

Integrated Pollution Prevention and Control

Northern Ireland

Standard Farming Installation Rules and Guidance for

Pig Rearing

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[Waste Management Regulations]

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2	May 2006	Changes following comments from industry, experience from applications, and to take account of Intensive Livestock BREF publication.
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1. INTRODUCTION

1.1 WHAT IS IPPC?

The Integrated Pollution Prevention and Control (IPPC) Directive (96/61/EC) controls the environmental impacts of certain industrial activities. Its aim is to apply Best Available Techniques (BAT) to prevent, or reduce, emissions to air, land and water from these activities. In Northern Ireland, the IPPC Directive is implemented through the Pollution Prevention and Control Regulations (Northern Ireland) 2003 ('the PPC Regulations').

The PPC Regulations apply to larger pig farms with capacity for more than:

- a. 2000 production pigs (over 30 kg liveweight) or
- b. 750 sows

1.2 LEGAL FRAMEWORK

General Binding Rules provide a simplified method for intensive livestock producers to apply for a permit under the PPC Regulations.

The power to make General Binding Rules (GBRs) is provided in the PPC Regulations. Regulation 14 allows GBRs to fulfil the specific permitting requirements of the Regulations *provided* that the rules result in the same high level of environmental protection and an integrated approach.

General binding rules must be made by the Department. The Chief Inspector intends that the **Standard Farming Installation Rules** set out in this paper will support a simple permitting regime that can be operated in a similar way to General Binding Rules.

1.3 What is BAT?

Best Available Techniques (BAT) is defined as the most effective and advanced stage of development of activities and their methods of operation which indicates the practical suitability of particular techniques to prevent and where that is not practicable to reduce emissions and the impact on the environment as a whole.

For these purposes: "available techniques" means "those techniques which have been developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the cost and advantages, whether or not the techniques are used or produced inside the United Kingdom, as long

as they are reasonably accessible to the Operator”; “best” means “in relation to techniques, the most effective in achieving a high general level of the environment as a whole”, and “techniques” “includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned”.

This document contains the Standard Farming Installation Rules which suggest options that meet the requirements for BAT on your farm. They comprise management practices, structures and husbandry techniques at the farm – they are not prescriptive but any deviation from the rules needs to give equivalent environmental protection. A key principle of the Pollution Prevention and Control regime is that operators will use BAT to suit the local circumstances. Much of this guidance is based on the BAT Reference Document (BREF) for Intensive Livestock Installations produced by the European IPPC Bureau. You can refer to this BREF for more detailed information on BAT at the European level.

New or extended farms must use these techniques or techniques which give equivalent levels of environmental protection from the date of operation. It is recognised that new techniques cannot be brought into effect overnight on any site, especially on existing farms where capital investment has been limited by poor economic returns. Existing farms will be expected to implement a structured programme of improvements to management practices and to invest in equipment/plant that will reduce emissions to air, land or water.

1.4 STRUCTURE OF THE RULES

The proposed Standard Farming Installation Rules are noted in bold type, and supported by explanatory notes. The rules constitute the conditions that will be included in a ‘Standard Farming Permit’ (together with other site-specific conditions as described below).

1.5 CONTENT OF THE RULES

The rules cover most aspects of site operation. The exceptions are:

- 1) Where site specific conditions will be required, specifically for noise and odour. The exclusion of these emissions from the rules will enable the maximum number of installations to qualify for the Standard Farming Installation route.
- 2) Any improvement conditions applied as the result of audits and reports required by the rules, or in order to comply with the rules.

The site specific permit conditions relating to 1) and 2) above will not prevent the applicant from taking advantage of the lower charge for Standard Farming Installations. These rules are subject to modification as new evidence of Best Available Techniques becomes available.

1.6 STANDARD FARMING INSTALLATION PERMIT

You should apply for a Standard Farming Installation permit using the Standard Farming Installation application form. A fee is due on application, to cover the costs of assessment. You are encouraged to comment on the user friendliness of the form and any improvements you feel would aid future applicants.

Once granted, a permit can be reviewed at any time and must be reviewed from time to time. When a permit is reviewed any changes in the Rules, such as the addition of rules currently being developed, will be applied from that time onwards.

The rules and other conditions within the permit apply once the permit is granted, and a subsistence fee is due annually.

1.7 RULES FOR NEW AND EXISTING STRUCTURES

Where reference is made to different rules for 'new' and 'existing', these refer to structures, not installations. The operator of an existing installation wishing, for example to erect a new pig building, must adhere to the rules for new buildings for the new structure.

1.8 EMISSIONS FROM LIVESTOCK UNITS

To help you put the principles of PPC into action it is important to understand how and why your farm affects the environment. The most significant emissions from pig and poultry installations include ammonia; nutrients and metals in manure/litter/slurry; effluent discharges; dust; odour and noise. The effects of these emissions could include acidification, eutrophication, damage to ecosystems, the build up of substances in soils, effect on human health and reduction of amenity.

The 1999 UNECE Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone (under the Convention on Long-Range Transboundary Air Pollution), and the EU National Emission Ceilings Directive 2001, which came into UK law in November 2002, commit the UK to achieving a reduction in ammonia emissions to an annual ceiling of 297kt by 2010. Emissions are reported by the Government annually in the UK's National Atmospheric Emissions Inventory. In 2003 total ammonia emissions were 300kt with more than 80% originating from agriculture. Recent research suggests that over 11% of UK agricultural emissions of ammonia arise from pig farming.

In order to contribute to meeting this target, pig and poultry buildings must be constructed and operated, and manure/slurry/litter must be stored and spread to minimise ammonia emissions. Other emissions should be prevented or reduced to ensure there are no adverse environmental effects from the operation of an installation in accordance with the aims of the IPPC Directive.

Spreading of manure and slurry can result in ammonia (and odour) emissions to air. The UNECE Gothenburg Protocol commits the UK to a 30% reduction in emissions of ammonia from manure application compared to the 1990 baseline. Rapid incorporation is an important factor in reducing emissions to air and will help to maximise the benefit of the manure and slurry.

More detailed information on Best Available Techniques (BAT) at the European level for Intensive Livestock Installations, which member states are required to take into account when setting standards, can be found in the BAT Reference Document (BREF) published in July 2003 by the IPPC Bureau at <http://eippcb.jrc.es/pages/FActivities.htm>.

2. THE RULES

2.1 FARM MANAGEMENT TECHNIQUES

2.1.1 INSPECTION AND MAINTENANCE

2.1.1.1 Records shall be kept of the inspection and maintenance of structures and plant.

2.1.1.2 All structures and plant shall periodically, and at least annually, be thoroughly inspected.

2.1.1.3 All structures and plant shall be maintained in good operating condition.

Notes to rules:

- a) *Structures to be inspected should include feed stores, manure, slurry and dirty water containment as well as those for storing, pesticides, veterinary, medicines, waste products and agricultural fuel oil.*
- b) *Inspections should cover signs of leakage, corrosion and structural damage, security and correct operation. Site security measures should prevent unauthorised access to the site, as far as is practicable to help prevent vandalism which is a common cause of pollution incidents. What is appropriate will depend upon the risks posed by the activity itself and the particular location.*
- c) *Periodic inspection and maintenance should be in accordance with manufacturer's recommendations where available, and should be carried out by people with appropriate expertise.*
- d) *Periodic inspections should include visual appraisal of the structure or facility.*
- e) *Opportunities should be taken to inspect structures when they are empty or partially empty.*
- f) *Records should be kept of maintenance of plant such as slurry pumps, mixers, separators, spreading equipment and ventilation system, to demonstrate that the equipment performs to standard (including during operation) and does not cause unnecessary increases in emissions.*

Safety note:

Enclosed structures or tanks may contain lethal or explosive gases. Do not go into them. If in any doubt seek advice from the Health and Safety Executive for NI.

2.1.2 STAFF TRAINING

2.1.2.1 All staff shall receive training, which shall cover:

- a) **Prevention of accidental releases and action to be taken should such an accident occur; and**
- b) **Awareness of the Accident Management Plan such that they are fully conversant with those areas relevant to their duties.**

2.1.2.2 Appropriate staff shall receive training which shall cover:

- a. Awareness of the conditions of the Permit for the farm, its implications, and how compliance can be secured by the work activities of the individual;
- b. Awareness of the potential environmental effects of the farm under routine and abnormal circumstances; and
- c. Maintenance of structures and plant where these are maintained by farm staff.

2.1.2.3 Training records must be maintained for staff involved in operating the installation and made available to the inspector on request.

Notes to rules:

- a) *Staff should be familiar with the production systems on the farm and trained to carry out the tasks for which they have responsibility. They should also understand how their tasks and responsibilities relate to those of other staff.*
- b) *A number of training courses that meet the requirements of 2.1.2.2 are under development. An example is a specific course designed by LANTRA. Requirements could also be met by staff completing Livestock GNVQ Level III.*
- c) *There may be in-house or assurance scheme training courses which meet some or all of the requirements.*
- d) *It will be acceptable for staff with approved training under Rule 2.1.2.2 to cascade training in preventing accidental releases, and on the accident management plan, to other staff on the same unit.*
- e) *Training records should include the name of the trainee, date and type of training, and the training provider.*
- f) *Staff includes all full time and part time permanent staff (whether employees or self employed).*

2.1.3 NOTIFICATION

(A) Notification of abnormal emissions, malfunctions and accidents

2.1.3.1 The Northern Ireland Environment Agency shall be notified without delay of any incident or accident, which is causing or may cause significant pollution via its 24 hour emergency pollution hotline 0800 807060

2.1.3.2 Written confirmation of notification required by rule 2.1.3.1 above shall be submitted within 24 hours.

Notes to rules

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- a) *Examples of incidents or accidents requiring notification might be accidental over-application of manure, containment failure and loss of yard washings to surface water, or a spillage of fuel oil.*
- b) *Written returns should usually be made by fax.*
- c) *After an incident or accident, the operator should review the Accident Management Plan as required by rule 2.7.1.*

(B) Notification of implementing the Site Closure Plan

2.1.3.3 The Inspector shall be given at least 14 days notice before implementing any part of the Site Closure Plan.

2.2 RAW MATERIAL USAGE

2.2.1 SELECTION AND USE OF RAW MATERIALS

2.2.1.1 An inventory shall be maintained detailing typical quantities and relevant environmental characteristics of raw materials used.

2.2.1.2 These records shall be maintained in a format equivalent to the proforma in Appendix 1 and shall be made available to the Inspector on request.

Notes to rules:

- a) *The inventory shall cover biocides (including disinfectants, wood preservatives, slimicides), pesticides (including herbicides, fungicides, insecticides, vertebrate control products, biological pesticides), veterinary medicines, agricultural fuel oils and lubricants, and bedding. The raw materials inventory should be included in the accident management plan.*
- b) *Disinfectants, pesticides and veterinary medicines listed in either the Defra/HSE Guide to Pesticides (The Blue Book) Electronic Copy (previously referred to as Defra/HSE Reference Book 500), National Office for Animal Health (NOAH) compendium, or DARD's approved list of disinfectants, are not required to be listed individually, but a reference shall be made to: the category of materials used, whether they are from an approved list, the total quantities used each year, the total quantity stored on site (raw materials proforma example in Appendix 1).*
- c) *Products not on approved lists shall be individually listed, and manufacturer's safety data sheets, including information on potential environmental harm, supplied.*
- d) *Volumes of veterinary medicines held on site for general purposes shall be listed.*
- e) *Usage of veterinary medicines shall be recorded on NOAH record sheets or equivalent, and held on site.*
- f) *A description of types of bedding used should be given. Quantities stored are not required.*
- g) *Feedstuffs are covered in sections 2.2.2 and 2.3.1 below.*

2.2.2 SELECTION AND USE OF PIG FEEDS

SELECTION AND USE OF SOW FEEDS TO REDUCE NITROGEN EXCRETION.

2.2.2.1. A minimum of two diets shall be available for sows over the production cycle:

- **For the majority of the period between weaning and farrowing, a diet formulated to meet the nutritional requirements of the dry sow.**
- **For the antenatal period, during lactation, and for some time post weaning a diet formulated to meet the nutritional requirements of the lactating sow.**
- **The dry sow diet shall have a lower level of crude protein than the lactating sow diet.**

2.2.2.2 Buildings and associated infrastructure, such as feed storage bins, shall be designed to allow at least a two-stage feeding regime.

Notes to rules:

- a) *The energy and protein requirements of sows vary according to their stage in the production cycle. Sows at conception, in very late pregnancy and whilst lactating have a higher requirement for protein than dry sows. A staged feeding system based on a minimum of two diets with different protein levels can reduce nitrogen excretion. The aim is to optimise protein use so as to minimise nitrogen output.*
- b) *Feeding a minimum of two diets has benefits for the lifetime performance of the sow and litter and significantly reduces the amount of excess protein, and so nitrogen, fed.*
- c) *The timing of the change from dry sow to lactating sow diet, and back again, will differ according to the genetics of the stock and management on the unit. As a guide the lower protein diet is likely to be used for at least three-quarters of the gestation period.*
- d) *A higher number of diets may be used.*
- e) *There may be a need to support low crude protein diets with supplementary amino acids.*
- f) *Pregnant gilts may require a higher protein diet than subsequent parities.*
- g) *The formulation of the diet should always be discussed with a nutritional advisor or supplier to ensure that the appropriate dietary requirements of the animals are being met.*

SELECTION AND USE OF REARING AND FINISHING FEEDS TO REDUCE NITROGEN EXCRETION.

2.2.2.3 Rearing and finishing pigs shall be fed a minimum of two diets with reducing crude protein content between 30kg and slaughter at weights up to 105kg. Where pigs are routinely taken to weights over 105kg, a third diet shall be fed with a further reduced protein level.

2.2.2.4 Applicants shall submit an improvement plan to the Inspector for optimising crude protein in diets within 12 months of the permit

2.2.2.5 New buildings and associated infrastructure, such as feed storage bins, shall be designed to allow for a multi-stage feeding regime.

Notes to rules:

- a) *As pigs age their protein requirement per kg of live weight gain falls. Where only one diet is fed young pigs are under-supplied with protein and lean growth is not maximised, and older pigs are oversupplied with protein and expend energy in excreting it. The nitrogen excreted as a result of excess protein contributes to ammonia emissions to air and to nitrogen rich manure or slurry.*
- b) *The BREF recommends that where a two-diet system is used the change over should be made at around 50 to 60kg. Where higher numbers of diets are used the change should be appropriate to the life stage of the pig.*
- c) *Dietary Guidance Notes for Protein and Phosphorus for IPPC Pig installations are available from the Inspectorate ie. "Guidance for operators on dietary management at IPPC pig installations". Where an operator can demonstrate that they are meeting these*

dietary guidelines, this will be sufficient to show compliance with rule 2.2.2.4 (for example, if purchasing feed from a NIGTA approved feed supplier).

- d) *A higher number of diets may be used providing that dietary crude protein levels are reduced with increasing age.*
- e) *There may be a need to support low crude protein diets with supplementary amino acids.*
- f) *The formulation of the diet should always be discussed with a nutritional advisor or supplier to ensure that the appropriate dietary requirements of the animals are being met.*

SELECTION AND USE OF ALL PIG FEEDS TO REDUCE PHOSPHORUS EXCRETION

2.2.2.6 Phosphorus levels in rations for pigs should be reduced over their rearing and production cycle.

2.2.2.7 Applicants shall submit an improvement plan to the Inspector for optimising phosphorus in diets within 12 months of the permit. The improvement plan shall be implemented subject to such amendments or additions as notified by the Inspector in writing

Notes to rule:

- a) *Lower phosphorus in rations fed to pigs will reduce phosphorus excretion and so reduce phosphorus levels in the slurry / manure*
- b) *Dietary Guidance Notes for Protein and Phosphorus for IPPC Pig installations are available from the Inspector ie. "Guidance for operators on dietary management at IPPC pig installations". Where an operator can demonstrate that they are meeting these dietary guidelines, this will be sufficient to show compliance with rule 2.2.2.7 (for example, if purchasing feed from a NIGTA approved feed supplier).*
- c) *The addition of digestible phosphorus or the use of enzymes such as phytase will ensure optimum performance and maintenance, whilst limiting the excretion of phosphorus.*
- d) *The use of phytase shall be evaluated as a means to increase availability of phosphorus from vegetable sources and so reduce the total phosphorus and inorganic phosphorus in the diet.*
- e) *The formulation of the diet should always be discussed with a nutritional advisor or supplier to ensure that the appropriate dietary requirements of the animals are being met and that excess phosphorus in the diet above pig requirements is not being supplied.*
- f) *Where possible the amount of total and available phosphorus in the diet should be recorded to assist in assessing phosphorus content of slurry or manure.*

2.2.3 OPTIMISING WATER USE

2.2.3.1 An audit of water use shall be carried out and supplied to the Inspector with a content equivalent to that contained in the Northern Ireland Environment Agency “Guidance for operators on preparing an agricultural water audit for intensive livestock IPPC installations”. The audit shall be completed within 3 years of the effective date of the permit and made available to the Inspector on request thereafter together with a plan for optimising water use in areas identified in the audit. The audit shall be reviewed at least every 3 years.

