

# UK Interpretation Guidance and Permitting Advice on the Best Available Techniques (BAT) Conclusions for

---

## Intensive rearing of poultry or pigs (IRPP)

### Contents

SCOPE .....	2
OTHER RELEVANT BATc.....	3
DEFINITIONS.....	4
1 General Bat Conclusions .....	10
Environmental management systems (EMS).....	10
Good House keeping.....	11
Nutritional Management.....	13
Efficient Use of Water.....	15
Emissions from WaSte Water.....	16
Efficient Use of Energy.....	17
Noise Emissions .....	18
Dust Emissions.....	21
Odour Emissions .....	23
Emissions from Solid Manure Storage .....	26
Emissions from Slurry Storage .....	28
On farm processing of Manure .....	31
1.13 Manure Landspreading .....	32
Emissions From the whole production process .....	35
Monitoring of emissions and process parameters.....	36
2 Bat Conclusions for the Intensive Rearing of Pigs.....	40
Ammonia Emissions from Pig Houses .....	40
3 Bat Conclusions for the intensive rearing of poultry.....	44
Ammonia emissions from poultry houses.....	44
AMMONIA EMISSIONS FROM HOUSES FOR LAYING HENS, BROILER BREEDERS OR PULLETS.....	44
Ammonia emissions from houses for broilers .....	46
Ammonia emissions from houses for ducks .....	47
Ammonia emissions from houses for turkeys .....	48

## SCOPE

These BAT conclusions concern the activities specified in Section 6.6 of Annex I to Directive 2010/75/EU, the Industrial Emissions Directive (IED), namely:

6.6. Intensive rearing of poultry or pigs:

- (a) with more than 40 000 places for poultry
- (b) with more than 2 000 places for production pigs (over 30 kg), or
- (c) with more than 750 places for sows.

In particular, these BAT conclusions cover the following on-farm processes and activities:

- nutritional management of poultry and pigs;
- feed preparation (milling, mixing and storage);
- rearing (housing) of poultry and pigs;
- collection and storage of manure;
- processing of manure;
- manure land spreading;
- storage of dead animals.

These BAT conclusions do not address the following processes or activities:

- disposal of dead animals; this may be covered in the BAT conclusions on Slaughterhouses and Animal By-products Industries (SA).

## GUIDANCE

The guidance sections of this document set out the regulatory authorities' interpretations of each BAT conclusion. The objective is to provide clarification on any interpretational issues and consistency when applying the BAT conclusions in the United Kingdom.

This document was jointly prepared and agreed by the regulators in England, Northern Ireland, Scotland and Wales; Environment Agency, Northern Ireland Environment Agency (NIEA), Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW). We will refer to these as the regulators throughout.

The BAT conclusions<sup>1</sup> were published on the 21<sup>st</sup> February 2017. The Industrial Emissions Directive<sup>2</sup> stipulates that all EU member states must ensure that existing operational permitted sites will be compliant with the BAT conclusions within 4 years of publication. These BAT conclusions must be implemented at existing sites by 21<sup>st</sup> February 2021.

From the 21<sup>st</sup> February 2017 all new farms and any new or replacement housing or plant at

---

<sup>1</sup> Commission Implementing Decision (EU) 2017/302 of 15 February 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the intensive rearing of poultry or pigs

<sup>2</sup> Directive 2010/75/EU of the European Parliament And of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

existing permitted farms must be compliant with the BAT conclusions and meet associated emission limits from the date that they are first permitted.

These BAT Conclusions do not cover all the activities and processes which may occur on a permitted farm for example waste activities and activities covered by the relevant Animal By-Products Regulations. For guidance on the relevant requirements refer to your regulator.

Note the Bat Conclusion Document includes Section 4, description of techniques, which has not been replicated in this document. Some foot notes in the tables within each Bat conclusion may refer to section 4. Please refer to the main BAT conclusion document for further information.

## OTHER RELEVANT BATC

Other BAT conclusions and reference documents which could be relevant for the activities covered by these BAT conclusions are the following:

Reference documents	Activity
Waste Incineration (WI)	Incineration of manure
Waste Treatment Industries (WT)	Composting and anaerobic digestion of manure
Monitoring of emissions from IED-installations (ROM)	Monitoring of emissions to air and water
Economics and Cross-media Effects (ECM)	Economics and cross-media effects of techniques
Emissions from Storage (EFS)	Storage and handling of materials
Energy Efficiency (ENE)	General aspects of energy efficiency
Food, Drink and Milk Industries (FDM)	Feed production

Where these BAT conclusions address manure storage and landspreading, this is without prejudice to the provisions of Council Directive 91/676/EEC<sup>1</sup> concerning the protection of waters against pollution caused by nitrates from agricultural sources.

Where these BAT conclusions address the storage and disposal of dead animals and manure processing and landspreading this is without prejudice to the provisions of EC Regulation 1069/2009<sup>2</sup> laying down health rules as regards animal by-products and derived products not intended for human consumption.

These BAT conclusions apply without prejudice to other relevant legislation, e.g. on animal welfare.

## GUIDANCE

The Medium Combustion Plant Directive (MCPD) will be relevant for the combustion of biomass (wood chip) with an individual capacity of >1 MW. For poultry litter biomass burners, as well as having an individual capacity of > 1MW, the MCPD will only apply to poultry litter burners with an aggregate capacity of <5 MW. Poultry litter is also regulated by the Animal By-Products Regulations.

## DEFINITIONS

For the purposes of these BAT conclusions, the following definitions apply:

Term used	Definition
Ad libitum	The provision of free access to feed or water thereby allowing the animal to self-regulate intake according to its biological needs
Animal Place	Space provided per animal in a housing system taking into account the maximum capacity of the plant
Conservation tillage	Any method of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop, to reduce soil erosion and run-off.
Existing farm	A farm which is not a new farm.
Existing plant	A plant which is not a new plant.
Farm	An installation as defined in Article 3(3) of Directive 2010/75/EU where pigs or poultry are reared.
Manure	Slurry and/or solid manure.
New farm	A farm first permitted following the publication of these BAT conclusions or a complete replacement of a farm following the publication of these BAT conclusions.
New plant	A plant first permitted at the site of the farm following the publication of these BAT conclusions or a complete replacement of a plant on the existing foundations, following the publication of these BAT conclusions.
Plant	A part of the farm where one of the following processes or activities is carried out: animal housing, manure storage, manure processing. A plant consists of a single building (or facility) and/or the necessary equipment to carry out processes or activities.
Sensitive receptor	Area which need special protection from nuisance, such as: <ul style="list-style-type: none"> <li>• Residential areas</li> <li>• Areas where human activities are carried out (e.g. schools, day care centres, recreational areas, hospitals or nursing homes)</li> <li>• Sensitive ecosystems/habitats</li> </ul>

<b>Term used</b>	<b>Definition</b>
Slurry	Faeces and urine mixed or not with some litter material and some water to give a liquid manure with a dry matter content up to about 10 % that flows under gravity and can be pumped.
Solid manure	Faeces or droppings and urine mixed or not with litter material that do not flow under gravity and cannot be pumped.
Total ammoniacal nitrogen	Ammonium-N (NH <sub>4</sub> -N) and its compounds, including uric acid, which are readily broken down to NH <sub>4</sub> -N.
Total nitrogen	Total nitrogen, expressed as N, includes free ammonia and ammonium (NH <sub>4</sub> -N), nitrites (NO <sub>2</sub> -N), nitrates (NO <sub>3</sub> -N) and organic nitrogen compounds.
Total nitrogen excreted	Total nitrogen eliminated from animal metabolic processes through urine and faeces.
Total phosphorus emissions	Total phosphorus, expressed as P <sub>2</sub> O <sub>5</sub> , includes all inorganic and organic phosphorus compounds, dissolved or bound to particles.
Total phosphorus excreted	Total phosphorus eliminated from animal metabolic processes through urine and faeces.
Waste water	Rainwater run-off commonly mixed with manure, water derived from the cleaning of surfaces (e.g. floors) and equipment, and water derived from the operation of air cleaning systems. This may also be referred to as soiled water.

Definitions for certain animal category's:

<b>Term used</b>	<b>Definition</b>
Breeders	Parent stock (males and females) kept to lay eggs for hatching.
Broilers	Chickens reared for meat production.
Broiler breeders	Parent stock (males and females) kept to lay eggs for broilers production.
Farrowing sows	Sows between the perinatal period and the weaning of the piglets.
Fattening pigs	Production pigs typically reared from a live weight of 30 kg to slaughter or first service. This category includes growers, finishers and gilts that have not been serviced.
Gestating sows	Pregnant sows, including gilts.

<b>Term used</b>	<b>Definition</b>
Laying hens	Grown female chickens for egg production after 16 to 20 weeks of age.
Mating sows	Sows ready for service and before gestation.
Pig	An animal of the porcine species of any age, kept for breeding or fattening.
Piglets	Pigs from birth to weaning.
Poultry	Fowl (chickens), turkeys, guinea fowl, ducks, geese, quails, pigeons, pheasants and partridges reared or kept in captivity for breeding, the production of meat or eggs for consumption, or for restocking supplies of game.
Pullets	Young chickens below the age for laying eggs. When reared for egg production a pullet becomes a laying hen when it begins to lay eggs at 16 to 20 weeks of age. When reared for breeding, young female and male chickens are defined as pullets until 20 weeks of age.
Sows	Female pigs during the rearing periods of mating, gestating and farrowing.
Weaners	Young pigs reared from weaning until fattening, typically reared from a live weight of around 8 kg to 30 kg.

### General considerations:

The techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection.

Unless otherwise stated, the BAT conclusions are generally applicable.

Unless otherwise stated, emission levels associated with the best available techniques (BAT-AELs) for emissions to air given in these BAT conclusions refer to the mass of substances emitted per animal place, for all rearing cycles carried out during one year (i.e. kg substance/animal place/year).

All values for concentrations expressed as mass of emitted substance per volume in air refer to standard conditions (dry gas at a temperature of 273.15 K, and a pressure of 101.3 kPa).

## **GUIDANCE**

### Definitions

**Animal Place:** The number of animals housed will be based on the physical capacity of the house. The maximum number of animals housed is specified in the permit. Where a shed has potential to house a larger number of animals, then numbers may need to be restricted to those in the permit by a physical restriction such as removal of water drinkers or feeders.

