Biological waste treatment: appropriate measures for permitted facilities

From:
Environment Agency

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1. When appropriate measures apply

Assessing the appropriate measures that will apply to a permitted facility that handles biowaste.

This guidance applies to aerobic and anaerobic processes including:

- composting in open-air and closed (in vessel) systems
- aerobic processing of organic fractions by mechanical and biological treatment (MBT) and mechanical heat treatment (MHT)
- thermophilic aerobic digestion (TAD)
- anaerobic digestion (AD) including the combustion or upgrading of the resulting biogas and treating the digestate (anaerobic treatment can include wet, dry and dry-batch digestion)
- aerated lagoons and activated sludge (as a waste water treatment)
- collecting and storing methane from lagoons and tanks and upgrading to biomethane
- treating sewage sludge using any of these biological processes
- storing feedstock, compost and digestate
- receiving wastes destined for biological treatment

There is overlap between best available techniques (BAT) for waste installations and necessary measures for waste operations. The Environment Agency uses the term ‘appropriate measures’ to cover both sets of requirements.

This guidance sets out what you must consider when you assess the appropriate measures for your facility. It is not definitive and it does not replace your obligation to assess appropriate measures fully for your site.

Some measures may not be suitable for or relevant to your operation. Appropriate measures will depend on the:

- complexity of the activities being carried out
- size and nature of the activities
- location of the site

Where an operator wants to propose an alternative measure, this must achieve the same level of environmental protection. The operator must also provide evidence of why the alternative is equivalent to (or better than) what this guidance proposes.

In certain situations, a higher standard of environmental protection may be needed, for example:

- where there are local sensitive receptors
- if the facility is affecting the local environment or human health despite using appropriate measures
- if there is a risk that you may breach an Environmental Quality Standard

Other technical guidance relating to emissions, odour and noise may also apply.

Where the biological treatment is directly connected or associated with another regulated activity or process, specific technical guidance may apply.

Operations that are permitted to accept, store, handle, treat or transfer the following wastes must also comply with the requirements in Chemical waste: appropriate measures for permitted facilities:

- hazardous waste
- mirror entry waste
- laboratory smalls
- chemicals

Combustion plant with a rated thermal input equal to or greater than 1 megawatt (but less than 50 megawatts) must have a permit and comply with the relevant requirements of the Medium Combustion Plant Directive (Directive (EU) 2015/2193). Specified generators which are used to generate electricity must also have a permit and comply with the relevant requirements of the specified generator regulations. Additional guidance is available from the Environment Agency.

1.1 The waste water treatment activities this guidance applies to,

This guidance applies to the following activities for the waste water treatment sector, the:

- biological treatment of waste water not covered by the Urban Waste Water Treatment Directive (UWWTD)
- biological treatment of sludges, centrate liquors and other wastes generated by the waste water treatment process
- importation of wastes or effluents (excluding sewage, sewage sludge and septic tank sludge) to the works where they are fed into the UWWTD biological treatment process

1.2 When this guidance applies to a specific process,

Where measures apply to all processes and operations this is stated. Where measures are process-specific this is stated.

1.3 Implementing appropriate measures at new and existing facilities,

The appropriate measures in this guidance apply to both new and existing facilities that treat biodegradable and organic waste.

New facilities

All new facilities must implement the relevant appropriate measures, or a fully justified equivalent. These must be in place before waste treatment operations start.

New installations (including new or replacement plant at existing facilities) must comply with any relevant best available technique (BAT) associated emission level (AEL) as set out in the published Waste Treatment BAT Conclusions document. They must do this from the start of their operations, unless we approve a derogation.

Existing facilities

Installations permitted after 17 August 2018 must already be BAT compliant.

Existing installations permitted before 17 August 2018 must comply with the BREF and BAT AELs by 17 August 2022.

Where operators are unlikely to comply with a BAT AEL by 2022 they must apply for a derogation. If you cannot comply, you must contact the Environment Agency as soon as possible.

Existing waste operations should already be applying appropriate measures depending on their risk.