2.2.3.2 Water use for the installation shall be measured and recorded using a water meter.

2.2.3.3 Responsibility shall be allocated to a member of staff for monitoring and management of water usage.

Notes to rules:

- a) *An example proforma is given in the NIEA “Guidance for operators on preparing an agricultural water audit for intensive livestock IPPC installations”, with benchmark figures for water consumption which may be helpful.*
- b) *Where the audit indicates opportunities to reduce wastage, the following measures should be considered:*
- *a plan identifying all water supply and distribution pipework for water at the installation;*
 - *insulating exposed water pipes above ground, or installing suitable systems to reduce the risk of freezing pipes;*
 - *installing stop taps and drain valves in the farm water distribution system;*
 - *draining and closing off all lengths of pipe which are not in use;*
 - *installing covers on water tanks;*
 - *fitting all hoses, hand lances and washing equipment with trigger controls;*
 - *taking measures to pinpoint leaks and excessive use;*
 - *identifying the position of the water meter;*
 - *reading and recording the water meter readings monthly as a minimum to monitor consumption and identify leaks;*
 - *brushing, scraping or squeegeeing dirty areas before washing down;*
 - *cleaning housing and equipment with high-pressure cleaners for a short duration after each production cycle; and*
 - *regular calibration of drinking water installations and meters.*

2.3 TECHNIQUES FOR POLLUTION PREVENTION AND CONTROL

2.3.1 FEED DELIVERY, MILLING AND PREPARATION

2.3.1.1 Dusty or potentially dusty materials shall be stored in covered containers, purpose-built silos or under cover.

2.3.1.2 Transfers of feed-stuffs to and from storage areas shall be carried out so as to prevent or minimise dust emissions to air.

2.3.1.3 The mixing and milling of dry foodstuffs shall be carried out so as to prevent or minimise dust emissions to air.

Notes to rules:

a) Measures may include extraction and abatement of dust from feed preparation areas.

2.3.1.4 Containment shall be provided for foodstuffs to prevent spillages and minimise waste.

2.3.1.5 Storage vessels for feedstuffs shall be protected from collision damage.

Notes to rules:

- a) Feedstuffs are highly polluting if allowed to enter watercourses.*
- b) Any feedstuff which might flow under the influence of gravity e.g. liquid feed should be contained.*
- c) Vulnerable locations, such as areas with high levels of motorised traffic, should be identified in the Accident Management Plan (see 2.7.1).*
- d) Containment may consist of a bunded area, or the store may be sited in an area isolated from the surface-water system.*
- e) Collision protection may be achieved by careful siting relative to traffic flows with measures such as provision of kerbs or other markers to stop reversing vehicles, or by the use of barriers in more vulnerable locations.*

2.3.2 STORAGE OF AGRICULTURAL FUEL OIL AND OTHER MATERIALS

2.3.2.1 All agricultural fuel oil storage facilities with a capacity of over 1250 litres shall meet the requirements of Schedule 3 to The Control of Pollution (Silage Slurry and Agricultural Fuel Oil) Regulations (NI) 2003

Notes to rules:

- a) *This measure extends the requirements for fuel oil storage facilities to all IPPC farms, whereas under the Control of Pollution (Silage Slurry and Agricultural Fuel Oil) Regulations (NI) 2003 these requirements apply only to newly constructed facilities or those substantially enlarged or reconstructed after 2003. The measure has been adopted due to the high risk of losses occurring from unbunded storage facilities, through spillage, leakage or physical damage.*
- b) *These rules do not apply to domestic fuel oil.*
- c) *Guidance on the construction of a bund is available in the UK Agencies Pollution Prevention Guidance notes (PPG26).*

2.3.2.2 Agricultural fuel oil in quantities less than 1250 litres, other oils and chemicals shall be kept in a store capable of retaining leakage or spillage or on an impermeable base within a bunded area.

2.3.2.3 Pesticides shall be kept in a store that is resistant to fire, capable of retaining leakage or spillage, dry, frost protected and secure against unauthorised access.

Notes to rules:

- a) *Pesticides are often highly toxic to aquatic life and may cause watercourses to fail Environmental Quality Standards.*
- b) *Further information is given in the DARD Code of Good Agricultural Practice for the Prevention of Pollution of Water and Defra/HSE 'Green Code'.*

2.3.2.4. Veterinary medicines shall be kept in a store that is capable of retaining leakage or spillage, dry, frost protected and secure against unauthorised access.

Notes to rules:

- a) *Veterinary medicines are considered to be those listed by the National Office for Animal Health and do not necessarily require prescription or administration by a veterinary surgeon.*

2.3.3 MINIMISING POLLUTION FROM PIG HOUSING

Recent research suggests that over 7% of the UK agricultural emissions of ammonia arise from pig housing. These emissions contribute to the UK annual emissions and have an impact on local sensitive habitats. Techniques to abate emissions will depend on the type of housing and slurry or manure collection systems in place. For slurry based systems the techniques mostly aim to reduce the emitting surface of the slurry, and to reduce the area of flooring which is damp, or where dung and urine can mix above slats. For manure based systems, generous use of straw will bind nitrogen and reduce the release of ammonia.

Rules relating to new housing will apply to all new housing, on both new and existing installations.

The aim of these rules is to ensure that housing and slurry systems are designed and managed to minimise releases, particularly of ammonia and odour.

MINIMISING POLLUTION FROM ALL PIG HOUSING

2.3.3.1 **The design, management and operation of the housing on the installation shall be in accordance with the application.**

Note to rule:

- a) *Welfare standards must be complied with in the design and operation of the housing on the installation. The regulation of animal welfare is the responsibility of the DARD Veterinary Service.*

2.3.3.2 **Drainage from contaminated yard areas shall be isolated from the clean water system and collected and stored safely in a tank until application to land can take place in accordance with DARD codes of good agricultural practice where the material meets the definition of dirty water under the Nitrates Action Programme. Otherwise, it will be classed as slurry and shall be spread in accordance with the rules set out in section 2.3.5.**

Notes to rule:

- a) *The farm should be managed to prevent contamination of clean water drainage systems*
- b) *Opportunities should be taken to segregate drainage from clean yard areas to minimise the amount of contaminated run-off produced.*
- c) *Should an existing unit be discharging contaminated run-off to ground water or to a surface water system, this may already constitute pollution contrary to the Water Order (NI) 1999 or the Groundwater Regulations (NI) 1998.*

- d) *Where material can meet the definition of “dirty water” as set out in the Nitrates Action Programme, the material may be applied to land throughout the year except in those periods where applications would result in pollution of waterways and/or underground strata ie. in accordance with the DARD codes of good agricultural practice. “Dirty water” is defined under the Nitrates Action Programme as: “a low dry matter waste made up of water contaminated by manure, urine, effluent, milk and cleaning materials and it must have a Biological Oxygen Demand (BOD) no greater than 2,000 mg/litre and must have a dry matter content of less than 1%”.*
- e) *Where diverter valves are used to direct dirty water from yards to storage tanks the following measures should be taken:*
 - *the location of the diverter valve should be detailed on the accident management plan*
 - *when heavily contaminated yard drainage is diverted to the waste or slurry tank, this must be recorded.*
- f) *Where material is directed to slurry tanks or does not meet the definition of dirty water then it will be treated as slurry.*

2.3.3.3 Lightly contaminated drainage e.g from yard areas and roofs shall be either:

- **Treated by means of swales or constructed wetlands; or**
- **Treated by means of a soakaway (where contamination can be shown to be minimal)**
- **Treated by means of a settling pond with sediment trap**
- **Isolated from the clean water system and collected until application to land in accordance with DARD Codes of Good Agricultural Practice can take place**

Notes to rule:

- a) *Roof water may be contaminated with dust from the housing and may have a high ammonia content. Where the ventilation system has roof outlets, the first flush of contaminated rainwater should be treated.*
- b) *Lightly contaminated yards are likely to exclude buildings/yards to which animals have direct access. Such areas with direct access will generate “dirty water” and this should be directed to slurry storage systems.*
- c) *Roof water from housing where there are no roof outlets does not require interception and treatment*
- d) *Yard areas are likely to become contaminated through day to day passage of vehicles, feed dust etc.*
- e) *Where the ventilation system has outlets through side-walls, interception is required before drainage reaches surface water systems. Where side-wall outlets are located above yard areas, the dust should be removed regularly (so that the yard is kept visibly clean).*
- f) *Where side-wall outlets are located above grass areas, further interception is not required provided that the grass cover is sufficient to collect the dust and to impede run-off to surface water systems.*
- g) *The construction of swales, wetlands, soakaways and settling ponds should be agreed with the Inspector. Monitoring to assess the effectiveness of the treatment used may be necessary. Guidance on construction of methods for treatment of lightly contaminated drainage is available from NIEA ie. “Treating lightly contaminated surface run-off from poultry and pig farms in Northern Ireland”.*
- h) *Direct discharges of lightly contaminated roof or yard drainage to a watercourse through a pipe or ditch are not acceptable without some means of treatment.*
- i) *Opportunities should be taken to separate clean roof and yard drainage from the foul or contaminated drainage system to minimise the amount of contaminated water produced. These should include:*
 - *keeping yards visibly clean;*
 - *keeping drainage channels clear;*
 - *cleaning up accumulations of spilt feed and dust.*

2.3.3.4 On removal from housing, manures and slurries shall be either:

- **stored in structures that meet requirements of the rules in section 2.3.4; or**
- **applied to land directly in accordance with the requirements of the rules in section 2.3.5; or**
- **exported from the site for treatment or alternative utilisation; or**
- **treated on site.**

Notes to rule:

- a) *Slurries consist of (i) excreta produced by livestock whilst in a yard or building or (ii) a mixture of such excreta with bedding, rainwater, seepage, washings or any other extraneous material from a building or yard used by livestock or in which livestock manure is stored or any combination of these, of a consistency that allows it to be pumped or discharged by gravity at any stage in the handling process and includes dirty water that is stored with slurry or mixed with slurry.*
- b) *Solid manures include farmyard manure (FYM) and comprise material from covered straw yards, excreta with lots of straw in it, or solids from mechanical separators. FYM means a mixture of bedding material and animal excreta in solid form arising from the housing of cattle, sheep and other livestock, excluding poultry manure, but including spent mushroom compost and the stackable solids fraction from mechanical separation of slurry excluding pig slurry. Solid manure can generally be stacked.*
- c) *Under no circumstances should slurry (including seepage from manure) be permitted to enter surface water drains or drain into the ground.*

2.3.3.5 The farm shall be managed so as to prevent contamination of clean water drainage systems.

2.3.3.6 Water which has been used for cleaning within housing shall be collected and stored either in a slurry store or separate tank, until application to land can take place in accordance with the DARD codes of good agricultural practice where the material meets the definition of “dirty water” under the Nitrates Action Programme. Otherwise it will be classed as slurry and shall be spread in accordance with the rules set out in section 2.3.5.

Notes to rule:

- a) *Every opportunity should be taken to separate clean roof and yard drainage from the foul or contaminated drainage system to minimise the amount of dirty water and slurry produced.*
- b) *Drainage channels should be kept clear.*
- c) *Where diverter valves are used to direct dirty water from yards to storage tanks the following measures should be taken:*
 - i. *The location of the diverter valve should be detailed on the emergency plan.*
 - ii. *When heavily contaminated yard drainage is diverted to the waste or slurry tank, this must be recorded.*
- d) *Where this material does not meet the definition of “dirty water” (see definition in note (d) under rule 2.3.3.2), it is classed as slurry and must be spread to land in accordance with the requirements of the rules set out in section 2.3.5.*

2.3.3.7 Areas around buildings shall be kept free of any build up of manure, slurry and spilt feed.

2.3.3.8 Disinfectant footbaths shall not overflow. The spent disinfectant contained in foot baths and wheel washes shall be either added to house washings or slurry stores and applied to land with those materials in accordance with rules in sections 2.3.3 and 2.3.4 or exported from the site.

MINIMISING POLLUTION FROM NEW PIG HOUSING

Any new pig housing, including replacement housing or on an expanded installation must be designed in accordance with the following rules – other techniques are not excluded, but you will need to demonstrate that they qualify as “best available techniques” (BAT).

2.3.3.9 Drinkers and troughs should be designed and operated to prevent leakage.

MINIMISING EMISSIONS FROM NEW DRY SOW HOUSING

2.3.3.10 Slurry systems shall be designed and operated with either:

- A partly-slatted floor with a reduced area manure pit; or
- A fully or partly-slatted floor with vacuum system for frequent slurry removal; or
- Other techniques that provide equivalent or better emission minimisation.

Notes to rule:

- Examples of designs which meet this rule are described in Appendix 3.*
- Other techniques are not excluded, but operators will need to demonstrate that they qualify as BAT.*
- These techniques should be applied to group or individual housing.*
- Slat design and slurry channels:*
 - Slat design should facilitate maximum transfer of dung and urine to the transfer channels;*
 - Channels should be designed to transfer slurry to storage facilities (and not to store slurry);*
 - The area under the slats should be cleared of slurry frequently i.e. when there is sufficient slurry to flow out.*
- Lying areas should be kept clean through high standards of management and effective control of environmental conditions.*
- Floor space allowances including partly-slatted floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*

2.3.3.11 Solid floor systems shall be designed and operated so that:

- Sufficient straw or other bedding material is used to provide a clean dry bed; and
- Scraped areas prevent ponding or build up of urine.

Notes:

- Dunging and lying areas should be clearly differentiated to ensure that the lying areas are kept clean and dry at all times.*

- b) *Solid floor systems should comprise: scraped areas that prevent ponding or build up of urine; dung passages and bedded areas sloped to drain urine and prevent ponding.*
- c) *Dunging areas should be cleaned out by scraping at least three times a week.*
- d) *Deep straw systems, bedded areas and straw yards should have sufficient straw or other bedding material to keep the lying area clean and dry, and to bind nitrogen to reduce ammonia emissions.*
- e) *Floors should be kept free from urine or slurry puddles, either through:*
 - *the provision of additional bedding to soak it up, or*
 - *management to address puddles as they arise – scraping or washing down.*
- f) *Floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*

MINIMISING EMISSIONS FROM NEW FARROWING SOW HOUSING

2.3.3.12 Slurry systems for farrowing sows including piglets should comprise a part or fully-slatted floor with:

- **A combination of water and manure channel; or**
- **A flushing system with manure gutters; or**
- **A manure pan underneath; or**
- **Other techniques that provide equivalent or better emission minimisation.**

Notes to rule:

- a) *Examples of designs which meet this rule are described in Appendix 3.*
- b) *Other techniques are not excluded, but operators will need to demonstrate that they qualify as BAT.*
- c) *Emission reduction techniques focus on alterations to the manure pit and slurry channels:*
 - i. *Slat design should facilitate maximum transfer of dung and urine to the transfer channels;*
 - ii. *Channels should be designed to transfer slurry to storage facilities (and not to store slurry);*
 - iii. *The area under the slats should be cleared of slurry frequently i.e. when there is sufficient slurry to flow out; and*
- d) *Farrowing pens should be designed to provide a slurry channel at the rear of the sow, away from the feeding area. A smaller slatted area under the water tray or trough should be added to catch feed and water spills and manure from the piglets.*
- e) *Lying areas should be kept clean through high standards of management and effective control of environmental conditions.*
- f) *Floor space allowances including partly-slatted floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*

2.3.3.13 Solid floor systems shall be designed and operated so that:

- **Sufficient straw or other bedding material is used to provide a clean dry bed; and**
- **Scraped areas prevent ponding or build up of urine.**

Notes to rule

- a) *Dunging and lying areas should be clearly differentiated to ensure that the lying areas are kept clean and dry at all times.*
- b) *Solid floor systems should comprise: scraped areas that prevent ponding or build up of urine; dung passages and bedded areas sloped to drain urine and prevent ponding.*
- c) *Dunging areas should be cleaned out by scraping at least three times a week.*
- d) *Deep straw systems, bedded areas and straw yards should have sufficient straw or other bedding material to keep the lying area clean and dry, and to bind nitrogen to reduce ammonia emissions.*
- e) *Floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*

MINIMISING EMISSIONS FROM NEW WEANER HOUSING

2.3.3.14 Slurry systems shall be designed and operated with a pen:

- **or flatdeck with a fully-slatted or partly-slatted floor with a vacuum system for frequent slurry removal;**
- **or flatdeck with a fully-slatted floor beneath which there is a concrete sloped floor to separate faeces or urine; or**
- **with a partly-slatted floor (two climate system); or**
- **with a partly-slatted floor and a sloped or convex solid floor; or**
- **with a partly-slatted floor and a shallow manure pit and channel for spoiled drinking water; or**
- **with a partly-slatted floor with triangular slats and a manure channel with sloped side walls; or**
- **other techniques that provide equivalent or better emission minimisation.**