## Poultry

Breeders, broiler breeders and pullets are not subject to either the broiler or laying hen BAT-AELs, however narrative BAT will apply to all poultry.

## Laying Hens

Caged systems refers to enriched cage or colony systems.

Non-caged systems are housing systems that allow the birds to move freely within a barn and if appropriate a free-range area and includes:

- deep litter system, also referred to as the single-tier non-cage system or single level system; manure cleared infrequently.
- flat deck or single tier - a barn with a raised platform in the middle with nest boxes usually with belt removal for the eggs.
- aviary system also known as perchery, multi-tier or multilevel system, consisting of a ground floor with one or more perforated platforms.

## Pigs

Any pigs, other than those falling within the definition of sows (i.e. a female pig that has had her first litter and female pigs which have already been serviced, but have not yet farrowed), that weigh over 30kg (including gilts which have not been serviced) will be counted as production pigs for the purposes of calculating pig places and determining whether a farm is operating over the IPPC Directive/Environmental Permitting Regulation threshold.

## Slurry and Manure

The definition of slurry from the Silage, Slurry and Agricultural Fuel Oil Regulations (SSAFO)<sup>3</sup> is a liquid composed of a mixture of livestock excreta, bedding, rainwater and washings of a consistency that allows it to flow by gravity.

All slurry must be collected and contained. Infrastructure, for collecting and containing slurry (including reception pits, channels and pipework and storage), will be deemed BAT where it meets the requirements of SSAFO. This includes slurry infrastructure regardless of its age, and any date exemption within local regulations doesn't apply. Note that in England and Wales, slurry with a dry matter content of <1% can be stored in an uncovered reception pit/slurry store.

Waste water – Not a commonly used term in the UK. The term covers the following:

- Heavily contaminated site run-off – run-off from yard areas which animal have access to, and run off during periods of clean out and destocking. This must be treated as a slurry.

---

<sup>3</sup> The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England and Wales) Regulations 2010; The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland, Northern Ireland) Regulations 2003; The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (Northern Ireland) 2003.

- Wash water cleaning housing and yard areas will contain slurry and manure. This must be treated as a slurry.
- Lightly contaminated site run-off - run-off from roofs with ridge fans; yard areas which animals do not have access to or during periods outside clean-out or destocking. Note this will need some sort of interception such as soakaway or swale.
- Process effluent e.g. liquid used in an air cleaning system – the nature of the used process effluent will determine whether it needs to be treated as a slurry or a waste with any other specific treatment requirements.

Solid Manure - Solid manures include farmyard manure (FYM) and comprise material from straw-based housing systems, excreta with lots of straw/sawdust/woodchips in it, or solids from mechanical separators. Manure from housed livestock that does not flow under gravity, cannot be pumped but can be stacked in a freestanding heap without slumping.

### Sensitive Receptor

A sensitive receptor for human health is any location where people are likely to be regularly present for the time frame the objective is set (e.g. annual mean, or 24 hours). This will include, but is not limited to residential houses, gardens, including those associated with the installation.

A sensitive receptor for habitats includes all locally, nationally or internationally designated nature conservation sites, as well as proposed sites.

A sensitive receptor for noise and odour includes any location where people are likely to be regularly present and where the process could result in loss of amenity. This is unlikely to include onsite dwellings associated with the installation, but could do in some circumstances.

### Odour

The regulators have the remit to regulate odorous emissions (those which cause offence to human senses or interfere with amenity) from permitted sites. The regulators require that emissions from permitted sites are minimised by taking appropriate preventative measures and the use of BAT. This is in contrast to the role of the Local Authorities who regulate statutory nuisance under Part III of the EPA 1990, which is defined as odour arising from an installation which is prejudicial to health or a nuisance.

### New and existing farms and plant

Some of the BAT conclusions have different requirements for new farms and plant compared to existing farms and plant.

New Farm and New Plant. Defined as a farm or plant that is first permitted following the publication of the BAT conclusions on the 21<sup>st</sup> February 2017. The definition therefore applies to anything that is newly permitted rather than the date it was constructed or installed. Therefore it will apply to existing farms expanding above the threshold and applying for a permit for the first time even where the expansion doesn't require the construction of new housing.

The existing plant BAT-AEL and narrative BAT will apply to any existing housing permitted before 21<sup>st</sup> February 2017.

All new permits issued after the 21<sup>st</sup> February 2017, including those where there is a mixture of old and new housing, will need to meet the new plant narrative BAT and the BAT-AELs.

Operators who make a change to existing housing will need to ensure that the housing is compliant with BAT and BAT-AELs for new housing.

#### Derogation under IED (Article 15(4))

Where BAT Associated Emission Levels (AELs) are specified, operators will need to demonstrate that they can meet these AELs or provide sufficient technical and commercial information that allows the determination of a derogation under IED (Article 15(4)).

Where there is a BAT Associated Emission Level described in the BAT Conclusions Document, the operator will need to provide sufficient technical and commercial information to demonstrate that achieving these emissions levels would lead to disproportionately higher costs, compared to the environmental benefits, due to:

- the geographical location of the installation;
- the local environmental conditions around the installation;
- the technical characteristics of the installation.

Whilst this is an option, it is considered highly unlikely that new plant would be successful under a derogation application.

#### Equivalence

Operators must follow the BAT conclusions relevant to their facility, however they can use an alternative technique where they can demonstrate that it will provide a level of environmental protection that's equivalent to the BAT. The only exception is where a specific technique is described as not being BAT in the BAT Conclusions e.g. pig housing with deep slurry storage, without acidification. Equivalence for BAT housing will include demonstrating that monitoring ammonia emissions fall within the BAT-AEL range.

## 1 GENERAL BAT CONCLUSIONS

The sector-specific or process-specific BAT conclusions included in Sections 2 and 3 apply in addition to these general BAT conclusions.

### ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)

**BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:**

1. commitment of the management, including senior management;
2. definition, by the management, of an environmental policy that includes the continuous improvement of the installation by the management;
3. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;
4. implementation of procedures paying particular attention to:
  - (a) structure and responsibility;
  - (b) recruitment, training, awareness and competence;
  - (c) communication;
  - (d) employee involvement;
  - (e) documentation;
  - (f) effective process control;
  - (g) maintenance programmes;
  - (h) emergency preparedness and response;
  - (i) safeguarding compliance with environmental legislation;
5. checking performance and taking corrective action, paying particular attention to:
  - (a) monitoring and measurement (see also the Reference Report on Monitoring of emissions to Air and Water from IED-installations – ROM);
  - (b) corrective and preventive action;
  - (c) maintenance of records;
  - (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;
6. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management;
7. following the development of cleaner technologies;
8. consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life;
9. application of sectoral benchmarking (e.g. EMAS Sectoral Reference Document) on a regular basis.

Specifically for the intensive poultry or pig rearing sector, BAT is also to incorporate the following features in the EMS:
10. implementation of a noise management plan (see BAT 9);
11. implementation of an odour management plan (see BAT12)

#### Technical considerations relevant to applicability

The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) is related to the nature, scale and complexity of the farm, and the range of environmental impacts it may have.

## GUIDANCE

We expect that the operator will already have a documented set of procedures that describes what they do to minimise the risk of pollution from the activities covered by the permit covering each of the points listed in the BAT conclusion. For operators this will mean bringing together many of the records and plans. It will cover staff training, site maintenance, emergency procedures, site decommissioning and odour and noise management plans.

*There are however some new aspects which apply to all permitted farms:*

- Sectoral benchmarking to assess how the installation compares to benchmark figures for the sector as a whole. We will use the BAT-AELs as the benchmark figures for the sector. There is no additional action for the operator. They may refer to the EMAS sectoral reference document ([https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L\\_.2018.145.01.0001.01.ENG&toc=OJ:L:2018:145:TOC](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.145.01.0001.01.ENG&toc=OJ:L:2018:145:TOC)).
- Operators will need to have an environmental policy statement and management commitment. For further information on a template, note that some trade associations (AHDB Pork) plan to produce and publish template EMS documents for operators to use.
- Recognised environmental management system schemes or standards, such as ISO 14001 are optional. We expect the vast majority of farms to have their own system which is acceptable.
- External auditing is optional. The EMS will be checked and audited by the regulator (Environment Agency, NIEA, NRW, SEPA) or third party Certification Bodies in Wales or England where assurance schemes are operated.

## GOOD HOUSE KEEPING

**BAT 2. In order to prevent or reduce the environmental impact and improve overall performance, BAT is to use all the techniques given below.**

a	Proper location of the plant/farm and spatial arrangements of the activities in order to: <ul style="list-style-type: none"> <li>• reduce transport of animals and materials (including manure);</li> <li>• ensure adequate distances from sensitive receptors requiring protection;</li> <li>• take into account prevailing climatic conditions (e.g. wind and precipitation);</li> <li>• consider the potential future development capacity of the farm;</li> <li>• prevent the contamination of water.</li> </ul>	May not be generally applicable to existing plants/farms
b	Educate and train staff, in particular for: <ul style="list-style-type: none"> <li>• relevant regulations, livestock farming, animal health and welfare, manure management, worker safety;</li> <li>• manure transport and landspreading;</li> <li>• planning of activities;</li> <li>• emergency planning and management;</li> </ul>	Generally applicable.

	<ul style="list-style-type: none"> <li>• repair and maintenance of equipment.</li> </ul>	
c	<p>Prepare an emergency plan for dealing with unexpected emissions and incidents such as pollution of water bodies. This can include:</p> <ul style="list-style-type: none"> <li>• a plan of the farm showing the drainage systems and water/effluent sources;</li> <li>• plans of action for responding to certain potential events (e.g. fires, leaking or collapsing of slurry stores, uncontrolled run-off from manure heaps, oil spillages);</li> <li>• available equipment for dealing with a pollution incident (e.g. equipment for plugging land drains, damming ditches, scum boards for oil spillages).</li> </ul>	Generally applicable.
d	<p>Regularly check, repair and maintain structures and equipment, such as:</p> <ul style="list-style-type: none"> <li>• slurry stores for any sign of damage, degradation, leakage;</li> <li>• slurry pumps, mixers, separators, irrigators;</li> <li>• water and feed supply systems;</li> <li>• ventilation system and temperature sensors;</li> <li>• silos and transport equipment (e.g. valves, tubes);</li> <li>• air cleaning systems (e.g. by regular inspections).</li> </ul> <p>This can include cleanliness of the farm and pest management.</p>	Generally applicable.
e	Store dead animals in such a way as to prevent or reduce emissions.	Generally applicable.