Where we have identified that an operator needs to (and can) improve the facility, or there is significant environmental risk or actual pollution, we will require the operator to apply appropriate measures.

We have reviewed and revised our standard rules to reflect these measures and will review all bespoke permits to make sure all necessary appropriate measures are applied. We will vary bespoke permits to meet the required standards.

Operators can deliver some improvements by reviewing and amending their management system and progressing a voluntary scheme of improvement.

Improvements at existing facilities are likely to fall into 1 of the following 2 categories.

1. Standard 'good practice' requirements

Where improvements are relatively low cost, operators should prioritise them based on the risk posed by their facility. They should implement these improvements as soon as possible and no later than 12 months after the publication date of this guidance. For example, these improvements could be:

- updated management systems
- waste pre-acceptance, acceptance, handling techniques and waste transfers off site
- equipment and infrastructure maintenance
- measures to prevent fugitive or accidental emissions

- appropriate monitoring equipment
- waste, water and energy efficiency measures

2. Longer term and capital-intensive improvements

Where local environmental impacts are affecting sensitive receptors an operator may have to take action immediately. The Environment Agency may require operators to complete improvements within the timeframe it sets. These may include capital-intensive improvements.

There is an existing requirement for operators to comply with their permits. Operators should periodically review, modify and update management, process systems or equipment in line with existing permit conditions. This may include periodic capital investment.

Examples of capital-intensive improvements include:

- reviewing, revising and installing abatement equipment
- significantly redesigning the layout of the facility, including, for example, the design and installation of new buildings or treatment plant to prevent ongoing pollution or reduce the risk of pollution
- replacing tanks or other primary infrastructure
- installing secondary containment where there is a significant risk

Capital-intensive projects may need permission from other regulators and the Environment Agency will take this into account when considering improvement timescales. It expects operators to send their permission requests to other regulators in a timely manner. In some cases, the Environment Agency will be a consultee (for example as part of the planning process).

2. Definition of biodegradable and sewage sludge

How the Environment Agency defines the terms 'biodegradable' and 'sewage sludge'.

These definitions apply to all processes and operations.

2.1 Biodegradable,

Biodegradable waste is material that can undergo biological anaerobic or aerobic degradation leading to the production of the following, depending on the environmental conditions of the process:

- carbon dioxide (CO_2)
- water (H_2O)
- methane (CH_4)
- compost or digestate
- mineral salts

The biological treatment of waste uses biological processes and agents to bring about a change in that waste. This may be for recovering the waste, remediating a contaminated material, or as a pre-treatment before disposal.

Biological treatment does not include physical treatments like dewatering, mechanical separation or chemical treatments such as lime dosing.

The term ‘biowaste’ is often used to describe biodegradable, organic waste. Biowaste is defined in Article 3 of the Waste Framework Directive to mean, “Biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants”.

Biowaste can also be called ‘organic matter’ which is a collection of complex humic substances and other organic compounds generally of animal or vegetable origin.

2.2 Sewage sludge,

Sewage sludge means residual sludge from sewage plants treating domestic or urban waste waters. It also includes sewage sludge from other sewage plants treating waste waters that have a similar composition to domestic and urban waste waters.

3. Bespoke wastes suitable for biological treatment

The source segregated biodegradable wastes the Environment Agency considers to be generically suitable for biological treatment.

Most organic waste streams of biological origin sent for biological treatment are well understood. The source segregated biodegradable wastes the Environment Agency considers to be generically suitable for biological treatment are included in the:

- biowaste treatment standard rules permits
- composting and AD quality protocols

1. The Environment Agency recognises the potential to use biological processes to treat other ‘non-standard’ or ‘bespoke’ wastes. However, any waste sent for biological treatment must be capable of being treated by the process. Dilution is not considered a suitable waste treatment.

2. Biological processes can degrade complex synthetic organic substances. The products resulting from these biological degradation processes may pose a significant threat to human health and the environment. You must therefore fully characterise and assess all bespoke wastes before introducing them into a biological treatment process.