Notes to rule:

- a) *Examples of designs which meet this rule are described in Appendix 3.*
- b) *Other techniques are not excluded, but operators will need to demonstrate that they qualify as BAT.*
- c) *Slat design and slurry channels:*
 - i. *Slat design should facilitate maximum transfer of dung and urine to the transfer channels;*
 - ii. *Channels should be designed to transfer slurry to storage facilities (and not to store slurry);*
 - iii. *The area under the slats should be cleared of slurry frequently i.e. when there is sufficient slurry to flow out; and*
- d) *Lying areas should be kept clean through high standards of management and effective control of environmental conditions.*
- e) *Floor space allowances including partly-slatted floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*
- f) *Weaner accommodation in 'umbrella buildings' should be provided with sufficient ventilation to keep manure temperatures low.*

- g) *Where water spray or dripper systems are used they should be used over the slats to cool the pigs in hot weather and encourage good dunging behaviour. These should be maintained to prevent leakage or loss of water.*
- h) *Where artificial heating is provided to weaners, controls should be used to match heating needs so that heat is not wasted by being drawn out of the building.*

2.3.3.15 Solid floor systems shall be designed and operated so that:

- (i) Sufficient straw or other bedding material is used to provide a clean dry bed; and**
- (ii) Scraped areas prevent ponding or build up of urine.**

Notes to rule:

- a) *Dunging and lying areas should be clearly differentiated to ensure that the lying areas are kept clean and dry at all times.*
- b) *Solid floor systems should comprise: scraped areas that prevent ponding or build up of urine; dung passages and bedded areas sloped to drain urine and prevent ponding.*
- c) *Dunging areas should be cleaned out by scraping at least three times a week.*
- d) *Deep straw systems, bedded areas and straw yards should have sufficient straw or other bedding material to keep the lying area clean and dry, and to bind nitrogen to reduce ammonia emissions.*
- e) *Floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*
- f) *Where artificial heating is provided to weaners, controls should be used to match heating needs so that heat is not wasted by being drawn out of the building.*

MINIMISING EMISSIONS FROM NEW GROWER/FINISHER HOUSING

2.3.3.16 Slurry systems shall be designed and operated with:

- **a fully-slatted floor with vacuum system for frequent removal; or**
- **a partly-slatted floor with a reduced manure pit, including slanted walls and a vacuum system; or**
- **partly-slatted floor with a central convex solid floor at the front of the pen, a manure gutter with slanted sidewalls and sloped manure pit; or**
- **other techniques that provide equivalent or better emission minimisation.**

Notes to rule:

- a) *Examples of designs which meet this rule are described in Appendix 3.*
- b) *Other techniques are not excluded, but operators will need to demonstrate that they qualify as BAT.*
- c) *Slat design should facilitate maximum transfer of dung and urine to the transfer channels;*
 - i. *Channels should be designed to transfer slurry to storage facilities (and not to store slurry); and*
 - ii. *The area under the slats should be cleared of slurry frequently i.e. when there is sufficient slurry to flow out.*

- iii. *Slat design and slurry channels:*
- d) *Lying areas should be kept clean through high standards of management and effective control of environmental conditions.*
- e) *Floor space allowances including partly-slatted floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*
- f) *Where water spray or dripper systems are used they should be used over the slats to cool the pigs in hot weather and encourage good dunging behaviour. These should be maintained to prevent leakage or loss of water.*

2.3.3.17 Solid floor systems shall be designed and operated so that:

- (i) Sufficient straw or other bedding material is used to provide a clean dry bed; and**
- (ii) Scraped areas prevent ponding or build up of urine.**

Notes to rule:

- a) *Dunging and lying areas should be clearly differentiated to ensure that the lying areas are kept clean and dry at all times.*
- b) *Solid floor systems should comprise: scraped areas that prevent ponding or build up of urine; dung passages and bedded areas sloped to drain urine and prevent ponding.*
- c) *Dunging areas should be cleaned out by scraping at least three times a week.*
- d) *Deep straw systems, bedded areas and straw yards should have sufficient straw or other bedding material to keep the lying area clean and dry, and to bind nitrogen to reduce ammonia emissions.*
- e) *Floor space allowances should be calculated to match the pigs requirements (including the appropriate standards set out in the "Welfare of Farmed Animal Regulations (Northern Ireland) 2000", as either a surplus or shortage of space can result in dunging in the lying areas.*

MINIMISING POLLUTION FROM EXISTING PIG HOUSING

MINIMISING EMISSIONS FROM ALL EXISTING PIG HOUSING

- 2.3.3.18** A review of existing pig housing and management practices at the installation shall be carried out. The review shall identify measures to reduce emissions to all media, the likely cost of such measures and a proposed timetable for their implementation; and shall be submitted to the Inspector within 12 months of the issue of the permit.
- 2.3.3.19** The improvement plan shall be implemented subject to such amendments or additions as notified by the Inspector in writing.

Notes to rules:

Emissions from pig housing are affected by the factors such as ventilation, temperature and management of surfaces. Changes to management of these should only be introduced where such changes will not affect pig health and welfare.

Ventilation – ventilation should meet pig health and welfare needs for the age and number of pigs. The target rates for different weather conditions should be calculated in conjunction with your equipment supplier or pig adviser.

Temperature – temperature should meet pig health and welfare needs for the age and number of pigs. Liveweight, group size, floor type, air speed and feed intake can markedly affect temperature requirements and should be considered when determining the minimum temperature appropriate.

Slatted floors and low feed levels generally require increased temperatures whereas straw bedding, high feed levels and higher body weights generally require reduced temperatures.

Structural improvements – whether structures or buildings are replaced or modified will be a decision for you in consultation with your Inspector, depending on local needs for emission reduction.

Retro-fitting new structures to existing buildings, needs to be carefully considered and costed. Research suggests that it may be more cost effective to replace buildings or structures. Any replacements should give equivalent emission reduction to those techniques outlined in the rules for new houses (ie. rules 2.3.3.9 – 2.3.3.17), and should be planned to fit the business cycle of the farm.

You should discuss changes to management with your pig advisor.

2.3.4 SLURRY AND MANURE STORAGE AND TREATMENT

The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (NI) 2003

All new and substantially reconstructed or substantially enlarged installations for the storage of slurry must conform with the technical measures detailed in the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (NI) 2003.

There is a legal requirement to notify the Northern Ireland Environment Agency (by completion of a form) at least 28 days before any new (and substantially reconstructed or enlarged) stores are brought into use. For further details contact: the Agricultural Regulations Team of the Water Management Unit of NIEA – Tel: 028 9262 3102.

A definition of slurries and manures is provided in the notes under rule 2.3.3.4

Notes:

- a) Acceptable slurry storage facilities must have the following features:
 - i. Base of the storage tank, effluent tank, and all parts of the drains and reception pit to be impermeable.
 - ii. Base and walls of storage tank, reception pit and drains should be protected against corrosion as described in BS 5502, Part 50.
 - iii. Slurry storage tank and reception pit designed to BS 5502, Part 50.
 - iv. Reception pit and associated channels normally to hold at least two days slurry production.
 - v. Minimum slurry storage tank capacity to be normally 26 weeks production, including allowance for rainwater to meet requirements under the Nitrates Action Programme. The slurry storage tank must be designed to have a minimum 300mm freeboard (a minimum of 750mm for earth-banked compounds).
 - vi. No part of a structure should be within 10m of a watercourse unless the written agreement of the Inspectorate is obtained beforehand.
 - vii. Tank, channels and pit to be designed for 20 years' life with routine maintenance.
 - viii. Two valves in series on any outlet pipe to be locked shut when not in use. (Ensure adequate spacing between the valves).
 - ix. Where walls of the slurry store are not impermeable, perimeter drains and effluent tank must be provided. The base must extend beyond the walls.

SLURRY STORAGE

Rules relating to new slurry stores will apply to all new stores, on both new and existing installations.

Manures and slurries should meet the storage requirements and spreading restrictions defined within the Nitrates Action Programme and rules in section 2.3.5.

2.3.4.1 All new slurry storage facilities shall be covered.

2.3.4.2 Proposals for covering or replacing existing slurry stores shall be submitted to the Inspector within 6 months of the date of the permit.

Notes to rules:

- a) *The store should be inspected as required under rule 2.1.1.1*
- b) *Exposed surface areas of slurry in stores should be covered to minimise emissions of odour and ammonia. The options are to fit a rigid cover to a steel or concrete tank, or to use a floating cover of light expanded clay aggregate. Other covers, such as straw or peat will sink and do not reduce emissions effectively.*
- c) *Wash water tanks do not need to be fully covered if the wash water has a dry matter content of less than 1%*
- d) *The use of covers to exclude rain will minimise additional slurry volume.*
- e) *Stores must be constructed in accordance with the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (NI) 2003.*
- f) *New earth banked lagoons should not be constructed unless an effective covering method can be demonstrated.*

2.3.4.3 Unless the store has a fixed cover, designed to minimise emissions to air, all reasonable steps shall be taken to:

- **minimise the frequency of stirring slurry; and**
- **introduce the slurry below the surface.**

Notes to rule:

- a) *Floating covers will only work effectively if disturbance to the surface is minimised. It is recognised that slurry mixing may be necessary to produce a suitable material for land application, but generally the preceding measure will reduce emissions of ammonia and odour.*

SOLID MANURE STORAGE AND TREATMENT

2.3.4.4 Where manure is stored in the yard, an impermeable base shall be provided with a collection system and tank for effluent.

Notes to rule:

- a) *Stores with constructed bases must include provision for collecting and containing effluent (liquid run-off) in accordance with The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (NI) 2003. The DARD Code of Good Agricultural Practice for Prevention of Pollution of Water (section 2.3) provides advice on construction of manure stores.*
- b) *In order to reduce contaminated run-off operators should consider providing a roof or cover.*
- c) *Effluent channels and collection tanks should be maintained to avoid blockage*
- d) *Effluent collection tanks should be checked regularly and emptied when necessary so that they do not overflow. The effluent should be spread to agricultural land in accordance with the requirements of the rules in section 2.3.5.*

2.3.4.5 *Proposals for installing an impermeable base with effluent containment for manure stores shall be submitted to the Inspector within 6 months of the issue of the permit. The proposals shall include a timetable for the construction work and shall be implemented subject to such amendments or additions as considered appropriate by the Inspector.*

2.3.4.6 Farmyard manure may be stored in the fields where land application will take place until the next application but for no longer than 180 days. It must not be stored in the same location of the field year after year. The farmyard manure must be stored in a compact heap. Farmyard heaps must not be placed:

- i. within 50 metres of lakes; or
- ii. within 20 metres of any other waterway, including open areas of water, open field drains or any drain which has been backfilled to the surface with permeable material such as stone/aggregate; or
- iii. within 50 metres of a borehole, spring or well; or
- iv. within 250 metres of a borehole used for public water supply; or
- v. within 50 metres of exposed cavernous or karstified limestone features (such as swallow-holes and collapse features)
- vi. where they would cause odour problems for nearby sensitive receptors.

Notes to rule:

- a) *Field stores should not be used as a substitute for a store with a constructed base and effluent collection tank.*
- b) *The Inspector may require heaps to be re-sited if there is a risk of pollution or of odour nuisance.*

2.3.4.7 SLURRY AND MANURE TREATMENT

There are various options for slurry treatment, including screening, separation, composting, aeration and anaerobic digestion. These may be of use in specific locations, where particular problems occur (for example, odour nuisance). Slurry separation may be of benefit where limited land is available for spreading close to the farm. Treatment may be more practical where several local units are available to provide the necessary throughput. The use of slurry treatment techniques would be covered by site specific conditions.

2.3.5 SLURRY SPREADING AND SLURRY/MANURE MANAGEMENT PLANNING

A definition of slurries and manures is provided in the notes for rule 2.3.3.4.

Management of manures and slurries should meet the storage requirements and spreading restrictions defined within the Nitrates Action Programme ie .total livestock manure storage capacity on holdings shall be at least 26 weeks for pig enterprises, except where it can be demonstrated that any manure in excess of the actual storage capacity can be disposed of in a manner which will not cause harm to the environment. Livestock (Organic) manure, excluding farmyard manure, shall not be applied to any land between 15 October in any year and 31 January of the following year – it is proposed that this will apply from 1 January 2007.

OFF-FARM ACTIVITY

(A) NEW AND EXPANDED INSTALLATIONS

- 2.3.5.1 Where the operator relies on land off the farm for spreading solid manures or slurry, written evidence of these arrangements (including a nutrient management plan) shall be provided to the Inspector to demonstrate that sufficient land is available to receive the quantity of solid manure or slurry exported. Records of movements of material shall be retained to demonstrate compliance with the arrangements (see also rule 2.9.1.5 & 2.9.1.6)**

Notes to rule:

- a) A nutrient management plan covering receiving land, the names and addresses of recipients and the suitable acreage available for spreading will have already been submitted as part of the application for those installations spreading manure or slurry. Nutrient content of slurry or manure may be calculated using standard figures or by analysis – the nutrient status shall be reviewed and analysed at a frequency specified by the Inspector. Nutrient application rates should be in accordance with rules 2.3.5.19 and 2.3.5.20 taking account of crop requirements and other nutrient inputs, and the requirements under the Nitrates Action Programme.*
- b) Standard soil analysis should be carried out every 4 years (including P status)*
- c) The requirements of this rule also applies to permitted installations changing to land spreading from an alternative method of utilisation of manures and slurries*
- d) An expanded installation, means in relation to an installation where the capacity has increased (ie. pig places) which, in the opinion of the Chief Inspector, may have significant negative effects on the environment.*

(B) EXISTING INSTALLATIONS

- 2.3.5.2 Where the operator relies on land off the farm for spreading solid manures or slurry, written evidence of these arrangements shall be provided to the Inspector. Records of movements of material shall be retained to demonstrate compliance with the arrangements.**

- a) Written evidence should include the quantity of nutrients generated from the installation and the capacity of the land currently used for spreading, along with initial proposals for*

addressing any surplus. Nutrient content of slurry or manure may be calculated using standard figures or by analysis.

2.3.5.3 The operator shall submit an improvement plan (for agreement with the Inspector) within 6 months of the date of the permit setting out the measures planned to ensure that spreading of solid manures and slurries will be in accordance with crop nutrient requirements.

- a) The improvement plan should set out detailed proposals for addressing nutrient surpluses including a timetable for implementation.*
- b) Where final arrangements are going to include landspreading, soil testing will be required – these requirements will be set out in the permit.*

(C) ALL INSTALLATIONS

2.3.5.4 The operator shall review the arrangements in the event of any change and at least once every 3 years.

2.3.5.5 The operator shall notify the Inspector of any amendments or additions to the arrangements deemed necessary after review. The Inspector's agreement in writing must be obtained before any such amendment or addition is made

- a) Changes which require notification to the Inspector would include changes to the land available for spreading or changes to the quantity of material which could be applied in accordance with the nutrient management plan.*

2.3.5.6 Documented contingency arrangements in the event of an emergency or the land becoming unavailable shall be made available to the Inspectorate on request.

Notes to rule:

- a) The information requested could be provided as part of the accident management plan.*

ON-FARM ACTIVITY

The controls on land spreading detailed in Section 2.3.5.7 to 2.3.5.20 of this document will apply where manure is spread on the installation. This would apply to either:

- the farmer or employees spreading on the installation; or
- a contractor spreading on the installation.

SLURRY/MANURE MANAGEMENT PLANNING

Slurries and solid manures from intensive livestock are potentially valuable sources of plant nutrients, but may also be the cause of pollution. It is important to demonstrate that the best use is being made of such slurries and manures on the farm, and that pollution risks are being minimised. This means that the nutrients

nitrogen, phosphorus and potassium (N, P, K) in the manures should be fully accounted for in terms of soil nutrient status, crop uptake and nutrient requirements.

(A) NEW AND EXPANDED INSTALLATIONS

2.3.5.7 The agreed and dated Slurry/Manure Management Plan shall be implemented.

Notes to rules:

- a) A Slurry/Manure Management Plan will have been submitted as part of the permit application for those installations spreading manure/slurry. Nutrient content of slurry or manure may be calculated using standard figures or by analysis – the nutrient status shall be reviewed and analysed at a frequency specified by the Inspector. Nutrient application rates should be in accordance with rules 2.3.5.19 and 2.3.5.20 taking account of crop requirements and other nutrient inputs, and the requirements under the Nitrates Action Programme.*
- b) Where the farm is to be used for the spreading of slurry or manure, a risk-based approach, detailing which land is suitable for spreading and when, will be required. The plan should also account for any manures brought onto the farm, including sewage sludge and other organic wastes.*
- c) Standard soil analysis should be carried out every 4 years (including P status)*
- d) Guidance on the content and design of manure management plans is available in the NIEA guide 'Slurry and Manure Management Planning for IPPC Installations' and in DARD Codes of Good Agricultural Practice for the Prevention of Pollution of Water, Soil and Air.*
- e) The requirements of this rule also applies to permitted installations changing to land spreading from an alternative method of utilisation of manures and slurries*
- f) An expanded installation, means in relation to an installation where the capacity has increased (ie. pig places) which, in the opinion of the Chief Inspector, may have significant negative effects on the environment.*

(B) EXISTING INSTALLATIONS

2.3.5.8 The agreed and dated Slurry/Manure Management Plan shall be implemented.

2.3.5.9 The operator shall submit an improvement plan (for agreement with the Inspector) within 6 months of the date of the permit setting out the measures planned to ensure that spreading of solid manures and slurries will be in accordance with crop nutrient requirements.