## GUIDANCE

Some aspects of BAT 2a are considerations for the local planning authority (proper location of the farm and transport) rather than the regulators. The remaining aspects such as the impact of emissions on nearby receptors will be assessed during permit determination. Although this will not be always be relevant in reviewing existing permits issued prior to the publication of the BAT Conclusions in February 2017, regulators may choose to review impacts of emissions as part of the permit review process.

The aspects set out in BAT 2b-e are already required at existing permitted sites. In relation to BAT 2b, the regulators are not the competent authorities for animal health and welfare.

An accident management plan is already required at existing sites and should be updated to ensure all relevant points from the BAT Conclusions are included.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## NUTRITIONAL MANAGEMENT

**BAT 3.** In order to reduce total nitrogen excreted and consequently ammonia emissions while meeting the nutritional needs of the animals, BAT is to use a diet formulation and nutritional strategy which includes one or a combination of the techniques given below.

Technique <sup>(1)</sup>		Applicability
a	Reduce the crude protein content by using a N-balanced diet based on the energy needs and digestible amino acids.	Generally applicable.
b	Multiphase feeding with a diet formulation adapted to the specific requirements of the production period.	Generally applicable.
c	Addition of controlled amounts of essential amino acids to a low crude protein diet.	Applicability may be restricted when low-protein feedstuffs are not economically available. Synthetic amino acids are not applicable to organic livestock production.
d	Use of authorised feed additives which reduce the total nitrogen excreted.	Generally applicable.
<p>(1) A description of the techniques is given in Section 4.10.1. Information on the effectiveness of the techniques for ammonia emission reduction can be taken from recognised European or international guidance e.g. UNECE</p>		

**Table 1.1: BAT-associated total nitrogen excreted**

Parameter	Animal category	BAT-associated total nitrogen excreted <sup>(1)(2)</sup> (kg N excreted/animal place/year)
Total nitrogen excreted, expressed as N.	Weaners	1.5 – 4.0
	Fattening pigs	7.0 – 13.0
	Sows (including piglets)	17.0 – 30.0
	Laying hens	0.4 – 0.8
	Broilers	0.2 – 0.6
	Ducks	0.4 – 0.8
	Turkeys	1.0 – 2.3 <sup>(3)</sup>
<p>(1) The lower end of the range can be achieved by using a combination of techniques.  (2) The BAT-associated total nitrogen excreted is not applicable to pullets or breeders, for all poultry species.  (3) The upper end of the range is associated with the rearing of male turkeys.</p>		

The associated monitoring is in BAT 24. The BAT-associated total nitrogen excreted levels may not be applicable to organic livestock production and to the rearing of poultry species not indicated above.

## GUIDANCE

The BAT-AELs are given as a range. Operators will need to demonstrate their excretion rates are within the range, and calculate annually for each animal place (as set out in BAT 24).

Agricultural Industries Confederation (AIC) have developed a tool which will be available to operators to calculate N and P levels in excreta to demonstrate that they are compliant.

We will now require operators to report annually on their livestock excreta. There will be a new permit condition for operators in England, Scotland and Wales. In Northern Ireland, operators are already required to report annually on livestock manure movements.

Where the BAT-AEL is not met operators will be required to consider alternative or additional abatement which would enable them to meet the BAT-AEL.

Operators rearing pullets and breeders for all poultry species do not have to demonstrate compliance with this BAT-AEL.

For organic livestock, the BAT-AELs may not apply. The operator's ability to comply may be impeded due to feed restrictions in organic rearing. Operators should report the N Excretion for their organic livestock and in cases where the BAT-AELs for organic livestock are not met, the operators will need to provide a justification.

We consider the upper level of the range to be the appropriate limit for the sector.

Foot note 3 does not imply there is a lower BAT-AEL for hen turkeys, the upper end of the range is appropriate for hen turkeys.

The BAT-AELs for sows applies to Farrowers also.

We understand that most operators already optimise a nutritional strategy and are likely to be compliant with narrative BAT. This will be assessed on a case by case basis when operators submit their monitoring results.

**BAT 4. In order to reduce the total phosphorus excreted, while meeting the nutritional needs of the animals, BAT is to use a diet formulation and a nutritional strategy which includes one or a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	Multiphase feeding with a diet formulation adapted to the specific requirements of the production period.	Generally applicable.
b	Use of authorised feed additives which reduce the total phosphorus excreted (e.g. phytase).	Phytase may not be applicable in case of organic livestock production.

c	Use of highly digestible inorganic phosphates for the partial replacement of conventional sources of phosphorus in the feed.	Generally applicable within the constraints associated with the availability of highly digestible inorganic phosphates.
(1) A description of the techniques is given in Section 4.10.2.		

**Table 1.2: BAT-associated total phosphorus excreted**

Parameter	Animal category	BAT-associated total phosphorus excreted <sup>(1)(2)</sup> (kg P <sub>2</sub> O <sub>5</sub> excreted/animal place/year)
Total phosphorus excreted, expressed as P <sub>2</sub> O <sub>5</sub> .	Weaners	1.2 – 2.2
	Fattening pigs	3.5 – 5.4
	Sows (including piglets)	9.0 – 15.0
	Laying hens	0.10 - 0.45
	Broilers	0.05 - 0.25
	Turkeys	0.15 - 1.0
(1) The lower end of the range can be achieved by using a combination of techniques.		
(2) The BAT-associated total phosphorus excreted is not applicable to pullets or breeders, for all poultry species.		

The associated monitoring is in BAT 24. The BAT-associated total phosphorus excreted levels may not be applicable to organic livestock production and to the rearing of poultry species not indicated above.

## GUIDANCE

As set out in BAT 3

## EFFICIENT USE OF WATER

**BAT 5.** In order to use water efficiently, BAT is to use a combination of the techniques given below.

Technique	Applicability
a Keep a record of water use.	Generally applicable
b Detect and repair water leakages.	Generally applicable.
c Use high-pressure cleaners for cleaning animal housing and equipment.	Not applicable to poultry plants using dry cleaning systems.
d Select and use suitable equipment (e.g. nipple)	Generally applicable.

	drinkers, round drinkers, water troughs) for the specific animal category while ensuring water availability ( <i>ad libitum</i> ).	
e	Verify and (if necessary) adjust on a regular basis the calibration of the drinking water equipment.	Generally applicable.
f	Reuse uncontaminated rainwater as cleaning water.	May not be applicable to existing farms, due to high costs. Applicability may be restricted by biosecurity risks.

## GUIDANCE

The operator must use at least two of the techniques listed.

All regulators require operators to minimise the use of water and record usage. Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## EMISSIONS FROM WASTE WATER

**BAT 6. In order to reduce the generation of waste water, BAT is to use a combination of the techniques given below.**

	Technique <sup>(1)</sup>	Applicability
a	Keep the fouled yard areas as small as possible.	Generally applicable.
b	Minimise use of water.	Generally applicable.
c	Segregate uncontaminated rainwater from waste water streams that require treatment.	May not be applicable to existing farms.
(1) A description of the technique is given in Section 4.1.		

## GUIDANCE

The operator must use at least two of the techniques listed.

Most operators will keep the fouled yard areas as small as possible. Current practices require operators to minimise their use of water.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 7. In order to reduce emissions to water from waste water, BAT is to use one or a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	Drain waste water to a dedicated container or to a slurry store.	Generally applicable.
b	Treat waste water.	Generally applicable.
c	Landspreading of waste water e.g. by using an irrigation system such as sprinkler, travelling irrigator, tanker, umbilical injector.	Applicability may be restricted due to the limited availability of suitable land adjacent to the farm. Applicable only for waste water with a proven low level of contamination.
(1) A description of the technique is given in Section 4.1.		

## GUIDANCE

The operator must use at least one of the techniques listed, ensuring the technique is appropriate for that type of waste water.

Land spreading may not be appropriate for all types of waste water particularly waste water containing priority substances. Operators are required to have regard for the Groundwater Regulations<sup>4</sup>.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## EFFICIENT USE OF ENERGY

**BAT 8. In order to use energy efficiently in a farm, BAT is to use a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	High efficiency heating/cooling and ventilation systems.	May not be applicable to existing plants.
b	Optimisation of heating/cooling and ventilation systems and management, especially where air cleaning systems are used.	Generally applicable.
c	Insulation of the walls, floors and/or ceilings of animal housing.	May not be applicable to plants using natural ventilation. Insulation may not be applicable to existing plants due to structural restrictions.
d	Use of energy-efficient lighting.	Generally applicable.

<sup>4</sup> The Groundwater (England and Wales) Regulations 2009; The Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009; Groundwater Regulations (Northern Ireland) 2009

e	Use of heat exchangers. One of the following systems may be used: 1. air-air; 2. air-water; 3. air-ground.	Air-ground heat exchangers are only applicable when there is available space due to the need for a large soil surface.
f	Use of heat pumps for heat recovery.	The applicability of heat pumps based on geothermal heat recovery is limited when using horizontal pipes due to the need for space availability.
g	Heat recovery with heated and cooled littered floor (combideck system).	Not applicable to pig plants. Applicability depends on the possibility to install closed underground storage for the circulating water.
h	Apply natural ventilation.	Not applicable to plants with a centralised ventilation system. In pig plants, this may not be applicable to: <ul style="list-style-type: none"> <li>• housing systems with littered floors in warm climates;</li> <li>• housing systems without littered floors or without covered, insulated boxes (e.g. kennels) in cold climates.</li> </ul> In poultry plants, this may not be applicable: <ul style="list-style-type: none"> <li>• during the initial stage of rearing, apart from duck production;</li> <li>• due to extreme climate conditions.</li> </ul>
(1) A description of the technique is given in Section 4.3.		

## GUIDANCE

The operator must use at least two of the techniques listed. All regulators require operators to minimise the use of energy and use energy efficiently and record usage.