3. If you accept a bespoke waste type your site permit must have the relevant list of waste (LoW) code and description as set out in the technical guidance (WM3). Typically, this applies to waste from a single producer. If you accept similar waste from a different producer it will require its own pre-acceptance assessment and you may need to apply for a permit variation to make sure these pre-acceptance processes are part of your operational techniques.

Additional guidance on characterising and assessing waste is available in WM3 and the waste pre-acceptance and acceptance section of this guidance. Inhibitory ranges are provided in section 13 Bespoke waste assessment as guidance for aerobic and anaerobic

processes. These are aimed at helping operators fully assess whether treatment will be effective, and any requirement for pre-treatment and additional process control measures. Operators may need to test the resulting outputs to make sure the material has been fully treated.

3.1 Animal by-products,

Biological treatment facilities may need to comply with The Animal By-Products (Enforcement) (England) Regulations 2013 (ABPR) to accept and treat animal by-products. This is regulated by the Animal and Plant Health Agency (APHA). More information is available from the APHA on the definition and categorisation of animal by-products. Biological, organic treatment facilities can be authorised to accept category 3 animal by-products.

3.2 Energy crops and by-products (residues),

1. AD plants, where the only feedstock is grown energy crops such as maize or by-product from food waste productions (some crop residues), do not currently need an environmental permit or exemption for the digestion process.

2. Operators will need a permit for any combustion unit (engine, boiler or generator). Time lines for compliance with emission limits may vary for combustion units. For more information please refer to guidance on medium combustion plant and specified generators.

3. AD plants taking mixed feedstocks (energy crops, slurry, manure and waste) require an environmental permit for the digestion process and any associated combustion unit or specified generator.

3.3 Wash down waters, liquor and leachate

1. Materials produced incidentally to a process, for example clean down or wash waters, leachates and liquors from feedstock storage, are waste. For example, where water has:

- permeated through a material
- resulted from that material being stored (such as silage liquor)
- resulted from composting

2. Transfer and disposal of waste must comply with the duty of care code of practice under section 34 (7) of the Environmental Protection Act 1990.

4. Site location, design and capacity

Issues to consider relating to site location, design and capacity, reducing or preventing contamination and primary and secondary containment for new and existing sites.

This section applies to all processes and operations.

4.1 Site location,

1. You should consider the potential impacts on local sensitive receptors when selecting a new site.

2. You must choose the location of your site so you prevent or minimise fugitive emissions to air. This includes dust, bioaerosols, odours and other gaseous emissions including ammonia.

3. You should also consider the possible impact of climate change, especially:

- flood risk
- drought
- extreme temperatures
- other extreme weather events

Existing sites must consider the risk of climate change on their existing facilities and as far as possible have contingency measures in place.

4.2 Site design,

1. The storage and handling of waste on site must be located as far as technically and economically possible from any sensitive receptors.

2. When designing your biological treatment site you must consider minimising the unnecessary handling of waste between each step in the process, from receipt, during treatment, and during storage of the final material.

3. All biological treatment facilities must be designed by a suitably qualified or experienced person. Facilities must be built to recognised industry standards.

4. You must design your plant to minimise emissions during the transfer of waste from one step to another. For example, the transfer of feedstock from reception to a feed hopper.

You must consider at the design stage where there is an opportunity to cover storage areas and where possible contain, treat and abate air using appropriately engineered plant.

5. To prevent emissions (including ammonia) you must cover digestate stores and compost liquor. Where fixed covers are used these must have a system that can remove and effectively treat emissions.

6. You must consider the location of access doors in relation to sensitive receptors to prevent loss of containment.

Reducing or preventing contamination

7. Good site design and process flow reduces the risk of cross-contamination of pasteurised or sanitised and stabilised materials.

8. You must consider the design, process flow and intended use of outputs during the planning and design stage of your plant to prevent cross contamination of treated and untreated material.

Preventing cross contamination by segregation relies on both the:

- physical separation of waste
- procedures that identify when and where wastes are stored

Primary and secondary containment

New facilities

9. When designing new plant, you must make sure that you assess the environmental impacts from the plant’s operating life and eventual decommissioning.