- a) The improvement plan should set out detailed proposals for addressing nutrient surpluses, in particular phosphorus, including a timetable for implementation.*
- b) A Slurry/Manure Management Plan will have been submitted as part of the permit application for those installations spreading manure/slurry. Nutrient content of slurry or manure may be calculated using standard figures or by analysis. Nutrient application rates should be in accordance with rule 2.3.5.19 (nitrogen application) taking account of crop requirements and other nutrient inputs, and the requirements under the Nitrates Action Programme.*
- c) Where final arrangements are going to include landspreading, soil testing will be required – these requirements will be set out in the permit.*

(C) ALL INSTALLATIONS

- 2.3.5.10** **Records shall be kept to demonstrate that the plan is implemented**
- 2.3.5.11** **The operator shall review the plan in the event of any change and at least once every 3 years.**
- 2.3.5.12** **The operator shall notify the Inspector of any amendments or additions to the arrangements deemed necessary after review. The Inspector's agreement in writing must be obtained before any such amendment or addition is made**
- a) Changes which require notification to the inspector would include changes to the land available for spreading or changes to the quantity of material which could be applied in accordance with the slurry/manure management plan.*
- 2.3.5.13** **Documented contingency arrangements in the event of an emergency or the land becoming unavailable shall be made available to the Inspectorate on request.**

Notes to rule:

- a) The information requested could be provided as part of the accident management plan.*

SPREADING OF SOLID MANURE AND SLURRIES

Spreading of manure and slurries can result in ammonia and odour emissions to air, run-off to surface water or leaching to groundwater of nutrients and other organic pollutants. The measures below have been designed to prevent or minimise these emissions, and maximise the benefit of the manure and slurry spread.

SPREADING TO MINIMISE EMISSIONS TO AIR

The UNECE Gothenburg Protocol on long-range transboundary air pollution commits the UK to a 30% reduction in emissions of ammonia from manure application compared to a 1990 baseline. Rapid incorporation of manures is an important factor in reducing emissions to air.

SOLID MANURE

- 2.3.5.14 Applications of solid manure to uncropped land or bare soil shall be incorporated within 24 hours, unless such applications are used to control wind erosion on susceptible soils.**

Notes to rule:

- a) *Incorporation is typically achieved by ploughing, discing or using a rotary cultivator.*
- b) *Where applications are not to be incorporated to prevent soil erosion, the Inspector should be provided with details of the susceptibility of soils to such erosion.*
- c) *Applications of solid manure do not need to be incorporated if applied to grassland or other established crops.*

SLURRY

- 2.3.5.15 Slurry shall be applied to land using only the following methods:**

- **Soil injection or soil incorporation methods;**
- **Band spreading with trailing hose or trailing shoe; and/or**
- **Any type of equipment with inverted splash plates provided slurry is incorporated into the soil as soon as is practicable and provided such equipment is operated to avoid slurry atomisation and drift i.e. operated at low pressure to create large droplets).**

Notes to rules:

- a) *Where replacement of equipment is required to meet this rule, this may be phased in as part of an agreed improvement programme, taking account of the expected operating life of the existing plant.*
- b) *Dirty water may be spread by the above methods and may also be spread by irrigation.*

SPREADING TO MINIMISE POLLUTION OF WATER

2.3.5.16 Organic manures shall not be applied to land when:

- soil is waterlogged;
- land is flooded or likely to flood;
- the soil has been frozen for 12 hours or longer in the preceeding 24 hours;
- land is snow covered;
- heavy rain is forecast within 48 hours
- soil is cracked down to field drains or back-fill.

Notes to rules:

- a) *Areas not suitable for spreading should be identified in the Slurry/Manure Management Plan. Restricting application rates and consequently the loading rate of total solids reduces the risk of run-off and the possibility of carrying organic matter, nitrate, phosphorus and ammonium N into watercourses.*
- b) *Applications of organic manures should be made to maximise the availability of nutrient for the crop and minimise the risk of run-off to watercourses and pollution of groundwater.*
- c) *Further information is available from The DARD Code of Good Agricultural Practice for the Prevention of Pollution of Water*

2.3.5.17 Organic manures shall not be applied to steeply sloping fields.

Notes to rule:

- a) *Care should always be taken when spreading regardless of the nature of the slope, run-off can occur from land that is almost flat. The risk of surface runoff increases with the steepness of the slope.*
- b) *Slopes are complex features of the landscape and it is not practicable to define critical angles of slope. As a guide however, steeply sloping fields can be defined to have an average incline of 20% or more.*

2.3.5.18 Organic manures shall not be applied to land within:-

- a. **within 20 metres of lakes; or**
- b. **within 10 metres of any other waterway, including open areas of water, open field drains or any drain which has been backfilled to the surface with permeable material such as stone/aggregate; On downward slopes, below the waterway, this may be reduced to 3 metres where organic manures are spread by band spreaders, trailing shoe spreaders or soil injection or where the adjoining area is less than 1 hectare in size or not more than 50 metres in width; or**
- c. **within 50 metres of a borehole, spring or well; or**
- d. **within 250 metres of a borehole used for public water supply; or**
- e. **within 15 metres of exposed cavernous or karstified limestone features (such as swallow-holes and collapse features).**

MINIMISING POLLUTION FROM, AND ACCUMULATION OF, SOIL NUTRIENTS

Applications of organic manures should be made to maximise the availability of nutrient for the crop and minimise the risk of run-off to watercourses and pollution of groundwater.

NITROGEN

- 2.3.5.19 For any holding the amount of total nitrogen in organic manures applied to land, including by the animals themselves, and that brought onto the holding, shall not exceed 170 kg N/ha/year. The 170kg limit applies to all organic manures and slurries applied to land including sewage sludges and other organic wastes but excludes the use of inorganic fertilisers.**

Notes to rule:

- a) *The N content of your manures may be available from the analysis required under Rules 2.3.5.1; 2.3.5.7; 2.3.5.9 or from standard figures eg. DARD Codes of Good Agricultural Practice or Nitrates Action Programme.*
- b) *The quantity of chemical fertiliser and organic manures applied each year shall not exceed crop requirements for nitrogen as outlined in the recommendations in RB209 and any supplementary guidance.*

PHOSPHORUS

High levels of phosphorus (P) can accumulate in soils receiving regular large applications of organic manure. This can increase P loss to water. P from livestock manures can reach surface waters by various routes. The main losses are:

- Surface run-off, particularly of recently spread manures;
- Erosion of eroded soil particles with a high P content; and
- Particulate and dissolved P in water flowing to land drains.

The amount of P lost will depend on the soil P level. The higher the soil P level, the higher the loss. There is a risk that fields which receive regular applications of livestock manures may accumulate soil P levels which exceed those necessary for crop production.

- 2.3.5.20 Slurry or manure shall only be applied to soils where there is a phosphorus requirement indicated by soil analysis and the fertiliser recommendations in 'Fertiliser Recommendations for Agricultural and Horticultural Crops – RB209 DEFRA. When slurry or manure is applied, the nutrient content shall be estimated according to standard values with appropriate justification eg RB209 DEFRA, or based on measurements and the application rate adjusted to match crop requirements**

Notes to rule:

- a) *These controls will be in effect for any new or expanded installations from the issue of permit (see conditions 2.3.5.1 and 2.3.5.7). For existing installations the controls will be implemented in line with requirements set out under the permit improvement programme (see conditions 2.3.5.2., 2.3.5.3., 2.3.5.8. and 2.3.5.9).*

2.3.6 MEASURES FOR CONTROLLING ODOUR

2.3.6.1 The Operator shall:

- a) maintain and implement an odour management plan where required;**
- b) review and record if required at least every 3 years or as soon as practicable after a complaint, (whichever is the earlier) whether changes to the plan should be made;**
- c) make any appropriate changes to the plan identified by the review.**

Notes to rules:

- a) It is acknowledged that there is likely to be odour from a pig farm outside of the installation boundary. The rules for this section incorporate measures to prevent and where that is not possible to minimise these odour emissions. In certain circumstances you are required to address odour through an odour management plan ie. for those farms where there are sensitive receptors within 400m of the installation and/or the installation has a history of odour related complaints. Condition 2.3.6.1 would only apply where an odour management plan is required.*
- b) For installations where an odour management plan is required, guidance on producing the plan is included in the "Guide to Odour Management at Intensive Livestock Installations". This guide is available from your Inspector.*
- c) Requirements to control odour will be site specific, depending on the location of the farm. Many of the rules for controlling emissions to air will have additional benefits in reducing odour.*
- d) Further advice is available in the Code of Good Agricultural Practice for the Prevention of Pollution of Air and Soil.*

2.4 GROUNDWATER REGULATIONS

2.4.1 There shall be no emission from the Activities into groundwater of any substances in List I (as defined by the Groundwater Regulations) contrary to those Regulations.

2.4.2 There shall be no emission from the Activities into groundwater of any substance in List II (as defined by the Groundwater Regulations) so as to cause pollution (as defined in those Regulations).

Notes to rules:

a) The Groundwater Regulations (NI) 1998 control the discharge to groundwater (direct or indirect) of a number of substances, details of which are given in List I and List II to the Regulations. Disposal onto or into land of any of these substances requires authorisation under the Groundwater Regulations, whilst use of these substances does not.

b) This is of relevance to intensive livestock farming since pesticides are very likely to contain List I or List II substances. In dealing with pesticide disposal you should assume that they are all within the scope of the regulations and make arrangements which meet these requirements. Further advice can be obtained from your Inspector.

2.5 AVOIDANCE, RECOVERY AND DISPOSAL OF WASTES PRODUCED AT THE INSTALLATION (INCLUDING CARCASS DISPOSAL)

European Legislation (namely the Waste Framework Directive and the Landfill Directive) requires the United Kingdom to apply existing waste management controls to agricultural waste. For many years there have been legal controls on the management of household, commercial and industrial waste. Agricultural waste has been excluded from Northern Ireland waste management controls. The new Waste Management Regulations (NI) 2006 extend controls to the management of agricultural waste in Northern Ireland and it will be necessary for anyone who produces or manages agricultural waste to comply with the Regulations.

2.5.1 The Operator shall:

a) maintain records of waste produced by the activities and records of wastes sent off site from the activities, for either disposal or recovery;

b) undertake a waste minimisation audit within 3 years of the effective date of the permit and made available to the Inspector on request thereafter, together with a plan for reducing waste quantities in any areas identified in the audit. The audit shall be reviewed at least every 3 years;

c) take appropriate measures to ensure that waste produced by the activities is avoided or reduced, or where waste is produced it is recovered wherever practicable or otherwise disposed of in a manner which minimises its impact on the environment.

Notes to rule:

a) *The audit should consider the following:*

- *can you avoid producing a waste?*
- *can you reduce the amount of waste produced?*
- *where waste is produced can it be recovered or recycled?*
- *is the waste disposed off so that the environmental impact is minimised?*

A waste minimisation audit equivalent to the Defra guide 'Opportunities for Saving Money by Reducing Waste on Your Farm' will meet the requirements of this rule.

The sections which should be completed include:

- *veterinary products;*
- *carcasses;*
- *feed waste;*
- *fuel oil and lubricants;*
- *scrap metals;*
- *tyres; and*
- *packaging.*

Other relevant issues in the Defra guide are covered by other rules.

- b) *You should implement measures for reducing waste quantities in any areas identified in the audit. You may wish to discuss these measures and when you will implement them, with the Inspector.*
- c) *The PPC Regulations require the site of the installation to be restored to a satisfactory state before the permit can be surrendered (on closure of the installation). The presence of any waste residues on the site at that time could prejudice the acceptance of the site as finally restored.*
- d) *Advice on disposal of pesticide / disinfectant containers is available in the revised DARD Codes of Good Agricultural Practice for the Prevention of Pollution of Water, Soil and Air (2006).*
- e) *All wastes produced from activities shall be managed in accordance with the waste management controls as set out in the Waste Management Regulations (NI) 2006. This may involve the requirement to obtain a waste management licence or licence exemption for the on-site recovery or disposal of wastes from the installation.*

DISPOSAL OF CARCASSES

Disposal of carcasses is regulated through the Animal By-Products Regulations (NI) 2003. The regulation of animal by-products is the responsibility of DARD Veterinary Service, whose prime concern is the protection of animal health and human health.

2.5.2 Carcasses shall be disposed of in accordance with the Animal By-Products Regulations (NI) 2003.

2.5.3 Extraordinary mortalities shall be disposed of in accordance with the accident management plan, or in the case of an outbreak of a notifiable disease, in accordance with instructions from DARD Veterinary Service.

Notes to rules:

- a) Carcasses may be disposed of in a DARD approved incinerator or removed by a licensed contractor to a DARD approved rendering plant in accordance with the requirements of the Animal By Products Regulations (NI) 2003. They should be removed frequently to prevent odour nuisance and be covered to prevent access by birds or rodents using plastic bags or lidded bins where possible.
- b) Only carcasses may be disposed of in incinerators licensed under the Animal By-Products Regulation. Operation of an incinerator for other wastes (except WID exempt wastes) would need to comply with the Waste Incineration Directive.
- c) Guidance on the Animal By-Products Regulations is available from the DARD Veterinary Service
- d) Carcasses must not be buried on farm, other than under the direction of the DARD Veterinary Service eg. in the case of an outbreak of a notifiable disease.

2.6 ENERGY USE

2.6.1 The Operator shall:

- a) take appropriate measures to ensure that energy is used efficiently in the activities;
- b) undertake an energy audit if required within 3 years of the effective date of the permit in order to identify whether there are suitable opportunities to improve the energy efficiency of the activities, and made available to the Inspector on request thereafter. The audit shall be reviewed at least every 3 years; and
- c) implement any appropriate measures identified in the audit.

Notes to rule:

- a) If you are subject to a Climate Change Levy Agreement (CCLA) then this will meet the requirements of this rule and you do not need to undertake an energy audit. You should provide the reference number of your agreement, as evidence, as part of your permit application.
- b) If you are not subject to a Climate Change Levy Agreement you should carry out an energy audit and make this available to the Inspector.
- c) The audit should be completed within three years of the effective date of the permit.
- d) Records should be kept of audits and made available to the Inspector on request. You should implement any measures for improvement that you have identified following your audit of energy use. You should discuss these measures and when you will implement them with the Inspector.
- e) There are a number of audit guides and packages which will help you to produce an energy audit, for example, the Defra guide 'Opportunities for saving money by reducing waste on your farm' and audits from the Farm Energy Centre. These audits will make recommendations for cost-effective energy management.
- f) Current estimates suggest that that energy usage at pig units is highly variable, and many units will find opportunities for cost savings. Many farms will find opportunities to reduce energy consumption and will see cost savings.
- g) Where substantial heat energy is used in heating buildings there can be energy costs savings, and carbon dioxide emission benefits, in using oil or gas fired heating rather than electrical energy, providing that the energy inputs can be well controlled.
- h) The following techniques should be considered in your audit to reduce energy use on pig farms:
 - i. applying low energy lighting;

- ii. *applying natural ventilation where possible, with design of buildings and pens, and spatial planning with respect to the prevailing wind directions to enhance the airflow (animal welfare considerations are vital in the choice of ventilation system);*
- iii. *mechanically ventilated houses optimised design of ventilation systems in each house to provide good temperature control and to achieve minimum ventilation rates in winter (animal welfare considerations are vital in the choice of ventilation system);*
- iv. *mechanically ventilated houses optimised to avoid resistance in ventilation systems through frequent inspection and cleaning of ducts and fans;*
- v. *reuse of waste heat e.g. from slurry cooling systems for purposes such as heating farrowing accommodation.*

2.7 ACCIDENT PREVENTION AND MANAGEMENT

2.7.1 The Operator shall:

- a) maintain and implement an Accident Management Plan.**
- b) review and record at least every 3 years or as soon as practicable after an accident, (whichever is the earlier) whether changes to the plan should be made.**
- c) make any appropriate changes to the plan identified at the review.**

Notes to rules:

- a) The Accident Management Plan will have been submitted as part of the application, and must be agreed with the Inspector as acceptable in order for it to be incorporated by way of this standard condition.*
- b) A site layout plan, showing details of all surface and foul drains, should be kept in the site office, with a back-up copy elsewhere in case the office is inaccessible in an emergency.*
- c) All staff should be aware of the location and contents of the emergency plan, and their responsibilities in the event of an accident.*
- d) A separate guide 'Accident Management Planning on IPPC farms', is appended (Appendix 2).*
- e) The raw material inventory should be included in the plan.*
- f) Reviewing the plan after an accident or incident is an effective way of preventing particular problems from occurring again. The relevant measures identified in the review must be incorporated into the accident management plan and subsequently implemented.*

2.8 MEASURES FOR CONTROLLING NOISE AND VIBRATION

2.8.1 The Operator shall:

- a) maintain and implement a noise management plan where required;**
- b) review and record if required at least every 3 years or as soon as practicable after a complaint, (whichever is the earlier) whether changes to the plan should be made;**
- c) make any appropriate changes to the plan identified by the review.**

Notes to rules:

a) *It is acknowledged that there is likely to be noise from a pig or poultry farm outside of the installation boundary. The rules for this sector incorporate measures to prevent and where that is not possible to minimise these noise emissions. In certain circumstances you are required to address odour through an noise management plan ie. for those farms where there are sensitive receptors within 400m of the installation and/or the installation has a history of noise related complaints. Condition 2.8.1. would only be required where a noise management plan is required.*

b) *For installations where a noise management plan is required, guidance on producing the plan is included in the "Guidance for Operators on Noise Management at Intensive Livestock Installations". This guide is available from your Inspector.*

c) *Requirements to abate noise will be site specific, depending on the location of the farm.*

d) *Guidance has also been produced by ADAS for Defra: Guidance on the control of noise on pig units*

2.9 RECORDING AND MONITORING

2.9.1 RECORDING

GENERAL REQUIREMENTS

2.9.1.1 Copies of all records, audits and plans shall be made available to the Inspector on request. Where the information forms part of a separate document, reference shall be made to the whereabouts of this document. Records shall be kept for a minimum of two years.