We are satisfied that existing practices at permitted farms in the UK are sufficient. Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

The UK has a temperate climate and the cold climate exemption does not apply.

## NOISE EMISSIONS

**BAT 9. In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to set up and implement a noise management plan, as part of the environmental management system (see BAT 1), that includes the following elements:**

- i. a protocol containing appropriate actions and timelines;
- ii. a protocol for conducting noise monitoring;
- iii. a protocol for response to identified noise events;
- iv. a noise reduction programme designed to e.g. identify the source(s), to monitor noise emissions, to characterise the contributions of the sources and to implement elimination and/or reduction measures;
- v. a review of historical noise incidents and remedies and the dissemination of noise incident knowledge.

## Applicability

BAT 9 is only applicable to cases where a noise nuisance at sensitive receptors is expected and/or has been substantiated.

## GUIDANCE

This BAT conclusion is applicable where noise nuisance is expected or has been substantiated.

SEPA require noise management plans for all farms. NRW only require noise management plans where complaints are substantiated. The Environment Agency and NIEA require operators to have a noise management plan where there are receptors within 400m of the installation, or where a noise complaint is substantiated. Operators are required to review their noise management plan.

SEPA require Noise management plans for all farms.

NRW only require noise management plans where complaints are substantiated.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 10. In order to prevent, or where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below.**

Technique <sup>(1)</sup>		Description	Applicability
a	Ensure adequate distances between the plant/farm and the sensitive receptors.	At the planning stage of the plant/farm, adequate distances between the plant/farm and the sensitive receptors are ensured by applying minimum standard distances.	May not be generally applicable to existing plants/farms.
b	Equipment location.	Noise levels can be reduced by: <ol style="list-style-type: none"> <li>i. increasing the distance between the emitter and the receiver (by locating equipment as far away as practicable from sensitive receptors);</li> <li>ii. minimising the length of feed delivery pipes;</li> <li>iii. Locating feed bins and feed silos so as to</li> </ol>	In the case of existing plants, the relocation of equipment may be restricted by the lack of space or excessive costs.

		minimise the movement of vehicles on the farm.	
c	Operational measures.	<p>These include measures, such as:</p> <ul style="list-style-type: none"> <li>i. closure of doors and major openings of the building, especially during feeding time, if possible;</li> <li>ii. equipment operation by experienced staff;</li> <li>iii. avoidance of noisy activities at night and during weekends, if possible;</li> <li>iv. provisions for noise control during maintenance activities;</li> <li>v. operate conveyers and augers full of feed, if possible;</li> <li>vi. keep outdoor scraped areas to a minimum in order to reduce noise from scraper tractors.</li> </ul>	Generally applicable.
d	Low-noise equipment.	<p>This includes equipment, such as:</p> <ul style="list-style-type: none"> <li>i. high efficiency fans, when natural ventilation is not possible or sufficient;</li> <li>ii. pumps and compressors;</li> <li>iii. feeding system which reduces the pre-feeding stimulus (e.g. holding hoppers, passive ad libitum feeders, compact feeders).</li> </ul>	<p>BAT 7.d.iii is only applicable to pig plants. Passive <i>ad libitum</i> feeders are only applicable when the equipment is new or replaced or when animals do not require a restricted feeding.</p>
e	Noise-control equipment.	<p>This includes:</p> <ul style="list-style-type: none"> <li>i. noise reducers;</li> <li>ii. vibration isolation;</li> <li>iii. enclosure of noisy equipment (e.g. mills, pneumatic conveyers);</li> <li>iv. soundproofing of buildings.</li> </ul>	<p>Applicability may be restricted due to space requirements, and health and safety issues. Not applicable to noise-absorbent materials impeding the effective cleaning of the plant.</p>
f	Noise abatement.	Noise propagation can be reduced by inserting obstacles between emitters and receivers.	May not be generally applicable due to biosecurity reasons.

## GUIDANCE

The operator must use at least one of the techniques listed.

We are satisfied that existing practices at permitted farms in the UK are sufficient. Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## DUST EMISSIONS

**BAT 11. In order to reduce dust emissions from each animal house, BAT is to use one or a combination of the techniques given below.**

	Technique <sup>(1)</sup>	Applicability
a	Reduce dust generation inside livestock buildings. For this purpose, a combination of the following techniques may be used:	
	1. Use coarser litter material (e.g. long straw or wood shavings rather than chopped straw);	Long straw is not applicable to slurry-based systems.
	2. Apply fresh litter using a low-dust littering technique (e.g. by hand);	Generally applicable.
	3. Apply <i>ad libitum</i> feeding;	Generally applicable.
	4. Use moist feed, pelleted feed or add oily raw materials or binders in dry feed systems;	Generally applicable.
	5. Equip dry feed stores which are filled pneumatically with dust separators;	Generally applicable.
	6. Design and operate the ventilation system with low air speed within the house.	Applicability may be limited by animal welfare considerations.
b	Reduce dust concentration inside housing by applying one of the following	

	1. Water fogging;	<p>Applicability may be restricted by the animal sensation of thermal decrease during fogging, in particular at sensitive stages of the animal's life, and/or for cold and humid climates.</p> <p>Applicability may be also restricted for solid manure systems at the end of the rearing period due to high ammonia emissions.</p>
	2. Oil spraying;	Only applicable to poultry plants with birds older than around 21 days. The applicability to plants for laying hens may be limited due to the risk of contamination of the equipment present in the shed.
	3. Ionisation.	May not be applicable to pig plants or to existing poultry plants due to technical and/or economic reasons.
c	Treatment of exhaust air by an air cleaning system, such as:	
	1. Water trap;	Only applicable to plants with a tunnel ventilation system.
	2. Dry filter;	Only applicable to poultry plants with a tunnel ventilation system.
	3. Water scrubber;	This technique may not be generally applicable due to the high implementation cost.
	4. Wet acid scrubber;	
	5. Bioscrubber (or biotrickling filter);	Applicable to existing plants only where a centralised ventilation system is used.
	6. Two-stage or three-stage air cleaning system;	
	7. Biofilter.	<p>Only applicable to slurry-based plants.</p> <p>A sufficient area outside the animal house is needed to accommodate the filter packages.</p> <p>This technique may not be generally applicable due to the high implementation cost.</p> <p>Applicable to existing plants only where a centralised ventilation system is used.</p>
(1) A description of the techniques is given in Sections 4.3 and 4.11.		

## GUIDANCE

The operator must use at least one of the techniques listed.

For all new applications (including applications to vary an existing permit) the Environment Agency, NRW and NIEA require a dust management plan where there are sensitive receptors located within 100 m of the installation.

SEPA require all applications with sensitive receptors within 250m to carry out a quantitative assessment of the predicted level of PM<sub>10</sub> using SCAIL agriculture. Any exceedances must be addressed by more detailed modelling.

Scotland has specific Air Quality Objectives for PM<sub>10</sub> that differ to the Air Quality Standards used across the rest of the UK and the EU.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## ODOUR EMISSIONS

**BAT 12. In order to prevent, or where that is not practicable, to reduce odour emissions from a farm, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes the following elements:**

- i. a protocol containing appropriate actions and timelines;
- ii. a protocol for conducting odour monitoring;
- iii. a protocol for response to identified odour nuisance;
- iv. an odour prevention and elimination programme designed to e.g. identify the source(s), to monitor odour emissions (see BAT 26), to characterise the contributions of the sources and to implement elimination and/or reduction measures;
- v. a review of historical odour incidents and remedies and the dissemination of odour incident knowledge.

The associated monitoring is in BAT 26.

### Applicability

BAT 12 is only applicable to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.

## GUIDANCE

SEPA and NRW require odour management plans for all permitted farms.

The Environment Agency and NIEA require an odour management plan where there are receptors within 400 m of the installation. Where there aren't any receptors within 400 m and an odour complaint is substantiated the operator is required to produce and implement an odour management plan. Operators are required to review their odour management plan.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 13. In order to prevent or, where that is not practicable, to reduce odour emissions and/or odour impact from a farm, BAT is to use a combination of the techniques given below.**

	<b>Technique <sup>(1)</sup></b>	<b>Applicability</b>
a	Ensure adequate distances between the farm/plant and the sensitive receptors.	May not be generally applicable to existing farms/plants.
b	<p>Use a housing system which implements one or a combination of the following principles:</p> <ul style="list-style-type: none"> <li>- keeping the animals and the surfaces dry and clean (e.g. avoid feed spillages, avoid dung in lying areas of partly slatted floors);</li> <li>- reducing the emitting surface of manure (e.g. use metal or plastic slats, channels with a reduced exposed manure surface);</li> <li>- removing manure frequently to an external (covered) manure store;</li> <li>- reducing the temperature of the manure (e.g. by slurry cooling) and of the indoor environment;</li> <li>- decreasing the air flow and velocity over the manure surface;</li> <li>- keeping the litter dry and under aerobic conditions in litter-based systems.</li> </ul>	<p>Decreasing the temperature of the indoor environment, the air flow and the velocity may not be applicable due to animal welfare considerations.</p> <p>Slurry removal by flushing is not applicable to pig farms located close to sensitive receptors due to odour peaks.</p> <p>See applicability for animal housing in BAT 30, BAT 31, BAT 32, BAT 33 and BAT 34.</p>
c	<p>Optimise the discharge conditions of exhaust air from the animal house by using one or a combination of the following techniques:</p> <ul style="list-style-type: none"> <li>- increasing the outlet height (e.g. exhaust air above roof level, stacks, divert air exhaust through the ridge instead of through the low part of the walls);</li> <li>- increasing the vertical outlet ventilation velocity;</li> <li>- effective placement of external barriers to create turbulence in the outgoing air flow (e.g. vegetation);</li> <li>- adding deflector covers in exhaust apertures located in low parts of walls in order to divert exhaust air towards the ground;</li> </ul>	Alignment of the ridge axis is not applicable to existing plants.