10. All critical structures should be designed and built to construction and design regulation.

11. All secondary containment must meet the requirements of the Construction Industry Research and Information Association (CIRIA) report C736 or an equivalent standard.

12. A chartered civil or structural engineer must provide construction quality assurance (CQA) and validate the construction of all facilities. You can use a chartered geotechnical or structural engineer for lagoon design and construction. All pipe work must be designed to allow for inspection or integrity checks, or both.

13. Drainage and vessels must be accessible to allow cleaning and maintenance.

14. You must design underground tanks to allow inspection and must have secondary containment with leakage detection.

15. You must consider the life of all plant and its decommissioning at the design stage. This includes tanks, pipework and drainage and lagoon structures.

Existing sites

16. Operators of existing sites must use a chartered engineer to carry out a detailed assessment of primary and secondary containment where it has not previously been validated to industry recognised standards.

17. You must assess containment structures against CIRIA 736. This is a risk-based assessment. Where you have not used CIRIA 736, the assessment must be an equivalent approved standard. Where improvements are identified, you must propose an improvement programme or process monitoring to make sure there are no uncontrolled process releases.

18. You should monitor underground pipe work or ducting and drainage to make sure there is no leakage.

19. Underground tanks should have secondary containment. You must implement a method of inspection and leakage detection as a minimum.

4.3 Site capacity,

1. You must determine the actual physical capacity needed to manage, treat and store waste on your site without causing pollution.

2. You must include factors like seasonal changes in feedstock supplies and in markets for outputs.

Exceeding the site capacity will significantly increase the risks of pollution. This includes the capacity of storm tanks.

3. You must provide enough space on site to operate your plant and equipment safely, and to allow easy and environmentally safe storage and treatment.

4. Environmental permits set limits on the amount of waste you can:

- bring onto site on an annual basis
- treat at any one time
- store at any one time

To determine the daily and annual throughput, you must establish the following critical volumes or tonnes:

- waste storage capacity at any one time for both incoming waste and processed material
- residence time for waste to be fully treated and recycled

5. General management appropriate measures

General management appropriate measures and the process they apply to.

5.1 Management system,

1. The following measures apply to all processes and operations. You must have an up to date, written management system. The level of detail you need will be related to the size of your operation, site location and complexity. Your management system must aim to improve the overall environmental performance of the site.

2. You must have management commitment, including from senior managers (where applicable) to develop an environmental policy that is defined by senior managers (where applicable). This policy must include the continuous improvement of the facility's environmental performance, so you can identify pollution risks and minimise them through appropriate measures and make best and most efficient use of resources.

Your management system must also incorporate the features that follow.

3. You plan and establish the resources, procedures, objectives and targets needed for environmental performance alongside your financial planning and investment.

4. You implement your environmental performance procedures, paying particular attention to:

- staff structure and relevant responsibilities
- staff recruitment, training, awareness and competence
- communication (for example, of performance measures and targets)
- employee involvement
- documentation
- effective process control
- maintenance programmes

- emergency preparedness and response
- making sure you comply with environmental legislation

5. You check environmental performance and take corrective or preventative action (or both), paying particular attention to:

- monitoring and measurement
- investigating and learning from incidents, near misses and mistakes including those of other organisations
- records maintenance
- independent (where practicable) internal or external auditing of the management system to confirm it has been properly implemented and maintained

6. Senior managers and or operators must periodically review the management system to check it is still suitable, adequate and effective.

7. You review the development of cleaner technologies and their applicability to site operations. The Environment Agency would expect you to consider cleaner technologies:

- as a result of substantiated pollution incidents
- when reviewing management systems
- when planning investment decisions, for example new items of plant

8. When designing new plant, you must assess the environmental impacts from the plant's operating life and eventual decommissioning. You must make sure that new plant is authorised by your environmental permit.

9. You must have a written procedure for proposing, considering and approving changes to procedures or infrastructure related to storing or treating waste or pollution control. This is so you can track and control the process of change.