Notes to rule:

There are a number of records, reviews and plans that are produced at different times, either as part of the permit application or during the life of the permitted farm, and in different site-specific situations. These are summarised below

- a) *Records, audits and plans which are required to be submitted with all applications include:*
- i. Site report and site plans;*
 - ii. Accident Management plan (an up to date copy must be available on site at all times);*
 - iii. Raw materials inventory.*

Copies of these documents will be held by the Inspector. Further copies should be provided if there are changes to record.

- b) *Records, audits and plans submitted with the application, but which are not required on some sites include:*
- i. Noise and/or odour management plans;*
 - ii. Records relating to arrangements for spreading on third party land for installations disposing of manure and slurry off site, including where relevant a nutrient management plan for the receiving land;*
 - iii. Records relating to other arrangements for off site disposal of manure or slurry; and*
 - iv. Slurry/Manure Management Plan for installations spreading manure or slurry on site.*

If these are required they will have been submitted with the application. Further copies should be provided to the Inspector if there are changes to record. Up to date copies of the documents should also be available in the farm office.

- c) *Records, audits and plans which need to be in place at the time of the permit application but do not need to be supplied as part of the application include:*
 - i. *site closure plan*
- d) *Records, audits and plans that will be generated once the installation is operational include:*
 - i. *Energy audit (sites without Climate Change Levy Agreement);*
 - ii. *Water audit;*
 - iii. *Waste minimisation audit;*
 - iv. *Improvement plan (for existing installations) eg. Proposals for utilisation of slurries/manures; covering or replacing existing slurry stores and lagoons;*
 - v. *Records of manure/slurry utilisation;*
 - vi. *Records of manure/slurry analysis;*
 - vii. *Records of soil analysis;*
 - viii. *Livestock numbers and movements;*
 - ix. *Record of pollution incidents and remedial action for Decommissioning Plan;*
 - x. *Records of any monitoring carried out;*
 - xi. *Records of inspection and maintenance of structures and plant; staff training; raw materials used.*

These documents must be provided to the Inspector in accordance with the time scales identified in the relevant Rules.

2.9.1.2 **A summary return of the records detailed in 2.9.1.3 and 2.9.1.4 below shall be kept and provided annually to the Inspector to coincide with the June census conducted by DARD.**

LIVESTOCK RECORDS

2.9.1.3 **A record of livestock numbers and movements on and off farm shall be kept, and be made available to the Inspector for inspection.**

Notes to rule:

- a) *This information will be required to estimate the emissions of ammonia to air from the installation, in place of monitoring of emissions directly.*

ON-SITE UTILISATION OF MANURE/SLURRY

2.9.1.4 **The Operator shall:**
(a) maintain records to demonstrate that the slurry/manure management plan is implemented, as required by rule 2.3.5.11 ;
(b) record any changes to the plan as required by rule 2.3.5.12.

Notes to rule:

- a) *Where such records are already kept for other purposes, such as the Nitrates Action Programme requirements, or a farm assurance scheme, this format will usually be sufficient.*
- b) *Occasional use of a weighbridge should be employed to allow a more accurate estimate of the weight in trailer or lorry loads of manure*

OFF-SITE UTILISATION

2.9.1.5 Where manure and slurry are transported off the originating installation, such that responsibility for applying it to land passes to a third party, the permit holder will retain a copy of the nutrient management plan where one is required (see rule 2.3.5.1) and record the following for each transfer of material:

- the recipient(s);
- the amount transported; and
- the date transported.

The records shall be kept for a minimum of two years

2.9.1.6 Where manure and slurry is transported off the installation for other purposes the recipient, amount and date transported shall be recorded. The records shall be kept for a minimum of two years

Notes to rule:

(a) Occasional use of a weighbridge should be employed to allow a more accurate estimate of the weight in trailer or lorry loads of manure

2.9.2 MONITORING

2.9.2.1 Monitoring shall be carried out for any of the parameters set out in the permit at the specified monitoring locations and at frequencies not less than those specified in the permit.

2.9.2.2 The Operator shall maintain records of all monitoring undertaken or carried out including records of the taking and analysis of samples instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.

Notes to rules:

(a) There will be few farms that will need to meet these rules. Monitoring may be required, for example of ammonia, if a farm has sensitive receptors close by.

(b) These rules will be enforced on a site-by-site basis. Please contact the Inspectorate for further information on these rules.

(c) Where the site report submitted with the application indicates that there is a risk of ground pollution, monitoring requirements in addition to the inspection requirements set out in rules 2.1.1.1 to 2.1.1.3 may be included in the permit.

2.10 CLOSURE AND DECOMMISSIONING

- 2.10.1** Within 12 months from the effective date of the Permit, the Operator shall prepare and maintain a Site Closure Plan which demonstrates how the Activities can be decommissioned to avoid any pollution risk and return the site of operation to a satisfactory state.
- 2.10.2** The Operator shall carry out and record a review of the Site Closure Plan at least every 3 years.
- 2.10.3** The Site Closure Plan (or relevant part thereof) shall be implemented on final cessation or decommissioning of the Activities or part thereof.
- 2.10.4** The operator shall notify the Inspector of any amendment of or addition to the plan that he considers necessary. The Inspector's agreement in writing must be obtained before such amendment or addition is made.

Notes to rules:

- a) You must maintain and implement a Site Closure Plan and make it available to the Inspector.*
- b) The Site Closure Plan must be agreed with the Inspector as acceptable in order for it to be incorporated by way of these standard conditions.*
- c) The Site Closure Plan should demonstrate that there has been adequate consideration of how to decommission the unit and return the site to an acceptable state. The Site Closure Plan should be implemented in order to surrender the permit.*
- d) You must discuss any amendments or additions to the plan following any review with the Inspector.*
- e) The Inspector will not accept an application to surrender the permit unless it is demonstrated that there is no pollution risk and no further steps are required to return the site to a satisfactory state.*
- f) Further information and guidance can be obtained from NIEA ie. Supplementary documentary guidance for IPPC applications for intensive livestock farms.*

3. REFERENCES AND CONTACT DETAILS

Department of Environment

- Integrated Pollution Prevention and Control: a Practical Guide

Northern Ireland Environment Agency

- Website: www.ni-environment.gov.uk
- Pollution Prevention Guidance Notes.
- Policy and Practice for the Protection of Groundwater in Northern Ireland July 2001 (available on website)
- conservation sites.

The following documents can be downloaded from the **IPRI website**. Farm regulations
www.ni-environment.gov.uk/environment/industrialPollution/ippc_farmregs.shtml

- Latest version of the Standard Farming Installation Rules and Guidance for Pig Rearing
- Notes for guidance of applicants
- Guidance for operators on noise management at intensive livestock IPPC installations
- Guidance for operators on odour management at intensive livestock IPPC installations
- Guidance for operators on slurry and manure management planning for intensive livestock IPPC installations
- Guidance for operators on preparing an agricultural water audit for intensive livestock IPPC installations
- Example of supporting documentation for an application for a pig unit.
- Guidance for treatment methods for lightly contaminated site run-off from poultry and pig units
- Guidance for operators on dietary management at IPPC pig installations
- Guidance for site reports for intensive livestock installations
- Guidance for assessment of environmental impacts from intensive livestock installations
- Application form for pig and poultry rearing permit
- Application form for a variation to a pig and poultry rearing permit
- Application form for a transfer of a pig and poultry rearing permit
- Application for a surrender of a pig and poultry rearing permit

A web resource called NetRegs has been developed by the Environment Agency in partnership with the Scottish Environment protection Agency, the Northern Ireland Environment Agency and the Small Business Service to help small to medium sized businesses understand their environmental responsibilities <http://www.environment-agency.gov.uk/netregs/>.

The agricultural section of NetRegs contains information on livestock farming (Sector Guidelines > Agriculture > Livestock or via <http://www.environment-agency.gov.uk/netregs/sectors/341895/341911/?version=1&lang=e>

Department of Agriculture and Rural Development (DARD)

- Code of Good Agricultural Practice for the Prevention of Pollution of Water.
- Code of Good Agricultural Practice for the Prevention of Pollution of Soil and Air
- Guidelines on Animal By-Products Regulations

Department for Environment, Food and Rural Affairs (Defra)

- Website: www.defra.gov.uk
- Approved list of disinfectants: http://www.defra.gov.uk/animalh/diseases/control/testing_disinfectants.htm
- Waste Minimisation Manual - opportunities for saving money by reducing waste on your farm (PB4819): <http://www.defra.gov.uk/environment/waste/topics/agwaste.htm#reducewaste>
- Guide to Pesticides (The Blue Book) Electronic Copy: <http://www.pesticides.gov.uk/publications.asp?id=64>
- Code of Recommendations for the Welfare of Livestock: Pigs (PB7050): <http://www.defra.gov.uk/animalh/welfare/farmed/pigs/pigcode.pdf>
- Fertiliser recommendations for agricultural and horticultural crops (RB209) is available from the Stationary Office – see below or can be downloaded in sections via: <http://www.defra.gov.uk/environ/pollute/rb209/index.htm>
- Ammonia in the UK. Defra <http://www.defra.gov.uk/environment/airquality/ammonia/index.htm>

The following three booklets are also available free of charge from ADAS Gleadthorpe Research Centre (Tel: 01623 844331).

- Managing Livestock Manures Booklet 1 Making better use of livestock manures on arable land: <http://www.defra.gov.uk/environ/pollute/farmwaste.htm>
- Managing Livestock Manures Booklet 2 Making better use of livestock manures on grassland: <http://www.defra.gov.uk/environ/pollute/farmwaste.htm>
- Managing Livestock Manures Booklet 3 Spreading systems for slurries and solid manures: <http://www.defra.gov.uk/environ/pollute/farmwaste.htm>

National Office of Animal Health (NOAH)

- Website: www.noah.co.uk
- Telephone: 020 8367 3131
- Email: noah@noah.co.uk
- Address: National Office of Animal Health, 3 Crossfield Chambers, Gladbeck Way, Enfield, EN2 7HF.
- The NOAH Compendium of Data Sheets for Veterinary Products can be obtained from the website.

British Pig Executive (BPEX)/Meat and Livestock Commission (MLC)

- Website: www.bpex.org.uk
- Telephone: 01908 844368
- Email: bpex@mlc.org.uk
- Address: PO Box 44, Winterhill House, Snowdon Drive, Milton Keynes, MK6 1AX

Useful publications:

- Environmental factors in pig production. Description of potential emissions, causes, abatement and legislation: <http://www.stotfoldpigs.co.uk/publish/pdfs/environ.pdf>
- Environmental Management for Healthy Pig Production: http://www.bpex.org/technical/publications/pdf/Environmental_management.pdf

Construction Industry Research and Information Association (CIRIA)

- Website: www.ciria.org
- Telephone: 020 7549 3300
- Email: enquiries@ciria.org
- Address: Classic House, 174-180 Old Street, London EC1V 9BP
- CIRIA report 126 'Farm waste storage – guidelines for construction' can be purchased from CIRIA or obtained through a library – ISBN: 0-86017-352-6.

The Stationery Office

- Web site: <http://www.hmsso.gov.uk>
- Telephone enquiries/orders: 0870 600 5522
- Email: book.enquiries@theso.co.uk
- Address: TSO Publications Centre, PO Box 276, London SW8 5DT

The following regulations can be downloaded from Office of Public Sector Information website (formerly HMSO) (www.opsi.gov.uk) or obtained in printed copy from The Stationery Office:

- The Pollution Prevention and Control (Northern Ireland) Regulations 2003 S.R. 2003 No. 46

- The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil Regulations (Northern Ireland) 2003 S.R. 2003 No. 319
- The Sludge (Use in Agriculture) Regulations (NI) 1990 S.R. 1990 No. 245
- The Groundwater Regulations (NI) 1998 SR 1998 No 401
- The Protection of Water against Agricultural Nitrates Pollution Regulations (Northern Ireland) 2004 S.R. 2004 No. 419
- The Action Programme for NVZs Regulations (NI) 1999 SR 1999 No 156
- Code of Practice for the Agricultural Use of Sewage Sludge. Department of the Environment 1989. ISBN 1 85112 005 X
- Fertiliser Recommendations for Agricultural and Horticultural Crops – Reference Book 209, Defra. ISBN 0 11 242813 4.

European Integrated Pollution Prevention and Control Bureau

Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs, July 2003, available from <http://eippcb.jrc.es/pages/FActivities.htm>.

Health and Safety Executive

- Website: www.hse.gov.uk
- Telephone: 08701 545500
- Email: hseinformationservices@natbrit.com
- Address: HSE Infoline, Caerphilly Business Park, Caerphilly, CF83 3GG

Agriculture Homepage: <http://www.hse.gov.uk/agriculture/index.htm>

Guide to Pesticides (The Blue Book) Electronic Copy.
<http://www.hse.gov.uk/bluebook/>

Farm Energy Centre

- Website: www.farmenergy.com
- Telephone: 0247 669 6512
- Email: info@farmenergy.org.uk
- Address: Farm Energy Centre, NAC Stoneleigh Park, Kenilworth, Warwickshire, CV8 2LS

Information on energy auditing on farms can be obtained via:
<http://www.farmenergy.com/services3.html>

A range of publications can be ordered from the Farm Energy Centre. The following can be downloaded from the website:

Technical Note TN37 - Energy Efficiency in Pig Production can be downloaded via:
<http://www.farmenergy.com/pig-tn37.html>

The Carbon Trust

- Website: www.thecarbontrust.co.uk
- Telephone helpline: 0800 085 2005
- Address: The Carbon Trust, 8th Floor, 3 Clement's Inn, London, WC2A 2AZ
- The Energy Consumption Guide 'Energy Use in Pig Farming' can be obtained via the website or from the NPA website via: http://www.npa-uk.net/ds_portal/library/Carbon%20Trust%20Pig%20Farming%20ECG0891.pdf

British Standards

- Website: www.bsi-global.com
- Telephone: 020 8996 9000
- Email: cservices@bsi-global.com
- Address: 389 Chiswick High Road, London, W4 4AL
- BS 5502-50:1993. Buildings and structures for agriculture. Code of practice for design, construction and use of storage tanks and reception pits for livestock slurry.

ACORUS

- Website: www.acorus.org
- Online enquiry service: <http://www.acorus.org/enquiryform.htm>

Construction Guidance Notes can be obtained via: <http://www.acorus.org/cgn.htm> including:

- CGN 100 Organising contracts for farm waste structures (manure and slurry);
- CGN 001 Above-ground circular concrete and rectangular weeping-wall slurry stores;
- CGN 003 In-situ concrete slurry stores
- CGN 004 Above-ground circular steel slurry stores;
- CGN 008 Separation of clean and dirty water, dirty water storage, yard area construction;
- CGN 009 Bunds for agricultural fuel oil tanks
- CGN 010 Sluice valves on steel and concrete circular above-ground slurry stores;
- CGN 011 The use of covers on circular steel and concrete slurry stores

Appendix 1 Raw materials proforma

Inventory of Raw Materials	On approved Lists (see note 1)	Quantity used (kg/yr)	Quantity stored on site (kg)
a. Biocides (includes disinfectants, wood preservatives, slimicides)			
b. Pesticides (including herbicides, fungicides, insecticides, vertebrate control products, biological pesticides)			
c. Veterinary medicines (see note 2)			
d. Bedding Types (see note 3)			
e. Fuels			

Note 1: Approved Lists

Defra/HSE Guide to Pesticides (The Blue Book) Electronic Copy (previously referred to as Defra/HSE Reference Book 500)

Pesticides

National Office for Animal Health compendium

Veterinary medicines

DARD approved list of disinfectants

Disinfectants

Note 2: Veterinary Medicines

Volumes or weights of products kept on site for general purposes should be recorded.

