from overfilling of vessels and failure of containment, wrong drainage connections and blocked drains, or other reasons. A 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.

# Introduction

## **Efficient use of raw materials and water**

The main sources of waste waters are from evisceration, washing 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**

You should store wastes that are awaiting disposal in dedicated storage areas which are under cover, surfaced and connected to the effluent drainage system. Waste removed from site should be done so under the duty of care for waste requirements. If you dispose of sludge from biological treatment on agricultural land you must show how it provides either a benefit to agriculture or an ecological improvement.

## **Emissions to water**

The worst environmental impact of the sector comes from emissions to water.

Poultry processing generates relatively large quantities of wastewater 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 fat, oil and grease (FOG). Allowing meat scraps to enter floor drains so that they begin to break down in the wastewater stream increases wastewater COD and BOD, and releases colloidal and suspended fats and solids. **Consequently the most important measure is keeping product and by-product out of wastewaters.**

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

## **Odour**

Odour is potentially a significant emission. Design of plant is key in reducing odour emissions. Maintenance of the wastewater treatment plant and of the drainage system (prevention of blockages), as well as careful management of waste, should minimise releases of odour.

## **Hygiene**

There is specific legislation 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 and reuse and recycling of water.

# 1

## Managing your activities

**1.1 Accident management**

**1.2 Energy efficiency**

**1.3 Efficient use of raw materials and water**

**1.4 Avoidance, recovery and disposal of wastes**

# Accident management

## Energy efficiency

### 1. Managing your activities

#### 1.1 Accident management

**Indicative BAT**

You should ensure the following:

1. Your effluent treatment plant does not get overloaded.
2. That fat, oil and grease (FOG) does not block drains.
3. Adequate containment of blood storage tanks.

#### 1.2 Energy efficiency

**Indicative BAT**

You should consider the following techniques to reduce energy consumption:

1. Minimisation of water use. Typically about half of the total water usage at an abattoir is heated to between 40°C and 60°C. Heating this water requires substantial energy consumption, and adds a significant cost.
2. 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.

# Efficient use of raw materials and water

## 1.3 Efficient use of raw materials and water

Poultry processing operations typically use a lot of water. This is partly due to the hygiene requirements set by UK and EU meat regulations, which result in high water consumption particularly during operations such as evisceration, cleaning and washing.

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).

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 Reference 1, Annex 1).

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:

- carcass washing
- cleaning and
- vehicle washing.

### Carcass washing

Carcass washing during evisceration typically accounts for about 24% of water consumption at a poultry processor. "Shower head" arrangements or pipes drilled with holes lead to excessive water use.

### Cleaning

In any poultry processing plant, 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 poultry processors. You may reduce water use by optimising your layout.

# Efficient use of raw materials and water

## Vehicle washing

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

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

### Indicative BAT

You should where appropriate:

1. Use recirculating systems to recycle water. e.g. use of scald tank water for wet feather flume. (Once through cooling systems should not be used.)
2. Use of nozzles instead of irrigation pipes during defeathering stage
3. Use of water efficient shower heads to wash poultry during evisceration
4. Interlock chemical dosing pumps with cleaning operations so that dosing does not continue after cleaning is complete.
5. Meet water consumption benchmarks as follows:
  - Chicken: 8 to 15 litres per bird
  - Turkey: 40 to 60 litres per bird

The amount of water used per bird varies between different processors depending on several factors including the size of bird, method of slaughter and carcass dressing, degree of automation etc.

# Avoidance recovery and disposal of wastes

## 1.4 Avoidance, recovery and disposal of wastes

### 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:
  - all avenues for recycling back into the process or reworking for another process
  - composting
  - animal feed
  - other commercial uses
  - 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. For composting, animal feed and landspreading you will need to make sure you also comply with Animal By Product Legislation. This requires that blood and other animal tissue resulting from slaughter are treated before disposal or re-use. Lairage is also covered by this legislation but does not have the same treatment requirements.