10. You consider the risks a changing climate presents to your operations and have appropriate contingency plans in place to assess and manage future risks.

11. You compare your facility's performance against relevant sector guidance and standards on a regular basis, known as 'sectoral benchmarking'.

12. You document and implement appropriate waste stream management.

13. You have and maintain a site condition report for installations. For waste facilities the Environment Agency recommends that you carry out a site condition assessment during the life of the site. You would need to carry out this assessment on surrender. Please read the guidance Environmental permitting: H5 site condition report.

14. You have and maintain:

- an inventory of waste water, waste gas streams or fugitive emissions
- a product and residues management plan
- an accident management plan
- a site infrastructure plan
- an odour management plan
- a bioaerosol risk assessment and management plan
- a fire prevention plan, if required
- a noise and vibration management plan, if required
- a pest management plan, if required
- a dust, mud and litter management plan (emissions management plan) if required
- a leak detection and repair plan, if required

By 'inventory' we mean a complete and detailed list of all waste water and waste gases produced, handled and treated by your process or plant. Where possible, for example from channelled emissions points (point-sources), your inventory must quantify characteristics such as:

- substance concentration
- load value and variability of each waste water and waste gas stream

5.2 Inspection, maintenance and monitoring,

The following measures apply to all processes and operations.

1. You must have a schedule of inspection, maintenance and monitoring programmes for all plant and equipment (including the impermeable surfacing and drainage systems).

2. You must inspect, maintain and monitor plant, equipment and infrastructure in accordance with manufacturer or design guidelines.

3. Where manufacturers' guidelines are not available, or where you have modified them, you must provide evidence that there are sound reasons for not following these guidelines, and that you have a robust alternative.

4. You must be able to produce proof of all inspection and maintenance through records of maintenance and inspection when requested.

5. If the site is more complex (AD, IVC and MBT plants) you must do a Hazard and Operability Study (HAZOP) or a similar study or risk assessment.

6. You must consider stocking or holding a list of critical spare parts and chemicals. You must be able to procure and install spares without undue delay.

7. You must have a programme of review and consider design improvements which take into account future de-commissioning (for existing plants). These improvements may include:

- improving or replacing underground tanks and pipework – or proposing an inspection regime
- installing secondary containment or instigating a suitable monitoring programme depending on the risks identified and the sensitivity of the potential receptors
- inspecting, draining and cleaning out vessels and pipework (especially before decommission and before dismantling)
- inspecting and reviewing lagoons to make sure there is no leakage or damage – you must consider the life of the facility and any future decommissioning and clean up
- reviewing insulation – this should be easy to dismantle without producing dust or causing a hazard to staff and local receptors

- using recyclable materials, taking into account operational or other environmental objectives

5.3 Staff competence,

The following measures apply to all processes and operations.

1. Your site must always be operated or monitored (or both) by an adequate number of staff who have appropriate qualifications or training (or both) and competence.

2. If you operate a 24-hour process, for example an in vessel or AD facility you must have:

- remote or telemetric systems in place to make sure an alarm would be raised in the event of an incident during unmanned hours
- appropriate personnel on call to deal with such incidents

3. You must adequately explain these procedures in your management system and make sure they are implemented.

4. The design, installation and maintenance of infrastructure, plant and equipment must be carried out by competent people, including using CQA where appropriate.

5. You must have appropriately qualified managers for your waste activity who are members of a government-approved technical competence scheme.

5.4 Accident management plan,

The following measures apply to all processes and operations.

1. As part of your written management system you must have a plan for dealing with incidents or accidents that could result in pollution, including near misses.

2. Your accident management plan must identify the hazards, risk and mitigation measures that will protect the environment in the event of an accident or event.