Anticipation of disease outbreaks, such as CSF or FMD is not required, the intention is to show what medicines would be stored on site in normal circumstances.

Note 3: Bedding

An indication of the types of bedding used is required. Details of quantities stored are not needed.

Appendix 2 *Accident Management* planning for IPPC farms

This guidance note has been drawn up to help you develop a site specific accident management plan to prevent and reduce damage to the environment caused by disease outbreaks or accidents such as spillages and fires. It is aimed at those farms regulated under the PPC Regulations. This note has been modified from PPG21: Pollution Incident Response Planning which was jointly produced by the Environment Agency, the Scottish Environmental Protection Agency (SEPA) and the Northern Ireland Environment Agency referred to as the Agency or Agencies.

1 Introduction

The Agencies' guidance on industrial sites (PPG11-Reference 1) provides basic advice on proactive pollution prevention. Further information on techniques for managing run-off generated in the event of a fire ("fire water") and major spillages is available in PPG18-Reference 2.

This guidance document provides extra advice on accident management planning. It identifies why an accident management plan is needed, what information should be included and provides a template as a starting point for those preparing such a plan. It aims to help farmers consider the appropriate level of detail for a specific site, taking into account the risks and the site layout.

2 Why produce an accident management plan?

Farms have the potential to cause significant environmental harm and to threaten water supplies and public health. The Agencies publish a range of pollution prevention guidance notes, which will, if followed, minimise the risk of an incident occurring; there will always be a residual risk of an accident or emergency that could cause serious environmental problems. In addition to the obvious threat posed by chemicals and oils, even materials which are non-hazardous to humans, such as foods and beverages, can cause serious environmental harm. The run-off generated in the event of a fire can also be very damaging.

The environmental impact of such an incident may be long term and, in the case of groundwater, may persist for decades or even longer. As a result, the legal consequences and clean-up operation can be costly. Rivers, sewers, culverts, drains, water distribution systems and service ducts all present routes for pollutants to travel off-site. As a result, the effects of a discharge may not be evident on site but may become apparent some distance away. In some cases, for example in the event of a fire, atmospheric deposition could also have a long-range impact.

In most cases, an incident of this kind need not result in serious environmental damage, providing appropriate pollution prevention measures are in place or immediately available. The key to this is to have in place an accident management plan. This need not be costly to prepare, but could minimise the consequences should an emergency arise.

3 Producing an accident management plan

The accident management plan should contain the following:

a. Cover page

This contains details of the site and of those for whom the plan is relevant. This should be completed with:

Box 1 - Company name and full postal address.

Box 2 - a brief description of the main business activities on site – for example ‘intensive pig unit with slurry storage’.

Box 3 - Date plan completed and date the plan is due to be reviewed.

Box 4 - The plan should be "signed-off" by an appropriate company manager.

Box 5 - A list of recipients of the completed plan.

b. Contact list

This should list key contact numbers for the Emergency Services, the Northern Ireland Environment Agency, NI Water, the Health and Safety Executive for Northern Ireland, DARD Veterinary Service and specialist clean-up contractors. Staff who are key-holders and those who would be contacted in the event of a significant incident should be identified (including home and mobile numbers). Include the contact numbers for any sources of specialist advice, such as chemical suppliers and manufacturers whose products are on site.

c. Site drainage plan

This should have a clear diagram of the site showing layout and access details, along with a schematic representation of the site drainage arrangements. Use red for foul drainage and blue for surface water drainage and clearly indicate the direction of flow. A similar approach should be used for drain covers on site, which can also be numbered to assist identification.

The plan should indicate:

- i. General layout of buildings.
- ii. Clearly mark site access routes for emergency services.
- iii. The location of hydrants, "fireboxes" (see section 6) and materials for pollution prevention (such as spill kits or straw).
- iv. Identify any bunded areas along with substance stored and estimated retention capacity.
- v. The location of livestock housing, and manure and slurry treatment and storage structures.
- vi. The location of areas or facilities used for storage of raw materials and waste.
- vii. The location of LPG storage facilities.
- viii. Show the location of sprinkler control valves (where present) and the mains water supply stopcock.
- ix. Identify facilities such as inspection points for the detection of pollution (for example surface water drain outlets to ditches or streams, oil separators, pollution control devices such as shut-off valves in drains. Indicate sites suitable for portable storage tanks or for blocking drains. Provide a brief description of how they operate and ensure such facilities are clearly labelled above ground on site.

- x. If surface water discharges to soakaways, show their location, depth and construction details.
- xi. Show any watercourse, borehole or well within or adjacent to the site. Indicate the direction of flow (or depth for boreholes and wells), surface water outfalls from the site and suitable points for installing pollution control booms or a dam. If possible, boom anchor points should be permanently installed at a suitable location, taking into account possible flow conditions.

It is important to have a simple site drainage plan with the key details shown. In some cases, additional plans will be required to provide detailed information. These should be attached to the plan and referenced within it.

d. Site oil, chemical and raw materials inventory

An inventory of materials is a requirement of the PPC Regulations. The whereabouts of the on-site inventory should be included in the plan.

4 Accident procedures

Accident procedures should define the scope of activities covered, staff responsibilities and the procedures for dealing with events such as spillages and leaking containers. The level of response will depend on Health and Safety issues, staff training, the level of personal protective equipment available, the nature of any spilled materials and the types of pollution control equipment available on the site. The appropriate level of response will, therefore, be site specific. It is important to consider what could happen in the worst case and to take this into account in developing the procedures. A checklist of actions may be a useful addition.

In general they should address the following issues:

- i. Fire fighting strategy. This should be discussed with the fire service. If controlled burn is an agreed option, (see Reference 2 for details) this should be clearly stated.
- ii. Disease strategy. Actions to be taken on destocking the unit. An emergency disposal plan should be prepared as part of this document, for disposal of carcasses off-site and, in the event of restrictions on movement, on-site. The procedures for dealing with Notifiable disease should be discussed with DARD Veterinary Service.
- iii. Nearby properties, downstream abstractors or environmentally sensitive sites which could be affected by an incident
- iv. The consequences of an incident at nearby properties
- v. Procedures for alerting staff on site, and where appropriate, adjacent sites. This should include evacuation procedures.
- vi. Contacting the emergency services, NIEA, district council and other organisations concerned and dealing with the press.
- vii. Substances posing particular risks should be highlighted in the Accident Management Plan.
- viii. The selection of the appropriate level of personal protective equipment
- ix. The means of making leaking containers safe

- xi. Procedures for containing leaks, spills and fire-fighting run-off. The location and use of spill kits, drain blockers and other pollution control equipment and the operation of pollution control devices should be documented.
- xii. The main routes of pollutants in the event of spillage should be established. This will make it possible to quickly block off routes and prevent damage to the environment.
- xiii. Procedures for the recovery of spilled product and the safe handling and disposal of any wastes arising from the incident. Reference 2 (PPG18) contains some useful relevant information.
- xiv. Procedures for dealing with:
 - a) Slurry and manure management in the event of:
 - Very wet weather;
 - Land that is frozen hard;
 - Overcoming cropping / grazing constraints. Including seasonal effluent production and management practices to overcome potential constraints); and
 - Addressing constraints on spreading to avoid smell nuisance (during certain weather conditions).
 - b) Measures to be taken in the event of:
 - Power / mechanical failure;
 - Store / system overflows – are high and low level alarms appropriate?
 - An accident arising during slurry spreading operations; and
 - Additional safeguards if night-time pumping is proposed for Low Rate Irrigation system.

5 Training

The effectiveness of any site incident response plan will depend on staff training. All staff and contractors working on site should be made aware of the plan and should know their role if an incident occurs. Exercises should be carried out to familiarise staff with the operation of the plan and to test its effectiveness. Records of such exercises should be included in the staff training records required by the permit.

6 Distribution and revision

A copy of the accident management plan should be submitted to the Inspectorate as part of the IPPC permit application. A copy should be kept in the farm office, but also keep a copy of the plan on site in an easily accessible location away from the main building, such as a gate-house or a dedicated "firebox" to which the emergency services can gain access. A notice at the site entrance should indicate the location of the plan. Finally, for the plan to remain effective, it is vital that it is regularly reviewed and that any significant changes are reflected in a revised plan. Ensure that revised copies are sent to all plan holders and that old versions are destroyed.

7 References

1. PPG11: Preventing pollution on industrial sites
2. PPG18: Managing fire-water and major spillages

EXAMPLE LAYOUT FOR ACCIDENT MANAGEMENT PLAN

ACCIDENT MANAGEMENT PLAN

For:

Date of plan

Review date:

Approved by:

Copied to?

Date sent:

CONTENTS:

Page 2 Contact details

Page 3 Site Drainage plan

Page 4 Accident procedures

EMERGENCY CONTACT DETAILS

Emergency services: 999

Local police:

Doctor:

Environment hotline: 0800 80 70 60

Office hours

Out of hours

District Council:

Sewage undertaker:

Water undertaker:

Gas supplier:

Electricity supplier:

Oil supplier:

Spreading contractor:

Maintenance contractor:

Specialist advice:

Waste disposal contractor:

Clean-up contractor:

COMPANY CONTACTS (Out of hours)

Managing director:

Site manager:

Head office contact:

SITE DRAINAGE PLAN



ACCIDENT PROCEDURES

Appendix 3 Minimising Emissions from New Pig Housing - Examples of Housing Designs from the BREF

The following examples of housing designs are taken from the Reference Document on Best Available Techniques (BAT) for Intensive Rearing of Poultry and Pigs, commonly referred to as the BREF, published in July 2003 by the European IPPC Bureau. These sections are reproduced here so that applicants do not need to obtain and read the BREF which is 341 pages long. If required, the full document can be downloaded at <http://eippcb.jrc.es/pages/FActivities.htm>. As this text is taken from a European document all costs are stated in Euros.

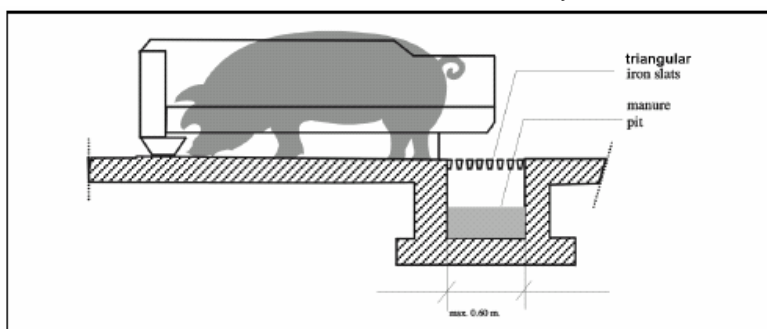
This appendix will be updated as further information becomes available on these housing designs and as new techniques and designs are evaluated and considered to be BAT.

The following examples are divided into sections for sows, farrowing sows including piglets, weaners and growers/finishers. The Standard Farming Installation Rule number/s that the section relates to is stated in the section heading. Each section is then sub-divided into the housing designs referred to in the Rules with the relevant BREF section reference included in the sub-section heading.

3.1 Sows (Rule 2.3.3.7)

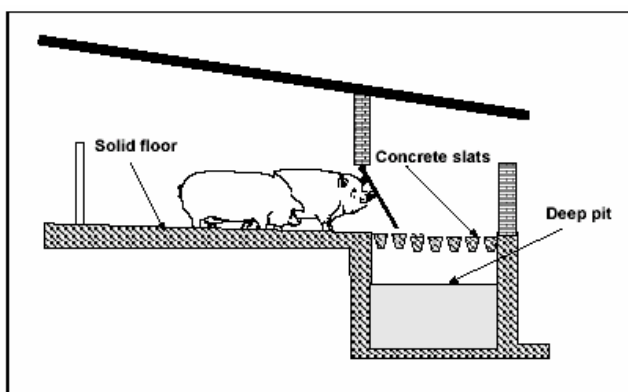
3.1.1 Partly-slatted floor with a reduced area manure pit (BREF 4.6.1.4)

Description: Ammonia emissions can be reduced by reducing the manure surface area, in particular by applying a small manure pit with a maximum width of 0.60m. The manure pit is equipped with triangular iron slats or concrete slats. The sows are individually housed.



Individual housing with a small manure pit

In Italy a loose-housing design is applied with a fully-slatted external alley with the slurry pit underneath; the slurry not being removed very frequently. Indoors, the animals are kept on a solid concrete floor, a hatched opening giving access to the external alley. This design can not be compared with the systems for loose-housed sows with the partly-slatted floors inside the housing. The applied reduction techniques show similar environmental performances and operating conditions, but may differ slightly in costs.



Solid concrete floor and fully-slatted external alley with storage pit underneath

Achieved environmental benefits: The combination of the reduction of the manure pit and slurry surface and the fast discharge of manure by using triangular slats reduce NH₃-emissions by 20 to 40 %. In a system, individual housing and group housing show different emissions due to the differences in manure emitting surface per sow. With loose housing of sows, levels are reported to be 2.96 kg NH₃ per sow place per year (Italy). For the individual housing of sows levels of 1.23 (Denmark) and 2.40 (Netherlands) NH₃ per sow place per year respectively have been reported.

Cross-media effects: These houses can be naturally or mechanically ventilated. In Denmark mechanical ventilation is applied and dimensioned for an output of a maximum of 100 m³ per hour per sow place. In areas with low outdoor temperatures these units can also be equipped with auxiliary heating. Energy input is unchanged. In the case of the external slurry pit, a reduced emission will not benefit the internal environment, which can be considered as one of the advantages of the reduced pit inside. In Italy energy savings are possible because artificial ventilation is not required.

Operational data: The slurry is usually removed via a central sewer system by opening a valve and using inclination of the manure pipe. Some systems are equipped with scrapers.

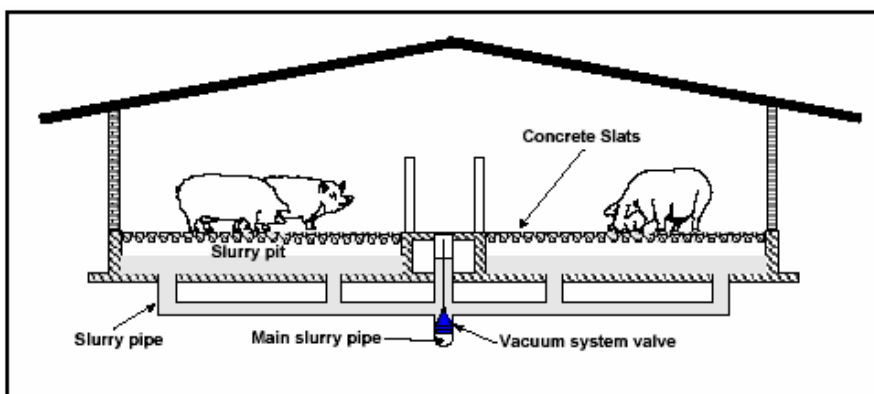
Applicability: In existing houses, the applicability depends on the design of the existing manure pit, but it is mostly difficult, if not impossible, to apply. For existing housings with an internal concrete solid floor an extension with an external alley with a storage pit might be possible. The application of a maximum width of 0.60 m may require more pit depth or more frequent removal and then outside manure storage. If a minimum pit size is imposed then by relation, a reduction will not be applicable, (e.g. Ireland: > 0.90 m). In some European countries (e.g. DK) the individual housing of sows will decline because of changing legislation stipulating loose-housing systems.

Costs: The remaining ammonia emission compared with a fully-slatted floor depends on the reference. With a 40 % reduction (4.2 to 2.4 kg NH₃), the additional investment is about EUR 17.75 per sow place or EUR 9.85 per kg NH₃ abated. Additional annual operating costs are EUR 5.80 per sow place or EUR 3.25 per kg NH₃. With a 20 % reduction, an additional investment of EUR 1.76 per sow place was reported. The system with the external manure pit and slatted floor reportedly had an additional investment of EUR 8.92 per sow place per year.

Reference farms: This is a very common housing system for mating and gestating sows in many European Member States. In Italy 40 % of the growers/finishers are kept in these kind of installations.