	<ul style="list-style-type: none"> <li>- dispersing the exhaust air at the housing side which faces away from the sensitive receptor;</li> <li>- aligning the ridge axis of a naturally ventilated building transversally to the prevailing wind direction.</li> </ul>	
d	<p>Use an air cleaning system, such as:</p> <ol style="list-style-type: none"> <li>1. Bioscrubber (or biotrickling filter);</li> <li>2. Biofilter;</li> <li>3. Two-stage or three-stage air cleaning system.</li> </ol>	<p>This technique may not be generally applicable due to the high implementation cost.</p> <p>Applicable to existing plants only where a centralised ventilation system is used.</p> <p>A biofilter is only applicable to slurry-based plants.</p> <p>For a biofilter, a sufficient area outside the animal house is needed to accommodate the filter packages.</p>
e	<p>Use one or a combination of the following techniques for storage of manure:</p>	
	<ol style="list-style-type: none"> <li>1. Cover slurry or solid manure during storage;</li> </ol>	<p>See applicability of BAT 16.b for slurry.</p> <p>See applicability of BAT 14.b for solid manure.</p>
	<ol style="list-style-type: none"> <li>2. Locate the store taking into account the general wind direction and/or adopt measures to reduce wind speed around and above the store (e.g. trees, natural barriers);</li> </ol>	<p>Generally applicable.</p>
	<ol style="list-style-type: none"> <li>3. Minimise stirring of slurry.</li> </ol>	<p>Generally applicable.</p>
f	<p>Process manure with one of the following techniques in order to minimise odour emissions during (or prior to) landspreading:</p>	
	<ol style="list-style-type: none"> <li>1. Aerobic digestion (aeration) of slurry;</li> </ol>	<p>See applicability of BAT 19.d.</p>
	<ol style="list-style-type: none"> <li>2. Compost solid manure;</li> </ol>	<p>See applicability of BAT 19.f.</p>
	<ol style="list-style-type: none"> <li>3. Anaerobic digestion.</li> </ol>	<p>See applicability of BAT 19.b.</p>
g	<p>Use one or a combination of the following techniques for manure landspreading:</p>	
	<ol style="list-style-type: none"> <li>1. Band spreader, shallow injector or deep injector for slurry landspreading;</li> </ol>	<p>See applicability of BAT 21.b, BAT 21.c or BAT 21.d.</p>
	<ol style="list-style-type: none"> <li>2. Incorporate manure as soon as possible.</li> </ol>	<p>See applicability of BAT 22.</p>

(1) A description of the techniques is given in Sections 4.4 and 4.11.

## GUIDANCE

The operator must use at least two of the techniques listed.

A – Applies at the permitting decision stage.

The operator must ensure day-to-day activities at the site are carried out to help minimise odour emissions.

The location of a permitted farm and the potential impact of emissions on nearby receptors, and the use of appropriate measures is assessed during the determination of a permit application. Where a substantiated odour complaint is received the operator will be required to submit an odour management plan to their regulator (if they are not already required to have one) or be required to review and update their odour management plan and implement appropriate measures to minimise the risk of odour pollution.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## EMISSIONS FROM SOLID MANURE STORAGE

**BAT 14. In order to reduce ammonia emissions to air from the storage of solid manure, BAT is to use one or a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	Reduce the ratio between the emitting surface area and the volume of the solid manure heap.	Generally applicable.
b	Cover solid manure heaps.	Generally applicable when solid manure is dried or pre-dried in animal housing. May not be applicable to not dried solid manure in case of frequent addition to the heap.
c	Store dried solid manure in a barn.	Generally applicable.
(1) A description of the techniques is given in Section 4.5.		

## GUIDANCE

The operator must use at least one of the techniques listed.

We interpret dried solid manure to mean solid manure, and that dried does not imply any additional processing.

This BAT conclusion reflects current practices at UK permitted farms. Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

For all longer term storage all regulators require new manure storage to be covered.

This BAT conclusion also applies to temporary manure heaps stored within the permit boundary, where technique A is likely to be applicable.

**BAT 15. In order to prevent, or where that is not practicable, to reduce emissions to soil and water from the storage of solid manure, BAT is to use a combination of the techniques given below in the following order of priority.**

Technique <sup>(1)</sup>		Applicability
a	Store dried solid manure in a barn.	Generally applicable
b	Use a concrete silo for storage of solid manure.	Generally applicable.
c	Store solid manure on solid impermeable floor equipped with a drainage system and a collection tank for the run-off.	Generally applicable
d	Select a storage facility with a sufficient capacity to hold the solid manure during periods in which landspreading is not possible.	Generally applicable.
e	Store solid manure in field heaps placed away from surface and/or underground watercourses which liquid run-off might enter.	Only applicable to temporary field heaps which change location each year.
(1) A description of the techniques is given in Section 4.5.		

## GUIDANCE

The operator must use at least two of the techniques listed.

All manure storage within the permitted farm yard area must have an impermeable base and provide a collection and containment system for liquid run-off.

For new sites, we expect the operator to store solid manure in a barn or covered silo. Where applications contain alternative proposals they must provide a justification for not covering the store.

Note that other rules may also be applicable such as SSAFO, NVZs, controlled substances and Farming Rules for Water. This BAT conclusion reflects current practices. Some straw based pig farms and layer farms store manure on site.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

### EMISSIONS FROM SLURRY STORAGE

**BAT 16. In order to reduce ammonia emissions to air from a slurry store, BAT is to use a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	Appropriate design and management of the slurry store by using a combination of the following techniques:	
	1. Reduce the ratio between the emitting surface area and the volume of the slurry store;	May not be generally applicable to existing stores. Excessively high slurry stores may not be applicable due to increased costs and safety risks.
	2. Reduce wind velocity and air exchange on the slurry surface by operating the store at a lower level of fill;	May not be generally applicable to existing stores.
	3. Minimise stirring of slurry.	Generally applicable.
b	Cover the slurry store. For this purpose, one of the following techniques may be used:	
	1. Rigid cover;	May not be applicable to existing plants due to economic considerations and structural limitations to withstand the extra load.
	2. Flexible covers;	Flexible covers are not applicable to areas where prevailing weather conditions can compromise their structure.
	3. Floating covers such as: <ul style="list-style-type: none"> <li>- plastic pellets;</li> <li>- light bulk materials;</li> <li>- floating flexible covers;</li> <li>- geometrical plastic tiles;</li> <li>- air-inflated cover;</li> <li>- natural crust;</li> <li>- straw.</li> </ul>	The use of plastic pellets, light bulk materials and geometrical plastic tiles is not applicable to naturally crusting slurries. Agitation of the slurry during stirring, filling and emptying may preclude the use of some floating materials which may cause sedimentation or blockages in the pumps. Natural crust formation may not be applicable to cold climates

		and/or to slurry with low dry matter content. Natural crust is not applicable to stores where stirring, filling and/or discharging of slurry renders the natural crust unstable.
c	Slurry acidification.	Generally applicable.
(1) A description of the techniques is given in Sections 4.6.1 and 4.12.3.		

## GUIDANCE

Operators must use technique a, and either b or c.

Operators must have an appropriately designed slurry store and cover it. Some operators may choose to acidify their slurry instead of covering their store.

All slurry stores should already be covered, or should be working towards covering them by February 2021. The Environment Agency required that slurry stores to be covered by 2020.

Where the farm is using an acidification system they no longer need to cover their slurry store.

Note: straw (b3) will not always be practical as it may cause blockages.

Note: a natural crust (b3) can only be used where an operator can demonstrate that a crust has formed and needs to have sufficient dry matter content. To ensure that a crust will achieve the desired reduction in ammonia emissions the operator should incorporate within their management system the necessary techniques to ensure the formation of a natural crust and its maintenance.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 17. In order to reduce ammonia emissions to air from an earth-banked slurry store (lagoon), BAT is to use a combination of the techniques given below.**

Technique (1)		Applicability
a	Minimise stirring of the slurry.	Generally applicable.
b	Cover the earth-banked slurry store (lagoon) with a flexible and/or floating cover such as: <ul style="list-style-type: none"> <li>flexible plastic sheets;</li> <li>light bulk materials;</li> <li>natural crust;</li> <li>straw.</li> </ul>	Plastic sheets may not be applicable to large existing lagoons due to structural reasons. Straw and light bulk materials may not be applicable to large lagoons where wind drift does not permit the lagoon surface to be kept fully covered. The use of light bulk materials is not applicable to naturally crusting slurries. Agitation of the slurry during stirring, filling and emptying may

		<p>preclude the use of some floating materials which may cause sedimentation or blockages in the pumps.</p> <p>Natural crust formation may not be applicable to cold climates and/or to slurry with low dry matter content.</p> <p>Natural crust is not applicable to lagoons where stirring, filling and/or discharging of slurry renders the natural crust unstable.</p>
(1) A description of the techniques is given in Section 4.6.1.		

## GUIDANCE

Operators must use technique a and b.

See additional guidance in BAT 16.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 18. In order to prevent emissions to soil and water from slurry collection, piping, and from a store and/or an earth-banked storage (lagoon), BAT is to use a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	Use stores that are able to withstand mechanical, chemical and thermal influences.	Generally applicable.
b	Select a storage facility with a sufficient capacity to hold the slurry during periods in which landspreading is not possible.	Generally applicable.
c	Construct leak-proof facilities and equipment for collection and transfer of slurry (e.g. pits, channels, drains, pump stations).	Generally applicable.
d	Store slurry in earth-banked stores (lagoons) with an impermeable base and walls e.g. with clay or plastic lining (or double-lined).	Generally applicable to lagoons.
e	Install a leakage detection system, e.g. consisting of a geomembrane, a drainage layer and a drainage pipe system.	Only applicable to new plants.

f	Check structural integrity of stores at least once every year.	Generally applicable.
(1) A description of the techniques is given in Section 3.1.1 and 4.6.2.		

## GUIDANCE

The operator must use at least two of the techniques listed.

The requirement for a leak detection system on a slurry store will depend on the sensitivity of the location of the store. Applicants should check during pre-application discussions. Good practice, generally required in for high risk areas, is set out in CIRIA 126 (updated to 759a).

We are satisfied that current practices and requirements of existing permits meet the requirements of this BAT conclusion and we do not need additional information from individual operators.

It is BAT to follow SSAFO requirements, and NVZ requirements. All existing slurry infrastructure on a permitted farm must be BAT regardless of its age.