3. Particular areas to consider may include:

- waste types and reactions of mixed waste

- transferring substances, for example filling (including overfilling) or emptying of vessels and containers, over pressure of vessels and pipework, blocked drains
- preventing incompatible substances coming into contact with each other
- failure of plant and equipment, for example storage tanks and pipework, or blocked drains
- failure of containment, for example bund failure or drainage sumps overfilling
- making the wrong connections in drains or other systems
- failure to contain firefighting water
- failure of abatement systems
- hazardous atmospheres in confined spaces
- failure of main services, for example power, steam or cooling water
- checking the composition of effluents before their emission
- vandalism and arson
- operator error
- accessibility of control equipment in emergency situations
- extreme weather conditions, for example flooding or very high winds
- having a contingency arrangement to divert waste feedstock when your ability to spread outputs to land, or inject gas to grid, is limited

4. You must assess the risk of accidents and their possible consequences. To help you do this you can either use:

- the Environment Agency's risk assessment guidance
- a HAZOP or a similar detailed assessment that identifies hazards through possible deviations from the design intention

5. Risk is the combination of the likelihood that a hazard will occur and the severity of the impact resulting from that hazard. Having identified the hazards, you can assess the risks by addressing 6 questions:

- how likely is it that the accident will happen?
- what may be emitted and how much?

- where will the emission go – what are the pathways and receptors?
- what are the consequences?
- what is the overall significance of the risk?
- what can you do to prevent or reduce the risk?

6. The depth and type of accident risk assessment you carry out will depend on the complexity of your facility and its location. The main factors to take into account are the:

- scale and nature of the accident hazard presented by the facility and its activities
- risks to areas of population and the environment (the receptors)

7. Through your accident management plan, you must also identify the roles and responsibilities of the staff involved in managing accidents. You must provide them with clear guidance on how to manage each accident scenario, for example as a result of a spillage of a potentially polluting liquid.

8. You must have a suitably trained facility employee available at all times who will act as an emergency co-ordinator and will take responsibility for implementing the accident management plan.

9. You must train your employees so they can perform their duties effectively and safely and know how to respond to an emergency.

10. You must also:

- establish how you will communicate with relevant authorities, emergency services and neighbours (as appropriate) before, during and after an accident
- implement emergency procedures, including for safe plant shutdown and site evacuation
- implement post-accident procedures that include doing an assessment of the harm an accident caused (or may have caused) and actions you will take to prevent further accidents
- consider the impact of accidents on the function and integrity of plant and equipment

- have contingency plans to relocate or remove waste from the facility and suspend incoming waste
- test the accident management plan by carrying out emergency drills and exercises

11. Following a flooding event you must inspect and assess the integrity of affected plant and equipment, in particular infrastructure that may have been in contact with floodwater or groundwater. Tank inspections should include non-destructive testing methods to verify their integrity.

12. Storage and drainage lagoons must have adequate storage capacity to make sure structural integrity is not compromised during extreme weather events.

5.5 Preventing accidental emissions,

The following measures apply to all processes and operations.

1. You must have a drainage plan and in the event of an emergency this must be available to emergency services. The drainage plan should clearly identify clean and dirty or foul drainage.

2. You must make sure that in an emergency you can contain on site:

- process waters
- contaminated site drainage waters
- emergency firefighting water
- chemically contaminated waters
- spillages of chemicals

3. You must put spill contingency procedures in place to minimise the risk of an accidental emission of raw materials, products, and waste materials, and to prevent their entry into water, land and air.

4. Your drainage and collection system must take account of additional firefighting water flows or firefighting foams. You may need emergency storage to prevent contaminated firefighting water reaching a receiving water body.

5. You must consider and reduce the risk of accidental emissions from:

- loss of containment – all polluting matter
- vents
- safety relief valves – making sure these are checked and maintained (preventing sticking and over feeding, see site capacity in section 4)
- bursting discs and seals
- tank wall penetrations
- storage containers

6. Liquids or fire water held in the buffer storage must be removed from site.

5.6 Security measures,

The following measures apply to all processes and operations.

1. You must have security measures in place (including staff) to prevent:

- entry by vandals and intruders
- damage to the equipment
- theft
- fly-tipping
- arson

2. Facilities must use one or a combination of the following measures:

- security guards
- total enclosure (usually with fences)
- controlled entry points
- adequate lighting
- warning signs
- 24 hour surveillance such as CCTV

5.7 Fire and explosion prevention,

The following measures apply to all processes and operations.