3.1.2 A fully-slatted floor with vacuum system for frequent slurry removal (BREF 4.6.1.1)

Description: On the bottom of the pit under a fully-slatted or part-slatted floor, outlets are placed every 10 m² and that are connected to a sewerage system. Slurry is discharged by opening a valve in the main slurry pipe. A slight vacuum develops and allows the slurry removal. The pit can be emptied once or twice a week, depending on the capacity of the pit itself.



Fully-slatted floor with vacuum system

Achieved environmental benefits: Reduction of NH₃-emission by about 25% due to frequent removal of slurry. Italian data reported about 2.77 kg NH₃ per sow place per year.

Cross-media effects: As the system is manually operated, no additional energy is required. Less water is needed to clean the floor compared to partly-slatted or solid concrete floors. It is suggested that any aerosols which develop during the discharge of the slurry are removed by the vacuum created when opening the valves.

Operational data: This technique is easy to operate compared to the reference technique.

Applicability: In existing houses, this technique may be applicable with:

- solid concrete floors and with sufficient height to build on top of the existing floor

- renovation of a FSF with a storage pit underneath.

Costs: Italy reported a negative extra cost (i.e. a benefit) of EUR 8.60 per sow place per year, when applied in new housing, compared to the costs of the reference system.

Reference farms: An increasing number of farms in Italy are adopting this technique in new housing for gestating sows, e.g. Sartori farm, Parma.

3.1.3 A partly-slatted floor with vacuum system for frequent slurry removal (BREF 4.6.1.6)

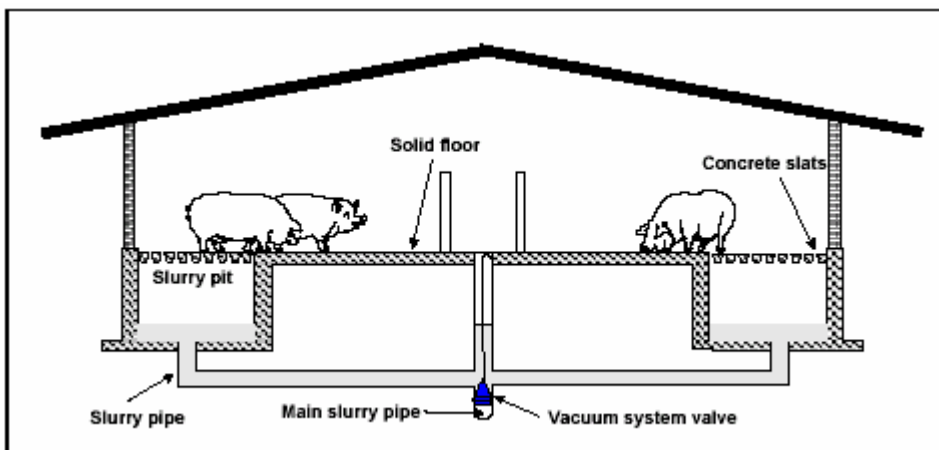
Description; cross-media effects: See 3.1.2.

Achieved environmental benefits: With a partially slatted floor and a vacuum system the NH₃-emission is reduced to 2.77 kg NH₃ per sow place per year on concrete slats, and to 2.40 kg NH₃ per sow place per year on metal slats for loose housed sows. This compares with the reference as relative reductions of 25 % and 35 % respectively.

Operational data: This technique is easy to operate compared to the reference technique.

Applicability: In existing housing application, its applicability is limited to housing with partially slatted floors and a storage pit with sufficient depth.

Costs: There are no data available on capital costs, but the annual operational costs are thought to be the same as for growers/finishers and this is an estimated negative extra cost (i.e. a benefit) of EUR 4 when concrete slats are applied and EUR 1.50 (also a benefit) when metal slats are applied in a new housing.



Partly-slatted floor with vacuum system

3.2 Farrowing sows including piglets (Rule 2.3.3.9)

3.2.1 Farrowing pen with part or fully-slatted iron or plastic floor with a combination of water and manure channel (BREF 4.6.2.2)

Description: The sow has a fixed place and as a result it is clear where the dunging area will be. The manure pit is split up into a wide water channel at the front and a small manure channel at the back. This greatly reduces the manure surface, which in turn reduces the ammonia emission. The front channel is partly filled with water. The slats are made of iron or plastic.

Achieved environmental benefits: It limits the manure surface and has frequent removal of the slurry by a sewerage system. A reduction of 52 % (4.0 kg NH₃ per sow place per year (NL, B)) can be achieved.

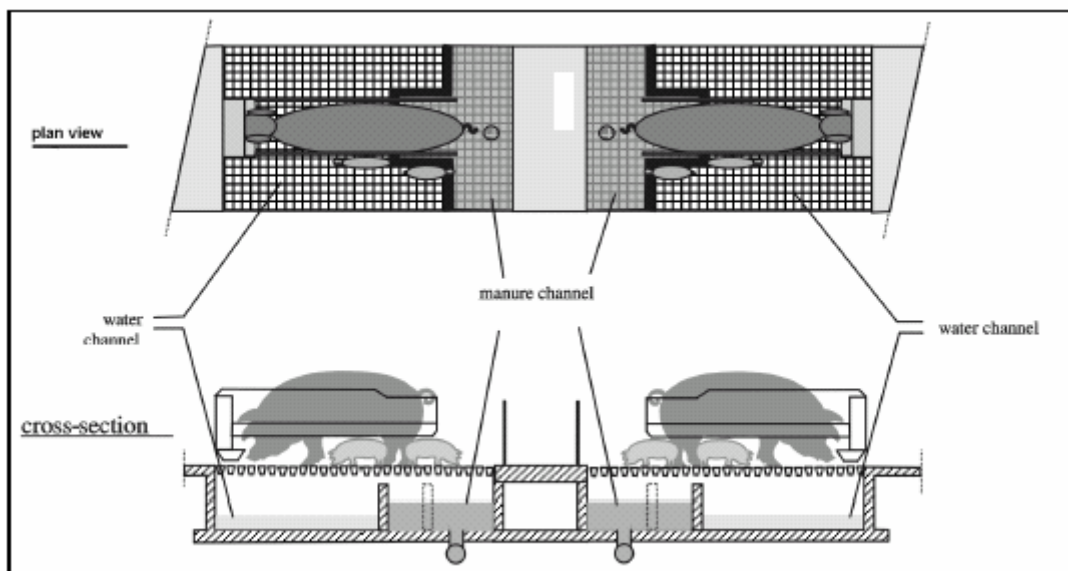
Cross-media effects: The frequent removal of the slurry may require extra energy. Water is needed to fill the front pit.

Applicability: This system is easy to implement in the reconstructions of existing buildings with the reference technique, as the design of the pen is not critical for the applicability of the system. Very simply, all that would be needed would be separation of the two pits.

Operational data: Supposedly the two pits are emptied into the same slurry sewerage system towards the slurry store. Water is changed after each round (approximately 4 weeks). The front section is drained completely, cleaned, disinfected and then filled up again with fresh water.

Costs: The extra investment costs are EUR 60 per pig place. This means for a 52 % reduction about EUR 13.85 per kg NH₃ abated. The extra annual operational costs are EUR 1.00 per pig place or EUR 0.25 per kg NH₃.

Reference farms: In the Netherlands 5000 sow places are equipped with this system.



Combination of a water and manure channel

3.2.2 Farrowing pen with part or fully-slatted iron or plastic floor with a flushing system with manure gutters (BREF 4.6.2.3)

Description: Small gutters limit the manure surface. This reduces the ammonia emission. Application is possible in pens with a partly or fully-slatted floor. The manure is removed frequently by a flushing system. The slats are made of triangular iron slats. The gutter sides should have a slope of 60 degrees. The gutters should be flushed twice a day. The flushing will be done by the liquid fraction of the manure (after separation), where the dry matter content should not be higher than 5%.

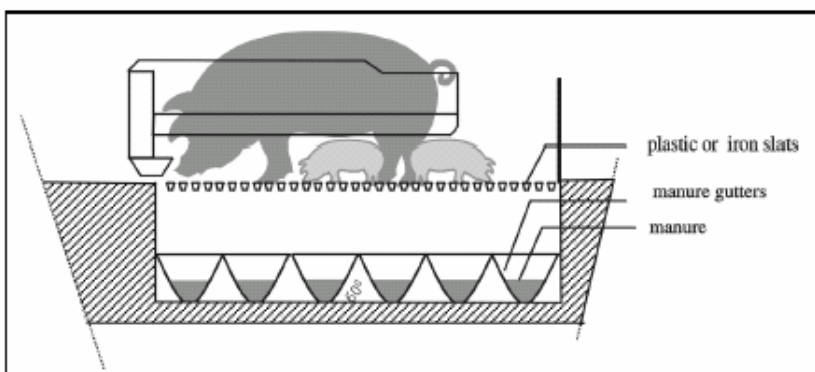
Environmental benefit: Limiting the manure surface in the manure channel, in combination with fast discharging of the manure from the slatted area by using plastic or iron triangular bars, and removing the manure twice a day by flushing reduces NH₃ emissions by 60 % (3.3 kg NH₃ per sow place per year (NL, B))

Cross-media effects: This system has an extra energy consumption of 8.5 kWh per sow place per year, related to the flushing of the gutters. Odour peaks due to flushing may cause a nuisance when receptors are living near the farm. On a case by case basis it has to be decided whether an overall load (thus applying a no-flushing system) or peak values are more important.

Applicability: In existing houses the applicability depends on the design of the existing manure pit, but it does not seem difficult with the reference system.

Costs: The extra investment costs are EUR 535 per sow place. This means with a 60 % reduction, i.e. 8.3 to 3.3 kg NH₃, costs are EUR 107 per kg NH₃ abated. The extra operational costs per year are EUR 86.00 per pig place. This means EUR 17.20 per kg NH₃. To achieve a slightly better reduction extra costs are considerably higher than those reported for the system with a separated water and manure channel. This difference could not be explained from the submitted information.

Reference farms: In the Netherlands, about 500 farrowing sow places are equipped with this system.



Flushing system with manure gutters

3.2.3 Farrowing pen with part or fully-slatted iron or plastic floor with a manure pan underneath (BREF 4.6.2.4)

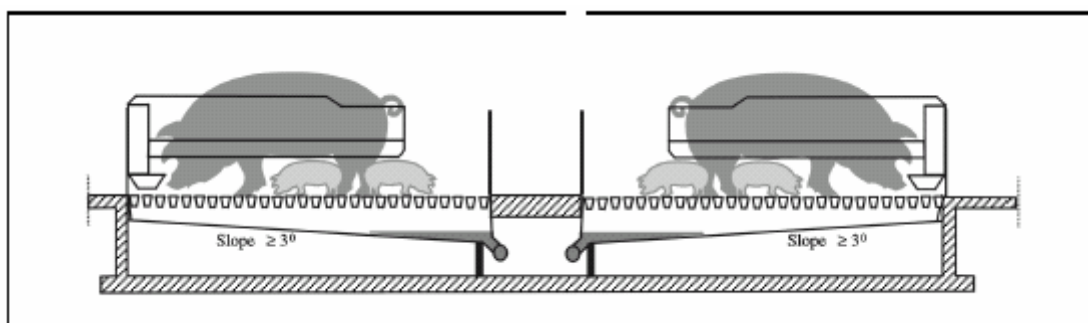
Description: A prefabricated pan is placed under the slatted floor and can be adapted to the dimensions of the pen. The pan is deepest at one end of the pen and the pan has a slope of at least 3° towards a central slurry channel. The pan is connected with a sewerage system. Every three days the manure should be removed by the sewerage system. The application does not depend on the pen design, or on whether it is with a fully or a partly-slatted floor. The slats are made of iron or plastic.

Environmental benefit: Limiting the manure surface and frequent removal of the slurry by a sewerage system achieves a 65 % reduction of NH₃-emissions (2.9 kg NH₃ per sow place per year). An increased reduction of 50 % compared with the sloped board construction is achieved, although both designs seem to be very similar. A lower emitting surface and a more frequent removal of the slurry is considered to be the most important factors determining the difference.

Applicability: This system is easy to implement in reconstructions of existing buildings. The design of the pen is not critical for the applicability of the system.

Costs: The extra investment costs are EUR 280 per pig place. This means with a 65 % reduction, i.e. 8.3 to 2.9 kg NH₃, costs are EUR 53.85 per kg NH₃ abated. The extra operational costs per year are EUR 45.85 per pig place. This means EUR 8.80 per kg NH₃.

Reference farms: In the Netherlands, about 10000 sow places are equipped with this system. This system has only recently been developed (1998). Currently this system is being implemented in many reconstructions as well as in new buildings.



Fully-slatted floor with manure pan

3.3 Weaners (Rule 2.3.3.11)

3.3.1 Slurry systems with a pen or flatdeck with a fully-slatted (BREF 4.6.1.1) or partly-slatted (BREF 4.6.1.6) floor with a vacuum system for frequent slurry removal

See 3.1.2 and 3.1.3 for details.

3.3.2 Slurry systems with a pen or flatdeck with a fully-slatted floor beneath which there is a concrete sloped floor to separate faeces or urine (BREF 4.6.3.1)

Description: A board (concrete or other material) with a very smooth surface is placed under the slatted floor. The size can be adapted to the dimensions of the pen. The board has a slope of at least 12° towards a central slurry pit, which is connected with a sewerage system. The slurry is removed weekly to a store by gravity or by pumping. The slats are made of iron or plastic. At the end of the weaning period, dry faeces are easily removed by water jets.

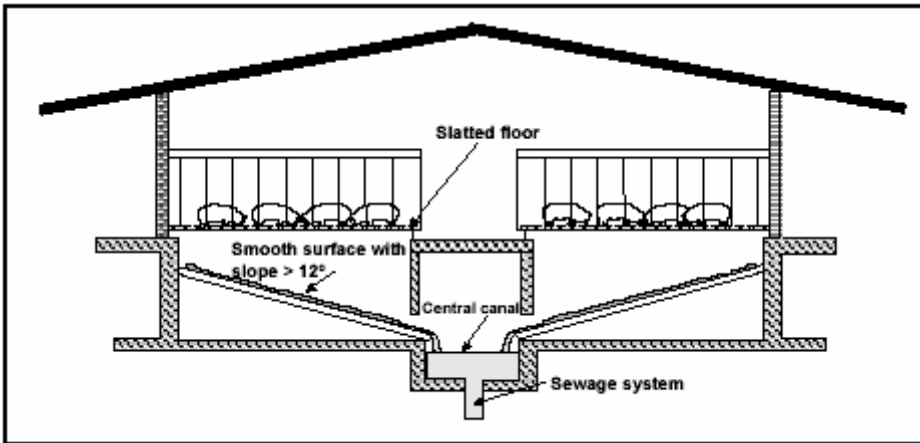
Achieved environmental benefits: Immediate removal of manure to central channel and immediate draining of urine achieves reduction of 30 % (0.42 kg NH₃ per pig place per year (I)).

Cross-media effects: There is no additional energy required.

Applicability: With a manure pit of sufficient depth, this technique can be easily applied in existing housing.

Costs: Investment costs are estimated to be less than the reference, if the benefits are included in costs calculation.

Reference farms: A few applications in Italy.



Flatdecks or pens with concrete sloped floor underneath to separate faeces and urine

3.3.3 Slurry systems with a pen with a partly-slatted floor (two climate system) (BREF 4.6.3.4)

Description: Manure is handled as a slurry. It is often drained through a pipe discharge system where the individual sections of the manure channels are drained via plugs in the discharge pipes. The channels can also be emptied via gates. The channels are drained after the removal of each group of pigs, often in connection with disinfecting the pens, i.e. at intervals of 6 - 8 weeks.

Achieved environmental benefits: A reduction in ammonia emissions by 34 % (0.53 kg NH₃ per pig place per year) is achieved when applying this technique. This technique has been applied in Denmark and its performance is therefore compared with the emission level of the reference obtained in Denmark (0.8 kg NH₃ per pig place per year).

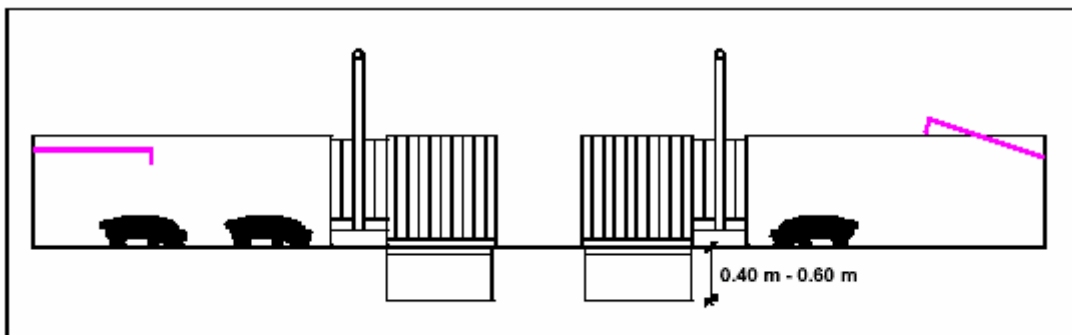
Cross-media effects: The naturally ventilated design uses less energy compared to the reference.