## ON FARM PROCESSING OF MANURE

**BAT 19. If on-farm processing of manure is used, in order to reduce emissions of nitrogen, phosphorus, odour and microbial pathogens to air and water and facilitate manure storage and/or landspreading, BAT is to process the manure by applying one or a combination of the techniques given below.**

Technique <sup>(1)</sup>		Applicability
a	Mechanical separation of slurry. This includes e.g.: <ul style="list-style-type: none"> <li>• Screw press separator;</li> <li>• Decanter-centrifuge separator;</li> <li>• Coagulation- Flocculation;</li> <li>• Separation by sieves;</li> <li>• Filter pressing.</li> </ul>	Only applicable when: <ul style="list-style-type: none"> <li>- a reduction of nitrogen and phosphorus content is needed due to limited available land for manure application;</li> <li>- manure cannot be transported for landspreading at a reasonable cost.</li> </ul> The use of polyacrylamide as a flocculant may not be applicable due to the risk of acrylamide formation.
b	Anaerobic digestion of manure in a biogas installation.	This technique may not be generally applicable due to the high implementation cost.
c	Use of an external tunnel for manure drying.	Only applicable to manure from plants for laying hens. Not applicable to existing plants without manure belts.
d	Aerobic digestion (aeration) of slurry.	Only applicable when pathogen and odour reduction is important prior to landspreading. In cold climates, it may be difficult to maintain the

		required level of aeration during winter.
e	Nitrification-denitrification of slurry.	Not applicable to new plants/farms. Only applicable to existing plants/farms when the removal of nitrogen is necessary due to limited available land for manure application.
f	Composting of solid manure.	Only applicable when: - manure cannot be transported for landspreading at a reasonable cost; - pathogen and odour reduction is important prior to landspreading; - there is enough space in the farm for windrows to be established.
(1) A description of the techniques is given in Section 4.7		

## GUIDANCE

The operator must use at least one of the techniques listed.

On farm means on site within the permitted boundary.

Note most farms will not have on site processing and so this BAT conclusion will not be relevant.

The UK is in a temperate climate and the cold climate restriction does not apply.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## 1.13 MANURE LANDSPREADING

**BAT 20. In order to prevent or, where that is not practicable, to reduce emissions of nitrogen, phosphorus and microbial pathogens to soil and water from manure landspreading, BAT is to use all the techniques given below.**

Technique	
a	Assess the manure receiving land to identify risks of run-off, taking into account: <ul style="list-style-type: none"> <li>• soil type, conditions and slope of the field;</li> <li>• climatic conditions;</li> <li>• field drainage and irrigation;</li> <li>• crop rotations;</li> <li>• water resources and water protected zones.</li> </ul>
b	Keep sufficient distance between manure spreading fields (leaving an untreated strip of land) and: <ol style="list-style-type: none"> <li>1. areas where there is a risk of run-off to water such as watercourses, springs, boreholes, etc.;</li> <li>2. neighbouring properties (including hedges).</li> </ol>

c	Avoid manure spreading when the risk of run-off can be significant. In particular, manure is not applied when: 1. the field is flooded, frozen or snow-covered; 2. soil conditions (e.g. water saturation or compaction) in combination with the slope of the field and/or field drainage are such that the risk of run-off or drainage is high; 3. run-off can be anticipated according to expected rainfall events.
d	Adapt the manure landspreading rate taking into account the nitrogen and phosphorus content of the manure and taking into account the characteristics of the soil (e.g. nutrient content), the seasonal crop requirements and weather or field conditions that could cause run-off.
e	Synchronize manure landspreading with the nutrient demand of crops.
f	Check the spreading fields at regular intervals to identify any sign of run-off and properly respond when necessary.
g	Ensure adequate access to the manure store and that loading of manure can be done effectively without spillage.
h	Check that machinery for manure landspreading is in good working order and set at the proper application rate.

## GUIDANCE

Individual member states all have different approaches to regulation of landspreading and it is not always regulated within the EPR permitting regime. Landspreading is subject to other regulatory constraints, such as the Nitrates Directive and the Water Framework Directive.

BAT conclusions 20 to 22 only apply to on-farm processes or activities i.e. a farm installation and any directly associated activities (DAA). BAT 20 to 22 are only considered to be relevant where spreading is carried out on the farm within the installation boundary and where it is a DAA. Slurry/manure spreading is unlikely to be a DAA except where a farmer always spreads the slurry on land which is used to grow crops which are used to produce feed for livestock on the installation. Such circumstances will rarely exist. If the circumstances do occur the operator must use all of the techniques listed.

The current requirements for manure/slurry management in each country will continue to be relevant.

In Northern Ireland operators are required (a) at the application stage to demonstrate that environmentally sustainable outlets are in place for the utilisation of manures produced from the farm and (b) to ensure appropriate records are kept to demonstrate compliance with permit conditions, for example, maintaining up-to-date nutrient management plans and associated soil testing.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 21. In order to reduce ammonia emissions to air from slurry landspreading, BAT is to use one or a combination of the techniques given below.**

	Technique <sup>(1)</sup>	Applicability
--	--------------------------	---------------

a	Slurry dilution, followed by techniques such as low-pressure water irrigation system.	Not applicable to crops grown to be eaten raw due to the risk of contamination.  Not applicable when the soil type does not allow rapid infiltration of dilute slurry into the soil.  Not applicable when crops do not require irrigation.
b	Band spreader, by applying one of the following techniques:  1. Trailing hose;  2. Trailing shoe.	Applicability may be limited when the straw content of the slurry is too high or when the dry matter content of the slurry is higher than 10 %.  Trailing shoe is not applicable to growing solid-seeded arable crops.
c	Shallow injector (open slot).	Not applicable on stony, shallow or compacted soil where it is difficult to achieve a uniform penetration.  Applicability may be limited where crops may be damaged by machinery.
d	Deep injector (closed slot).	Not applicable on stony, shallow or compacted soil where it is difficult to achieve a uniform penetration and an effective slit closure.  Not applicable during the vegetation of the crops. Not applicable on grassland, unless changing to arable land or when reseeding.
e	Slurry acidification.	Generally applicable.
(1) A description of the techniques is given in Sections 4.8.1 and 4.12.3.		

## GUIDANCE

As set out in BAT 20, BAT conclusions 20 to 22 only apply to on-farm processes or activities i.e. a farm installation and any directly associated activities (DAA). BAT 20 to 22 are only considered to be relevant where spreading is carried out on the farm within the installation boundary and where it is a DAA. Slurry/manure spreading is unlikely to be a DAA except where a farmer always spreads the slurry on land which is used to grow crops which are used to produce feed for livestock on the installation. Such circumstances will rarely exist. If the circumstances do occur the operator must use at least one of the techniques listed.

In Northern Ireland, although there is no restriction for the majority of farms on how slurry produced from a PPC regulated farm is spread, operators are required to demonstrate that the land has the capacity to take the nutrients in their nutrient management plan, which is

updated every 4 years.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 22. In order to reduce ammonia emissions to air from manure landspreading, BAT is to incorporate the manure into the soil as soon as possible.**

### Description

Incorporation of manure spread on the soil surface is done by either ploughing or using other cultivation equipment, such as tines or disc harrows, depending on the soil type and conditions. Manure is completely mixed with soil or buried.

Solid manure spreading is carried out by a suitable spreader (e.g. rota-spreader, rear discharge spreader, dual-purpose spreader). Slurry landspreading is carried out according to BAT 21.

### Applicability

Not applicable to grassland and conservation tillage, unless changing to arable land or when reseeded. Not applicable to cultivated land with crops that can be damaged by the incorporation of manure. Incorporation of slurry is not applicable after landspreading using shallow or deep injectors.

**Table 1.3: BAT-associated time delay between manure landspreading and incorporation into the soil**

Parameter	BAT-associated time delay between manure landspreading and incorporation into the soil (hours)
Time	0 <sup>(1)</sup> – 4 <sup>(2)</sup>
(1) The lower end of the range corresponds to immediate incorporation. (2) The upper end of the range can be up to 12 hours when conditions are not favourable for a faster incorporation, e.g. when human and machinery resources are not economically available.	

## GUIDANCE

As set out in BAT 20. Where manure is spread under a permit it must be incorporated within the time specified in the BAT-AEL and if appropriate foot note 2.

In most cases, footnote 2 will be applicable. This is a change, as historic requirement set out in guidance allowed for a 24 hour time delay. The new requirement will be for a maximum time delay of 12 hours.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

## EMISSIONS FROM THE WHOLE PRODUCTION PROCESS

**BAT 23. In order to reduce ammonia emissions from the whole production process for the rearing of pigs (including sows) or poultry, BAT is to estimate or calculate the reduction of ammonia emissions from the whole production process using the BAT implemented on the farm.**

## GUIDANCE

No additional requirement for operators. Operators will be required to report they are meeting the BAT-AELs annually which will suffice.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion in so far as they will have reduced ammonia emissions compared to those they would have produced had they not have implemented BAT.

## MONITORING OF EMISSIONS AND PROCESS PARAMETERS

**BAT 24. BAT is to monitor the total nitrogen and total phosphorus excreted in manure using one of the following techniques with at least the frequency given below.**

	<b>Technique<sup>(1)</sup></b>	<b>Frequency</b>	<b>Applicability</b>
a	Calculation by using a mass balance of nitrogen and phosphorus based on the feed intake, crude protein content of the diet, total phosphorus and animal performance.	Once every year for each animal category.	Generally applicable.
b	Estimation by using manure analysis for total nitrogen and total phosphorus content.		
(1) A description of the techniques is given in Section 4.9.1.			

## GUIDANCE

The regulators will implement a permit condition of meet this requirement. Operators will be required to report annually. See additional information in guidance on BAT 3.

**BAT 25. BAT is to monitor ammonia emissions to air using one of the following techniques with at least the frequency given below.**

	<b>Technique<sup>(1)</sup></b>	<b>Frequency</b>	<b>Applicability</b>
a	Estimation by using a mass balance based on the excretion and the total (or total ammoniacal) nitrogen present at each manure management stage.	Once every year for each animal category.	Generally applicable.

b	Calculation by measuring the ammonia concentration and the ventilation rate using ISO, national or international standard methods or other methods ensuring data of an equivalent scientific quality.	Every time there are significant changes to at least one of the following parameters:  (a) the type of livestock reared at the farm;  (b) the housing system.	Only applicable to emissions from each animal house.  Not applicable to plants with an air cleaning system installed. In this case, BAT 28 applies.  Due to the cost of measurements, this technique may not be generally applicable.
c	Estimation by using emission factors.	Once every year for each animal category.	Generally applicable.
(1) A description of the techniques is given in Section 4.9.2.			