1. You must have a fire prevention plan that meets the requirements of the Environment Agency's fire prevention plan guidance. The plan should include:

- preventing the uncontrolled decomposition and self-heating of stored waste by managing and monitoring temperature and moisture
- implementing written systems to prevent unsafe situations during site operations, repair and maintenance
- having a ‘permit to work’ system in place for maintenance and repairs, such as hot work on plant and equipment, and where the risk of unsafe conditions could occur
- having appropriate systems in place for fire and explosion prevention, detection and suppression or extinction – you must document these measures in your accident management plan or fire prevention plan, if required, to comply with your permit conditions

2. You must prevent the build-up of loose combustible material (including dust and waste) particularly around treatment plant, equipment and other potential sources of ignition.

3. You must:

- make sure that all the measurement and control devices you would need in an emergency are easy to access and operate in an emergency situation
- maintain plant in a good state through a preventive maintenance programme and a control and testing programme
- use techniques such as suitable barriers to prevent moving vehicles damaging equipment
- put procedures in place to avoid incidents due to poor communication between operating staff – during shift changes, periods of cover by temporary staff and following maintenance or other engineering work
- where relevant, use equipment and protective systems designed for use in potentially explosive atmospheres

4. You must be mindful of alarm fatigue and make sure all alarms are appropriately set and promptly responded to.

5. You must make sure that critical safety equipment, for example sprinklers, pressure relief valves and flares are maintained and kept in good working order.

6. Workers on site must be protected and monitored in line with the Health and Safety Executive (HSE) guidelines and regulations.

7. You must carry out all assessments in line with your facility's occupational exposure process and health and safety guidelines.

Fire prevention – composting plants only

8. The following measures only apply to composting plants including when storing oversize (tail ends) material from composting and maturing composted material.

You must:

- size your treatment and maturation piles (windrows) to make sure that passive heat convection is not inhibited – you must prevent persistent high temperatures and over-heating
- monitor temperatures daily during sanitisation and stabilisation
- monitor the temperature of all waste on site in storage, including oversized and screened material weekly
- make sure that you obtain a representative core temperature and that temperature probes are long enough to monitor the core temperature
- make sure you optimise moisture levels
- make sure there is enough space between windrows for turning so material can cool down and for safe access in the event of a fire
- have sufficient water, leachate or liquor available on site to give adequate moisture to your composting waste

Fire prevention and explosion – AD plants only

9. The following measures only apply to AD plants.

All AD facilities must comply with The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). More information is available from HSE. All AD plants must undertake a DSEAR risk assessment. This is not only for facility staff but for those attending the site in an emergency.

If a DSEAR risk assessment has identified potential explosion hazards you must make sure the design and planning of your plant includes appropriate structural, technical and organisational fire protection measures.

10. You must install protective measures on your site and implement procedures such as:

- a permit to work system
- using specialised personal protective equipment (PPE)
- health and safety protection signage
- using ATEX-rated equipment

11. Organisational protective measures include regular maintenance of the plant, systems and components.

12. You must follow national guidelines and standards on fire protection when designing and planning your site.

13. You must consider whether the Control of Major Accident Hazard (COMAH) Regulations 2015 apply to your activities, for example, the quantity of flammable gas (biogas) in combination with any other dangerous substances stored on site.

14. You must risk assess your site in line with BS EN 62305-2 to determine the lightning protection level. Where you have assessed that lightning protection measures are not necessary, you must make an assessment against transient over voltage, complying with BS7671. Where lightening condition systems are in place, they must comply with BS 62305 (part 1 to 4). A competent person must validate the system.

15. You should share your accident management and fire prevention plans, and liaise, with your local fire and rescue service.

16. You must maintain plant control in an emergency using one or a combination of the following measures:

- alarms
- process trips and interlocks
- automatic systems based on microprocessor control and valve control
- tank level readings such as ultrasonic gauges, high level warnings, process interlocks and process parameters
- using a flare to manage biogas in AD systems

5.8 Firefighting,

The following measures apply to all processes and operations.