Operational data: This housing type is normally equipped with mechanical ventilation, either in the form of negative-pressure or balanced-pressure ventilation. The ventilation is dimensioned for a maximum output of 40 m³ per hour per place. Auxiliary heating is available in the form of either electric fan heaters or a central heating plant with heating pipes. Naturally ventilated designs are also applied.

Applicability: This system is applicable in new and existing installations.

Costs: The extra investment costs and operational costs are estimated to be equal to the reference system.

Reference farms: It is estimated that in Denmark 30 – 40 percent of the weaners, corresponding to about 1600000 places, are housed on partly-slatted floors weighing from 7.5 to 30 kg. This figure is expected to increase.



Cross-section of rearing unit with partly-slatted floor, two climate

3.3.4 Slurry systems with a pen with a partly-slatted iron or plastic floor and a sloped or convex solid floor (BREF 4.6.3.5)

Description: Using a partly solid concrete floor reduces the manure surface which reduces the ammonia emission. Application is possible in pens with a convex floor. The convex floor separates the two channels. Application is also possible in pens with a partly-slatted floor consisting of a solid concrete floor on a slope in front of the pen. The slats can be iron or plastic (not concrete slats).

Achieved environmental benefits: Limiting the manure surface in the manure channel achieves a reduction of 43 % (0.34 kg NH₃ per pig place per year). The reduction can in fact only be achieved by

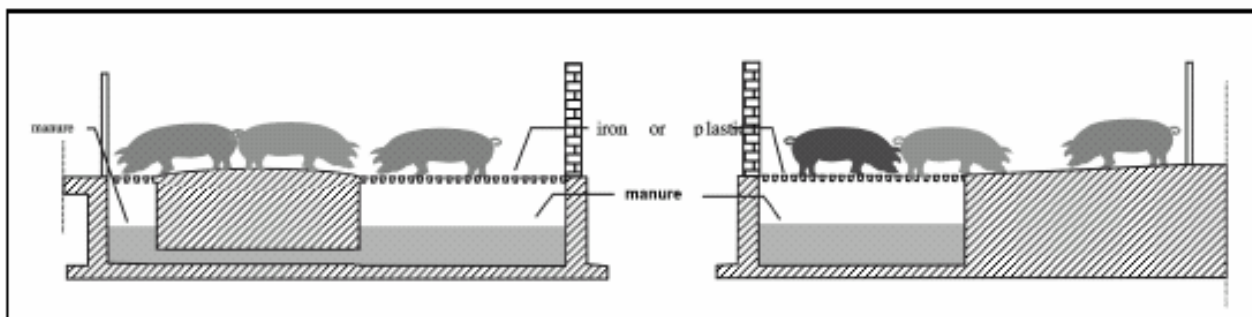
changing the design of the pen. This design is similar to the previous design, although a higher reduction is achieved, which is attributed to the convex or sloped floor.

Operational data: It is assumed that this is similar to the reference system.

Applicability: The system with partly-slatted floor or a convex floor can be applied in new houses. In existing houses the applicability depends on the design of the existing manure pit.

Costs: Extra investment is not needed if this alternative could be applied instead of a fully-slatted floor. Annual costs are also similar.

Reference farms: At least 10000 piglet places have been equipped with this system in the Netherlands.



Partly-slatted floor with iron or plastic slats and convex or sloped concrete floor

3.3.5 Slurry systems with a pen with a partly-slatted metal or plastic floor and a shallow manure pit and channel for spoiled drinking water (BREF 4.6.3.6)

Description: Using a partly solid concrete floor reduces the manure surface which reduces the ammonia emission. Application is possible in pens with a convex floor. The convex floor separates the two channels. The front channel is partly filled with water, as the pigs don't normally use the front area as a dunging area. Only spoiled feed concentrates come into the front channel. The main function of the water is to prevent flies breeding.

Achieved environmental benefits: Limiting the manure surface in the manure channel, together with quickly discharging the manure on the slatted area by using iron triangular bars and removing the manure frequently by a sewerage system reduces emissions by 57 % (0.26 kg NH₃ per pig place per year (NL, B)).

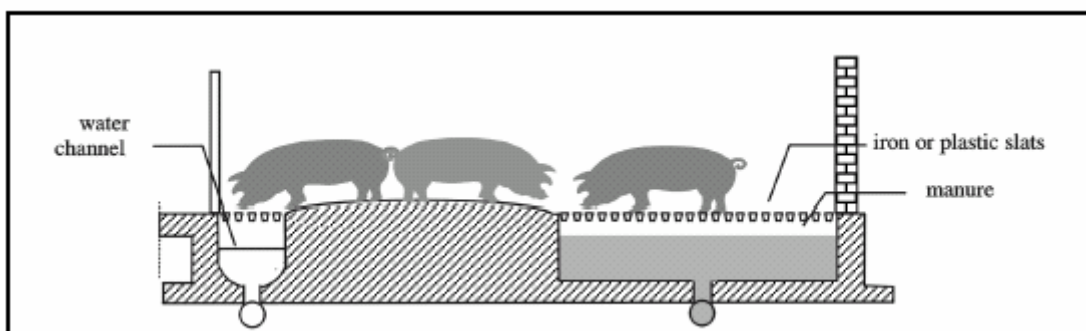
Cross-media effects: No extra energy required.

Operational data: It is assumed to be similar to the reference system.

Applicability: In existing houses the applicability depends on the design of the existing manure pit.

Costs: The extra investment is EUR 2.85 per pig place. The extra annual operational costs are EUR 0.35 per pig place.

Reference farms: In the Netherlands, about 250000 weaner places have been equipped with this system.



Shallow manure pit with a channel for spoiled drinking water in front in combination with a convex floor with iron or plastic slats

3.3.6 Slurry systems with a pen with a partly-slatted floor with triangular iron slats and a manure channel with sloped side walls (BREF 4.6.3.9)

Description: Side wall(s) on a slope reduce the manure surface which reduces the ammonia emission. Application is possible in pens with a convex floor. The convex floor separates the two channels. The front channel is partly filled with water, as the pigs do not normally use the front area as a dunging area. Only spoiled feed concentrates come into the front channel. The main function of the water is to prevent flies

breeding. Application is also possible in pens with a partly-slatted floor consisting of a solid concrete floor on a slope in front of the pen. The manure will be removed frequently by a sewerage system. The slats are made of triangular iron bars. The manure surface in the manure channel should not be larger than 0.07 m² per pig place. The surface of the sloping wall(s) should be made of a smooth material to prevent the manure adhering to the surface. A sloping wall at the back is not required, but when a sloping wall is present, then this wall should have a slope between 60 and 90 degrees. The wall next to the solid concrete floor should have a slope of between 45 and 90 degrees.

Achieved environmental benefits: Limiting the manure surface in the manure channel, together with a fast discharge of the manure from the slatted area by using iron triangular bars and a frequent removal of the manure by means of a sewerage system achieves a 72 % reduction (0.17 kg NH₃ per pig place per year).

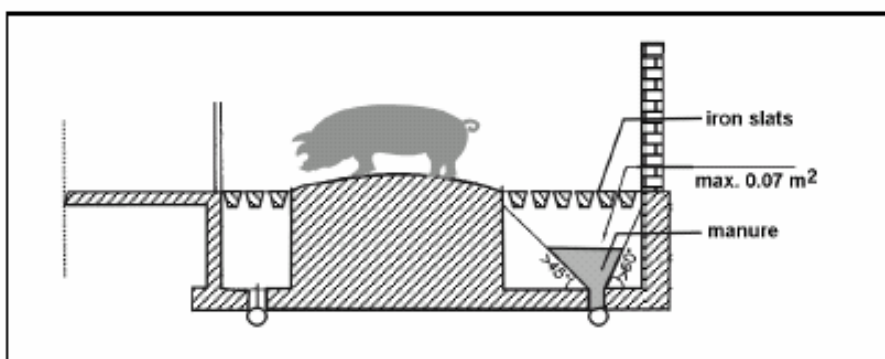
Cross-media effects: This system does not need extra energy compared with the reference.

Operational data: This is similar to the reference system.

Applicability: The system with side wall(s) on a slope can be applied in existing houses, with only a few alterations.

Costs: Extra investment costs are EUR 4.55 per pig place. With a 72 % reduction, this means about EUR 10.58 per kg NH₃ abated. Extra annual operational costs are EUR 0.75 per pig place or EUR 1.74 per kg NH₃.

Reference farms: This system is a recent development (1998). Currently this system is being implemented in most new buildings and alterations in the Netherlands.



Convex floor with triangular iron slats in combination with sewerage system and side walls on a slope in the manure channel

3.4 Growers/Finishers (Rule 2.3.3.13)

3.4.1 Slurry systems with a fully-slatted floor with vacuum system for frequent removal (BREF 4.6.1.1)

See 3.1.2 for details.

3.4.2 Slurry systems with a partly-slatted floor with a reduced manure pit, including slanted walls and a vacuum system (BREF 4.6.4.3)

Description: See Section 3.4.3 below where the system applying slanted walls is described and Section 3.1.2 above where the vacuum system is described. Combining the positive effects of these two techniques results in the PSF with a reduced manure pit, including slanted walls and a vacuum system.

Achieved environmental benefits: Due to limiting the manure surface in the manure channel and removing manure frequently by a vacuum system, it is estimated that the emission could be reduced by at least 60 % with concrete slats and by 66 % in the case of triangular iron slats.

Cross-media effects: As the system is manually operated, no additional energy is required. It is suggested that the vacuum created when opening the valves removes aerosols developing during discharge of the slurry.

Operational data: Similar to the reference system.

Applicability: The system with slanted side wall(s) can be applied in new houses. In existing houses the applicability depends on the dimensions of the existing manure pit. To implement this system only a few alterations are needed and hardly any change in management technique or regime is needed. The manure surface should be a maximum of 0.18 m² per pig place.

Costs: The extra investment costs are EUR 3.00 per pig place. The extra operational costs per year are EUR 0.50 per pig place. The additional vacuum system might require some extra costs. For the iron bars, cost data are slightly different. The extra annual investment costs are EUR 23 per pig place.

Reference farms: This combination of techniques has not been applied yet.

3.4.3 Slurry systems with a partly-slatted floor with a central convex solid floor at the front of the pen, a manure gutter with slanted sidewalls and sloped manure pit (BREF 4.6.4.2)

Description: Side wall(s) on a slope reduce the manure surface. This reduces ammonia emissions. Application is possible in pens with a convex floor. The convex floor separates the two channels. The front channel is partly filled with water, as the pigs do not normally use the front area as a dunging area. Only spoiled feed concentrates come into the front channel. The main function of the water is mainly to prevent flies breeding. Application is also possible in pens with a partly-slatted concrete floor consisting of a solid concrete floor on a slope in front of the pen. The manure will be removed frequently by a sewerage system. The manure channel has a width of at least 1.10 metre. The manure surface in the manure channel should not be larger than 0.18 m² per pig place. The surface of the sloping wall(s) should be made of a smooth material to the manure adhering to the surface. A sloping wall at the back is not required, but when a sloping wall is present, then this wall should have a slope of between 60 and 90 degrees. The wall next to the solid concrete floor should have a slope of between 45 and 90 degrees. The slats are made of concrete.

Achieved environmental benefits: Limiting the manure surface in the manure channel and removing manure frequently by a sewerage system reduces the emission by 60 % (1.2 kg NH₃ per pig place per year) with concrete slats and by 66 % (1.0 kg NH₃ per pig place per year) in the case of triangular iron bar slats.

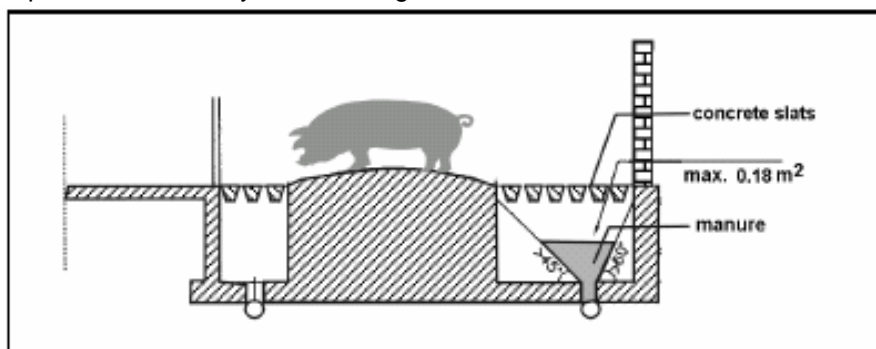
Cross-media effects: This system does not require any extra energy.

Operational data: Similar to the reference system.

Applicability: The system with slanted side wall(s) can be applied in new houses. In existing houses the applicability depends on the dimensions of the existing manure pit. To implement this system only a few alterations are needed and hardly any change in management technique or regime are needed. The manure surface should be a maximum of 0.18 m² per pig place.

Costs: The extra investment costs are EUR 3.00 per pig place. This means with a 60 % reduction (i.e. 3.0 to 1.2 kg NH₃), costs are about EUR 1.65 per kg NH₃ abated. The extra operational costs per year are EUR 0.50 per pig place. This means EUR 0.28 per kg NH₃ abated. For the iron bars cost data are slightly different. The extra investment costs are EUR 23 per pig place. This means with 65 % reduction about EUR 12 per kg NH₃ abated. The extra annual operational costs are EUR 15 per pig place or EUR 2.70 per kg NH₃ abated.

Reference farms: The system with iron triangular bars was developed in the mid-nineties and has been implemented in many new buildings and alterations in the Netherlands.



Convex floor with concrete slats and side walls on a slope in the manure pit

Appendix 4 Protocol for sampling slurry and solid manures for analysis¹

4.1 Why correct sampling matters

The nutrient content of slurry can vary considerably within a store due to settlement and crusting. Similarly, the composition of solid manure in a heap can vary depending on the amount of bedding and losses of nutrients during storage.

If stored materials are to be analysed either in a laboratory or by a rapid on-farm method, it is important that the sample taken represents an 'average' of what is found in the store or heap.

4.2 General principles of sampling

It is important, where this is practical and safe, to take a number of samples. Take these from a range of positions within the store or heap, bulk them together, mix them and then take a representative sub-sample.

The final sample can be sent to the laboratory for analysis or tested with a slurry N meter or slurry hydrometer on-farm depending on whether information is needed to draw up a full Slurry/Manure Management Plan, or as a check on earlier data once spreading is in progress.

4.3 Slurries

Take at least five sub-samples of 2 litres, pour into a larger container, stir thoroughly and pour a 2 litre sample immediately into a smaller clean container to provide the sample for analysis.

Above-ground stores

Ideally, slurry should be fully agitated and sub-samples taken from the reception pit. If this is not possible, and provided there is safe access from an operator's platform, the five sub-samples can be taken at a range of positions, using a weighted 2 litre container attached to a rope.

Below-ground pits

It may be possible to obtain sub-samples at various positions using a weighted container as above, but never enter the pit, as lethal gases may be present.

Sampling while spreading

If the tanker is fitted with a suitable valve, it may be possible to take five sub-samples from the stationary slurry tanker at intervals while field spreading is in progress. Or, trays placed in the field can be used to collect samples while the material is being spread.

4.4 Solid Manures

Take at least ten sub-samples of about 1kg each, taken as described below, and place on a clean, dry tray or sheet. Break up any lumps and thoroughly mix the sample. Then take a representative sample of around 2kg for analysis.

¹ Based on 'Managing Livestock Manures, Booklet 3: Spreading Systems for Slurries and Solid Manures'. MAFF/ADAS/IGER/SRI November 2000.

Manure Heaps

Provided the manure is dry and safe to walk on, identify at least ten locations which appear to be representative of the heap. Having cleared away any weathered material with a spade or fork, dig a hole approx 0.5m deep and take a 1kg sample from each point. Alternatively, take sub-samples from the face of the heap at various stages during spreading.

Weeping-wall stores

Do not attempt to take samples before the store is emptied as it is not safe to walk on the surface of the stored material. Sub-samples may be taken from the face of the heap once emptying has commenced.

Sampling during spreading

Trays placed in the field can be used to collect samples while the material is being spread. Take care to avoid the possibility of injury from stones and other objects which may be flung out by the spreading mechanism.

4.5 Storage and Analysis

If you analyse slurry using an on-farm rapid method, do this immediately after sampling, making sure that the sample taken is well mixed.

If you send samples to a laboratory for analysis slurry should be dispatched in clean screw-topped 2 litre plastic containers. Leave at least 5cm of airspace to allow the sample to be shaken in the laboratory. For manures, use 500-gauge polythene bags and expel excess air from the bag before sealing.

Clearly label the samples on the outside of the container or bag and dispatch them immediately or within a maximum of seven days if kept in a refrigerator.

Note: Soil Test for Phosphorus – Please refer to the Nitrates Action Programme for details of the soil test appropriate for phosphorus.