# 2

## Operations

- 2.1 Delivery**
- 2.2 Stunning and bleeding**
- 2.3 Scalding**
- 2.4 De-feathering**
- 2.5 Evisceration**
- 2.6 Chilling**
- 2.7 Cutting**
- 2.8 Cooking**
- 2.9 Packing**
- 2.10 Cleaning**

# Delivery Stunning and bleeding

## 2. Operations

### 2.1 Delivery

The Poultry Meat Hygiene Regulations require the poultry processor to provide separate facilities for cleaning and disinfecting the crates, modules and vehicles in which the birds are delivered. The level of faecal contamination produced during transportation, and hence the amount of effluent produced during cleaning, can be reduced by not feeding the birds before shipping. A period of

between 6 and 10 hours between feeding and kill gives best results.

The main control issues are:

- effluent from vehicle washing
- ammonia and odour from slurry collection systems
- solid manure from delivery
- overflow from slurry collection

#### Indicative BAT

1. Use automated crate washing equipment to minimise volume of effluent produced.

### 2.2 Stunning and bleeding

The main issues are:

- waste water and wash water from the cleaning process
- blood

#### Indicative BAT

1. After stunning, bleed the bird for up to 2 minutes before dressing.
2. Use of double-drain in bleeding area to optimise blood collection and reduce effluent volume produced during cleaning

# Scalding, De-feathering, Evisceration and Chilling

## 2.3 Scalding

As birds enter the scald tank there may be involuntary defecation leading to the accumulation of faecal materials in the tank.

The main issues are:

- poultry faeces dissociate in water to form ammonium nitrate and uric acid. These act as a chemical buffer, and maintain the pH of the scald tank at about 6, the point at which salmonellas are most heat resistant. In most cases the scald tanks are emptied into the wet feather flume at the end of the day shift
- electricity/gas used to heat water for scald tank
- scald tank dump can overload the effluent treatment system.

## 2.4 De-feathering

The main issues are:

- waste water and wash water produced
- solid waste material (e.g. waste wax and feathers) may be disposed of to landfill. Anything contaminated with animal by-product such as feathers or tissue will need treating before going to landfill.

## 2.5 Evisceration

The main issues are:

- odour

- use of water for carcass cleaning
- spreading of treated inedible offal
- loading of waste water with meat offal and meat scraps.

## 2.6 Chilling

The main issues are:

- high water consumption in spray chilling applications
- waste water derived from all chilling applications
- losses of refrigerant by spills and leaks
- noise from compressors, evaporators, pumps and fans.

Several designs of chilling equipment are in use, including:

**Immersion chilling:** Carcasses are moved through a counter-flow current so they are constantly moving into cleaner water. This system may lead to a build up of blood and carcass material.

**Static water chillers:** Involve use of static slush ice tanks after immersion chilling, are mainly used for fresh and frozen turkey, reflecting the need for large carcasses to be chilled for long periods. May also lead to a build up of contamination.

**Spray chillers:** Avoid problems of contamination build-up, but may give rise to spread of bacteria through aerosols. This method also uses high volumes of water.

# Chilling Cutting, Cooking and Packing

**Air chillers:** Generally used for carcasses for fresh sale. Chilling is either effected by batch in a chill room or by continuous air blast. Tests have shown that air chilling can reduce the contamination rate by up to three times more than immersion chilling.

Most producers have switched to air chilling in an effort to reduce water consumption. Water chilling remains popular with turkey processors in order to comply with hygiene requirements for the rapid chilling of larger carcasses.

Refrigerants commonly used include ammonia, ethylene glycol and water, R404 and R22 (an HCFC). The refrigeration condensers may be water cooled or air cooled.

## 2.7 Cutting

The main issues are:

- wash water loading with solid waste
- disposal of inedible offal.

## 2.8 Cooking

The main issues are:

- wash water from equipment used to process meat for cooking (e.g. by coating it with breadcrumbs) can be a high strength effluent stream
- odour.

## 2.9 Packing

The main issue is:

- disposal of waste packaging.

# Cleaning

## 2.10 Cleaning

To comply with the Meat Hygiene Regulations, all process floor areas, equipment, containers etc. must be washed down and sanitised at least once a day.