## GUIDANCE

We expect most operators to use national emission factors, which is already a requirement under the annual Pollution Inventory (PI) or Emissions Inventory reporting.

This will require a new permit condition and a new requirement for annual reporting, although it should not represent a new requirement for operators as they should already be submitting Pollution Inventory returns.

### **BAT 26. BAT is to periodically monitor odour emissions to air.**

#### **Description**

Odour emissions can be monitored by using:

- EN standards (e.g. by using dynamic olfactometry according to EN 13725 in order to determine odour concentration).
- When applying alternative methods for which no EN standards are available (e.g. measurement/estimation of odour exposure, estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality can be used.

#### **Applicability**

BAT 26 is only applicable to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.

## GUIDANCE

Routine monitoring is not expected in most cases, as we would expect the odour management plan to minimise and prevent any odour pollution. Odour monitoring (e.g. subjective 'sniff testing') will therefore only be expected and required on a site specific basis.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 27. BAT is to monitor dust emissions from each animal house using one of the following techniques with at least the frequency given below.**

Technique <sup>(1)</sup>		Frequency	Applicability
a	Calculation by measuring the dust concentration and the ventilation rate using EN standard methods or other methods (ISO, national or international) ensuring data of an equivalent scientific quality.	Once every year.	Only applicable to dust emissions from each animal house. Not applicable to plants with an air cleaning system installed. In this case, BAT 28 applies. Due to the cost of measurements, this technique may not be generally applicable.
b	Estimation by using emission factors.	Once every year.	Due to the cost of establishing emissions factors, this technique may not be generally applicable.

(1) A description of the techniques is given in Sections 4.9.1 and 4.9.2

## GUIDANCE

For poultry this is reported annually in the emissions inventory or pollution inventory reporting. We will be expanding this requirement for the pig sector.

**BAT 28. BAT is to monitor ammonia, dust and/or odour emissions from each animal house equipped with an air cleaning system by using all of the following techniques with at least the frequency given below.**

Technique <sup>(1)</sup>		Frequency	Applicability
a	Verification of the air cleaning system performance by measuring ammonia, odour and/or dust under practical farm conditions and according to a prescribed	Once	Not applicable if the air cleaning system has been verified in combination with a similar housing system and operating conditions.

	measurement protocol and using EN standard methods or other methods (ISO, national or international) ensuring data of an equivalent scientific quality.		
b	Control of the effective function of the air cleaning system (e.g. by continuously recording operational parameters or using alarm systems).	Daily	Generally applicable.
(1) A description of the techniques is given in Section 4.9.3.			

## GUIDANCE

Note this is only applicable where an air scrubber or cleaning system is in place. Verification documents are already required during permit determination. Process parameters listed are already likely to be included in permits.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

**BAT 29. BAT is to monitor the following process parameters at least once every year.**

	Parameter	Description	Applicability
a	Water consumption.	Recording using e.g. suitable meters or invoices. The main water-consuming processes in animal houses (cleaning, feeding, etc.) can be monitored separately.	Monitoring the main water-consuming processes separately may not be applicable to existing farms, depending on the configuration of the water supply network.
b	Electric energy consumption.	Recording using e.g. suitable meters or invoices. Electricity consumption of animal houses is monitored separately from other plants in the farm. The main energy-consuming processes in animal houses (heating, ventilation, lighting, etc.) can be monitored separately.	Monitoring the main energy-consuming processes separately may not be applicable to existing farms, depending on the configuration of the energy supply network.

c	Fuel consumption.	Recording using e.g. suitable meters or invoices.	Generally applicable.
d	Number of incoming and outgoing animals, including births and deaths when relevant.	Recording using e.g. existing registers.	
e	Feed consumption.	Recording using e.g. invoices or existing registers.	
f	Manure generation.	Recording using e.g. existing registers.	

## GUIDANCE

Operators should continue to record this information and this will be checked at compliance.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

SEPA don't currently require recording of livestock numbers annually, and this will now be required. SEPA will expect all this information to be recorded as part of the Resource Utilisation standard permit condition.

## 2 BAT CONCLUSIONS FOR THE INTENSIVE REARING OF PIGS

### AMMONIA EMISSIONS FROM PIG HOUSES

**BAT 30. In order to reduce ammonia emissions to air from each pig house, BAT is to use one or a combination of the techniques given below.**

	Technique (1)	Animal category	Applicability
a	One of the following techniques, which apply one or a combination of the following principles: i) reduce the ammonia emitting surface; ii) increase the frequency of slurry (manure) removal to external storage; iii) separate urine from faeces; iv) keep litter clean and dry.		

	0. A deep pit (in case of a fully or partly slatted floor) only if used in combination with an additional mitigation measure, e.g.: - a combination of nutritional management techniques; - air cleaning system; - pH reduction of the slurry; - slurry cooling.	All pigs	Not applicable to new plants, unless a deep pit is combined with an air cleaning system, slurry cooling and/or pH reduction of the slurry.
	1. A vacuum system for frequent slurry removal (in case of a fully or partly slatted floor).	All pigs	May not be generally applicable to existing plants due to technical and/or economic considerations.
	2. Slanted walls in the manure channel (in case of a fully or partly slatted floor).	All pigs	
	3. A scraper for frequent slurry removal (in case of a fully or partly slatted floor).	All pigs	
	4. Frequent slurry removal by flushing (in case of a fully or partly slatted floor).	All pigs	May not be generally applicable to existing plants due to technical and/or economic considerations. When the liquid fraction of the slurry is used for flushing, this technique may not be applicable to farms located close to sensitive receptors due to odour peaks during flushing.
	5. Reduced manure pit (in case of a partly slatted floor).	Mating and gestating sows	May not be generally applicable to existing plants due to technical and/or economic considerations.
		Fattening pigs	
	6. Full litter system (in case of a solid concrete floor).	Mating and gestating sows	Solid manure systems are not applicable to new plants unless it can be justified for animal welfare reasons. May not be applicable to naturally ventilated plants located in warm climates and to existing plants with forced ventilation for weaners and fattening pigs. BAT 30.a7 may require large space availability.
		Weaners	
		Fattening pigs	
a	7. Kennel/hut housing (in case of a partly slatted floor).	Mating and gestating sows	
		Weaners	
		Fattening pigs	
	Weaners		

	8. Straw flow system (in case of a solid concrete floor).	Fattening pigs	
	9. Convex floor and separated manure and water channels (in case of partly slatted pens).	Weaners Fattening pigs	May not be generally applicable to existing plants due to technical and/or economic considerations.
	10. Littered pens with combined manure generation (slurry and solid manure).	Farrowing sows	
	11. Feeding/lying boxes on solid floor (in case of litter-based pens).	Mating and gestating sows	Not applicable to existing plants without solid concrete floors.
	12. Manure pan (in case of a fully or partly slatted floor).	Farrowing sows	Generally applicable.
	13. Manure collection in water.	Weaners Fattening pigs	May not be generally applicable to existing plants due to technical and/or economic considerations
	14. V-shaped manure belts (in case of partly slatted floor).	Fattening pigs	
	15. A combination of water and manure channels (in case of a fully slatted floor).	Farrowing sows	
	16. Littered external alley (in case of a solid concrete floor).	Fattening pigs	Not applicable to cold climates. May not be generally applicable to existing plants due to technical and/or economic considerations.
b	Slurry cooling.	All pigs	Not applicable when: - heat reuse is not possible; - litter is used.
c	Use of an air cleaning system, such as: 1. Wet acid scrubber; 2. Two-stage or three-stage air cleaning system; 3. Bioscrubber (or biotrickling filter).	All pigs	May not be generally applicable due to the high implementation cost. Applicable to existing plants only where a centralised ventilation system is used.
d	Slurry acidification.	All pigs	Generally applicable.
e	Use of floating balls in the manure channel.	Fattening pigs	Not applicable to plants equipped with pits that have slanted walls and to plants that apply slurry removal by flushing.
(1) A description of the techniques is given in Sections 4.11 and 4.12.			

**Table 2.1: BAT-AEL for ammonia emissions to air from each pig house**

Parameter	Animal category	BAT-AEL (1) (kg NH <sub>3</sub> /animal place/year)
Ammonia expressed as NH <sub>3</sub>	Mating and gestating sows	0.2 – 2.7 (2) (3)
	Farrowing sows (including piglets) in crates	0.4 – 5.6 (4)
	Weaners	0.03 – 0.53 (5) (6)
	Fattening pigs	0.1 – 2.6 (7) (8)
<p>(1) The lower end of the range is associated with the use of an air cleaning system.</p> <p>(2) For existing plants using a deep pit in combination with nutritional management techniques, the upper end of the BAT -AEL is 4.0 kg NH<sub>3</sub>/animal place/year.</p> <p>(3) For plants using BAT 30.a6, 30.a7 or 30.a11, the upper end of the BAT -AEL is 5.2 kg NH<sub>3</sub>/animal place/year.</p> <p>(4) For existing plants using BAT 30.a0 in combination with nutritional management techniques, the upper end of the BAT -AEL is 7.5 kg NH<sub>3</sub>/animal place/year.</p> <p>(5) For existing plants using a deep pit in combination with nutritional management techniques, the upper end of the BAT -AEL is 0.7 kg NH<sub>3</sub>/animal place/year.</p> <p>(6) For plants using BAT 30.a6, 30.a7 or 30.a8, the upper end of the BAT -AEL is 0.7 kg NH<sub>3</sub>/animal place/year.</p> <p>(7) For existing plants using a deep pit in combination with nutritional management techniques, the upper end of the BAT -AEL is 3.6 kg NH<sub>3</sub>/animal place/year.</p> <p>(8) For plants using BAT 30.a6, 30.a7, 30.a8 or 30.a16, the upper end of the BAT -AEL is 5.65 kg NH<sub>3</sub>/animal place/year.</p>		

**The BAT-AELs may not be applicable to organic livestock production. The associated monitoring is in BAT 25.**

## GUIDANCE

'One or a combination' means one or more.

BAT-AEL's are legally binding therefore an applicant must meet these levels. An operator can demonstrate that they are meeting the objective of BAT 30 by the use of the techniques in the BREF and achieving the BAT-AELs or by demonstrating the method used produces an equivalent level of protection. They are likely to need to demonstrate equivalence through emissions monitoring to show they are compliant with the BAT-AEL's.

Vacuum system could mean a trailer and vacuum pump or sluice based system.

Deep pit a(0): - houses where slurry is stored and slurry removed infrequently. The depth of the pit is greater than 800 mm (excluding freeboard of up to 300 mm). Deep pit will only be acceptable for new plant if combined with an air cleaning system, slurry cooling and/or pH reduction/acidification of the slurry. Existing deep pit housing will not be required to change.

Shallow pit systems will be of a depth which enables frequent slurry removal, where slurry is removed and stored in a separate storage facility. Pits with a depth of up to 800 mm (excluding 300 mm of freeboard) are considered shallow pit.

For gravity fed vacuum removal to successfully remove slurry from the system, a minimum depth of 500 mm is required but an optimal depth is 800mm. Vacuum systems can be passive gravity fed. The speed at which a pit will fill varies depending on the weight of the pigs and their stocking densities, but is likely to be every 2 – 8 weeks.

Ammonia emissions can be reduced by a reported 25% through frequent and complete vacuum-assisted drainage of slurry from the floor of the pit (TFRN, Options for Ammonia Mitigation - Guidance from the UNECE Task Force on Reactive Nitrogen, 2014). The

frequency of removal in order to achieve the quoted 25% reduction is likely to be less than the above timeframes. A suggested timeframe is once or twice a week. Emissions monitoring, carried out by sector trade associations will provide revised data on appropriate ammonia emission rates.

Flushing channels are rarely used and such systems should remove slurry daily. Scrapers are applicable in solid floor housing.

For newly permitted sites which already operate as a pig farm, i.e. expanding to bring them over the threshold, we can agree a pragmatic approach on a case by case basis for depth of pit. Operators will be required to have the infrastructure to facilitate frequent slurry removal (so as to not exceed 800 mm) and will need slurry storage of a capacity to meet the requirements. We would expect commitment in their permit to a maximum depth of 800 mm, after which slurry must be removed. External slurry storage capacity must also be in line with SSAFO and sufficient to store during any exclusion period.

All slurry storage/retention structures must comply with SSAFO.

Operators complying with the relevant conditions in their permit will meet this BAT conclusion.

A new permit condition will outline the requirement for operators to submit annual monitoring.

### 3 BAT CONCLUSIONS FOR THE INTENSIVE REARING OF POULTRY

#### AMMONIA EMISSIONS FROM POULTRY HOUSES

#### AMMONIA EMISSIONS FROM HOUSES FOR LAYING HENS, BROILER BREEDERS OR PULLETS

**BAT 31. In order to reduce ammonia emissions to air from each house for laying hens, broiler breeders or pullets, BAT is to use one or a combination of the techniques given below.**

Technique (1)		Applicability
a	Manure removal by belts (in case of enriched or unenriched cage systems) with at least: - one removal per week with air drying; or - two removals per week without air drying.	Enriched cage systems are not applicable to pullets and broiler breeders. Unenriched cage systems are not applicable to laying hens.
b	In case of non-cage systems:	
	0. Forced ventilation system and infrequent manure removal (in case of deep litter with a manure pit) only if used in combination	Not applicable to new plants, unless combined with an air cleaning system.

	with an additional mitigation measure, e.g.: - achieving a high dry matter content of the manure; - an air cleaning system.	
	1. Manure belt or scraper (in case of deep litter with a manure pit).	Applicability to existing plants may be limited by the requirement for a complete revision of the housing system.
	2. Forced air drying of manure via tubes (in case of deep litter with a manure pit)	The technique can be applied only to plants with sufficient space underneath the slats.
	3. Forced air drying of manure using perforated floor (in case of deep litter with a manure pit).	Due to high implementation costs, applicability to existing plants may be limited.
	4. Manure belts (in case of aviary).	Applicability to existing plants depends on the width of the shed.
	5. Forced drying of litter using indoor air (in case of solid floor with deep litter).	Generally applicable.
c	Use of an air cleaning system, such as: 1. Wet acid scrubber; 2. Two-stage or three-stage air cleaning system; 3. Bioscrubber (or biotrickling filter).	May not be generally applicable due to the high implementation cost. Applicable to existing plants only where a centralised ventilation system is used.

**Table 3.1: BAT-AELs for ammonia emissions to air from each house for laying hens**

Parameter	Type of housing	BAT-AEL (kg NH <sub>3</sub> /animal place/year)
Ammonia expressed as NH <sub>3</sub>	Cage system	0.02 – 0.08
Non-cage system		0.02 – 0.13 <sup>(1)</sup>
(1) For existing plants using a forced ventilation system and an infrequent manure removal (in case of deep litter with a manure pit), in combination with a measure achieving a high dry matter content of the manure, the upper end of the BAT-AEL is 0.25 kg NH <sub>3</sub> /animal place/year.		

**The associated monitoring is in BAT 25. The BAT-AEL may not be applicable to organic livestock production.**

## GUIDANCE

'One or a combination' means one or more.

Broiler breeders and pullets do not have a BAT-AEL for ammonia emissions.

We are satisfied that current practices and requirements of existing permits meet the requirements of this BAT conclusion.

A new permit condition will outline the requirement for operators to submit annual monitoring.

The narrative BAT b(0) for existing non-caged housing with infrequent manure removal requires there to be an additional mitigation measure. This could include nutritional management techniques and ensuring the litter is managed such that it remains dry and friable as possible.

New non-caged housing will need to adopt a system which is compliant with BAT.

## AMMONIA EMISSIONS FROM HOUSES FOR BROILERS

**BAT 32. In order to reduce ammonia emissions to air from each house for broilers, BAT is to use one or a combination of the techniques given below.**

	<b>Technique (1)</b>	<b>Applicability</b>
a	Forced ventilation and a non-leaking drinking system (in case of solid floor with deep litter).	Generally applicable.
b	Forced drying system of litter using indoor air (in case of solid floor with deep litter).	For existing plants, the applicability of forced air drying systems depends on the height of the ceiling. Forced air drying systems may not be applicable to warm climates, depending on the indoor temperature.
c	Natural ventilation, equipped with a non-leaking drinking system (in case of solid floor with deep litter).	Natural ventilation is not applicable to plants with a centralised ventilation system. Natural ventilation may not be applicable during the initial stage of rearing of broilers and due to extreme climate conditions.
d	Litter on manure belt and forced air drying (in case of tiered floor systems).	For existing plants, the applicability depends on the height of the side walls.
e	Heated and cooled littered floor (in case of combideck systems).	For existing plants, the applicability depends on the possibility to install closed underground storage for the circulating water.
f	Use of an air cleaning system, such as: 1. Wet acid scrubber;	May not be generally applicable due to the high implementation cost.

	2. Two-stage or three-stage air cleaning system; 3. Bioscrubber (or biotrickling filter).	Applicable to existing plants only where a centralised ventilation system is used.
(1) A description of the techniques is given in Sections 4.11 and 4.13.2.		

**Table 3.2: BAT-AEL for ammonia emissions to air from each house for broilers with a final weight of up to 2.5 kg**

Parameter	BAT-AEL (1) (2) (kg NH <sub>3</sub> /animal place/year)
Ammonia expressed as NH <sub>3</sub>	0.01 – 0.08
(1) The BAT-AEL may not be applicable to the following types of farming: extensive indoor, free-range, traditional free-range and free-range - total freedom, as defined in Commission Regulation (EC) 543/2008.	
(2) The lower end of the range is associated with the use of an air cleaning system.	

**The associated monitoring is in BAT 25. The BAT-AEL may not be applicable to organic livestock production.**

## GUIDANCE

'One or a combination' means one or more.

We are satisfied that current practices and requirements of existing permits meet the requirements of this BAT conclusion and we do not need additional information from individual operators.

A new permit condition will outline the requirement for operators to submit annual monitoring.

## AMMONIA EMISSIONS FROM HOUSES FOR DUCKS

**BAT 33. In order to reduce ammonia emissions to air from each animal house for ducks, BAT is to use one or a combination of the techniques given below.**

	Technique (1)	Applicability
a	One of the following techniques using natural or forced ventilation:	
	1. Frequent litter addition (in case of solid floor with deep litter or deep litter combined with slatted floor).	For existing plants with deep litter combined with slatted floor the applicability depends on the design of the existing structure.
	2. Frequent manure removal (in case of fully slatted floor).	Only applicable to the rearing of Barbary/Muscovy ducks ( <i>Cairina Moschata</i> ), for sanitary reasons.
b	Use of an air cleaning system, such as:	May not be generally applicable due to the high implementation cost.

	1. Wet acid scrubber; 2. Two-stage or three-stage air cleaning system; 3. Bioscrubber (or biotrickling filter).	Applicable to existing plants only where a centralised ventilation system is used.
(1) A description of the techniques is given in Sections 4.11 and 4.13.3.		

## GUIDANCE

'One or a combination' means one or more.

We are satisfied that current practices and requirements of existing permits meet the requirements of this BAT conclusion and we do not need additional information from individual operators.

## AMMONIA EMISSIONS FROM HOUSES FOR TURKEYS

**BAT 34. In order to reduce ammonia emissions to air from each animal house for turkeys, BAT is to use one or a combination of the techniques given below.**

	<b>Technique (1)</b>	<b>Applicability</b>
a	Natural or forced ventilation with a non-leaking drinking system (in case of solid floor with deep litter).	Natural ventilation is not applicable to plants with a centralised ventilation system. Natural ventilation may not be applicable during the initial stage of rearing or due to extreme climate conditions.
b	Use of an air cleaning system, such as: 1. Wet acid scrubber; 2. Two-stage or three-stage air cleaning system; 3. Bioscrubber (or biotrickling filter).	May not be generally applicable due to the high implementation cost. Applicable to existing plants only where a centralised ventilation system is used.
(1) A description of the techniques is given in Sections 4.11 and 4.13.4.		

## GUIDANCE

'One or a combination' means one or more.

We are satisfied that current practices and requirements of existing permits meet the requirements of this BAT conclusion and we do not need additional information from individual operators.