The main issues are:

- wash waters will contain cleaning agents and remnants of meat and

waste removed from the equipment that is cleaned

- spillage of cleaning chemicals
- leakage from effluent system
- overloading of effluent treatment system.

### 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. The objective is to reduce the COD and suspended solids concentration of the waste water from cleaning.
3. Review your management practices for clean-up operations taking into account the following techniques:
  - install trays to collect waste as it falls to the floor
  - check drains regularly to ensure that catch pots are in place
  - empty catch pots into a waste bin and replace the catch pot in the drains before beginning to clean an area
  - dry pre-clean process areas before wet cleaning
  - avoid unnecessary hosing of blood and meat scraps into the drains (be aware that animal by product restrictions apply)
  - catch pots should be in place during cleaning (for example by installing lockable catch pots)
  - fit hoses with spray nozzles, and optimise water pressure at jets, nozzles and orifices.

# 3

## Emissions and monitoring

**3.1 Point source emissions**

**3.2 Fugitive emissions**

**3.3 Odour**

**3.4 Monitoring**

# Point source emissions

## 3. Emissions and monitoring

### 3.1 Point source emissions

#### Emissions to air

Some production operations, for example cooking, may produce odours. Odour issues are covered in GTBR as well as below.

#### Emissions to water

A wide variety of techniques is available for the control of releases to water or sewer, and you should consult the BREF on Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector (see Reference 2, Annex 1). 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.

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 (Reference 2, Annex 1).

In general, high water consumption and high COD and suspended solids are characteristic of poultry processing operations.

Some of the larger abattoirs have installed biological treatment plants that convert soluble and colloidal materials into biosolids. 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 when assessing your own techniques against BAT. The factors that should normally be considered are given below.

#### Indicative BAT

You should where appropriate:

1. Keep raw materials and product out of the wastewater system wherever possible. You should use the following techniques:
  - dry clean-up
  - installation of drain catchpots and screens:
  - where gross FOG is found in wastewater, drainage systems should have grease traps and gratings to prevent sewer blockage. These must be frequently inspected, emptied and maintained.

## Point source emissions

2. Use a balancing tank or pond (equalisation or balancing), with a hydraulic retention time of 6 – 12 hours. This 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

### 3.2 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 as 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.

### 3.3 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<sup>0</sup>C and blood below 10<sup>0</sup>C is reported to reduce odour problems.

You should as appropriate:

- Minimise chicken slurry production by controlling feeding rate prior to transportation of live birds to site
- Storage of putrescible waste in sealed containers
- Frequent cleandown of waste containers to prevent build-up of malodorous material
- Frequent e.g. daily removal off site of blood/ by-products
- Refrigeration of blood/ animal by-products / putrescible material if extended on-site storage is carried out.
- Install abatement (e.g. activated carbon) on blood storage tank vents .
- Backventing road tankers through the abatement unit during blood collection
- Use of screens/catchpots to prevent meat scraps / fats from entering drainage system
- Enclosure of effluent treatment plant / sludge handling systems

Control of hydraulic retention times in effluent systems

# Monitoring

## 3.4 Monitoring

### Monitoring of process variables

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

- monitoring usage 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

You should where appropriate:

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

**Table 1 Process variables that may need monitoring**

Process variable	Comment	Monitoring frequency
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 separate disposal and will not overload the effluent treatment plant	
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

# Monitoring

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**

# Annex 1-Other relevant guidance, abbreviations and glossary

## 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](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 references:

- *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](http://www.envirowise.gov.uk))

#### Reference 2

Releases to water references:

- BREF on Waste Water and Waste Gas Treatment. – [www.jrc.es/pub/english.cgi/0/733169\\_or\\_eippcb.jrc.es](http://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 ([EA website](#))
- *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.

Would you like to find out more about us, or about your environment?

Then call us on  
08708 506 506 (Mon–Fri 8–6)

email  
[enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

or visit our website  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

incident hotline 0800 80 70 60 (24hrs)  
floodline 0845 988 1188