1. Your accident plan must clearly state what actions are taken to extinguish fires on site and operators must be trained in these procedures.

2. Your facility must have access to water supplies to extinguish fires. In remote locations where water supplies are not available you must seek advice from your local fire service.

3. In the event of a fire on site, your accident plan must consider how you will prevent firefighting run-off leaving site. Where possible you should have the capability to collect, contain and store firefighting water run-off.

4. You must isolate drainage systems from flammable waste storage areas to prevent fire spreading along the drainage system by solvents or other flammable hydrocarbons.

5.9 Record keeping and procedures,

The following measures apply to all processes and operations.

1. You must:

- keep an up to date record of all accidents, incidents, near misses, changes to procedures, abnormal events, and the findings of maintenance inspections

- carry out investigations into accidents, incidents, near misses and abnormal events and record the steps taken to prevent their reoccurrence
- maintain an inventory of substances, which are present (or likely to be) and which could have environmental consequences if they escape
- record and hold a critical plant and equipment asset register, including a register of equipment installed in explosive atmospheres (ATEX-rated equipment)

2. You must notify the Environment Agency without delay if you detect any of the following events and they are causing, or may cause, significant pollution:

- a malfunction
- a breakdown or failure
- an accident
- an emission of a substance not controlled by an emissions limit
- a breach of an emissions limit

5.10 Contingency plans and procedures,

The following measures apply to all processes and operations.

1. You must have and implement a contingency plan which makes sure that you:

- comply with all your permit rules and operating procedures during maintenance or shutdown, or critical failure at your site or elsewhere
- do not exceed limits in your permit and you continue to apply appropriate measures for waste storage, handling and treatment
- stop accepting waste unless you have a clearly defined method of recovery or disposal, and enough permitted storage capacity when land bank availability is limited, for example, during exceptional weather events such as prolonged rain or snowfall, deep frosts and severe drought

- plan for any restrictions that will affect the spreading of digestate or compost to land, for example, nitrate vulnerable zones (NVZ) closed periods

2. You must have the following information in your contingency plan:

- a description of each waste and material and the correct LoW code for each waste (inputs and outputs)
- details of permitted waste facilities that could accept and manage your waste if site holding capacity will be exceeded – you must obtain a copy of the site permit to make sure it can accept your waste type
- the capacity (volume) of all contingency options and the length of time for which it would be available or needed
- potential environmental and health and safety risks and hazards of all contingency options (for example, odour and emission generation, or leachate production from longer-term storage)
- any legal restrictions or constraints for each contingency option

3. You must identify your contingency options for use over the short term (1 to 2 weeks), medium term (4 to 6 weeks) and the long term (up to 6 months).

4. Your management procedures and contingency plan must also:

- identify known or predictable malfunctions associated with your technology and the procedures, spare parts, tools and expertise needed to deal with them
- make sure you have the spare parts, tools, and competent staff needed before you start maintenance
- record where you can get critical spare parts from and how long it would take to obtain them if you cannot hold them on site
- have a defined procedure to identify, review and prioritise items of plant which need a preventative regime
- include all equipment or plant whose failure could directly or indirectly lead to an impact on the environment or human health

- identify non productive or redundant items such as tanks, pipework, retaining walls, bunds, reusable waste containers, ducts, filters and security systems

5. You must make your feedstock suppliers and customers aware of your contingency plan, and of the circumstances in which you would stop accepting waste from them.

6. You must consider whether the sites or companies you rely on in your contingency plan:

- can take the waste at short notice
- are authorised to do so in the quantities and types likely to be needed in addition to carrying out their existing activities – if in doubt contact your local Environment Agency office for advice

7. You must not include unauthorised capacity in your contingency plan. If your contingency plan includes using temporary storage for additional waste on your site, then you must make sure your site is authorised for this storage and the appropriate infrastructure is in place.

8. Your management system must include procedures for auditing your performance against all the contingency measures detailed above and for reporting the audit results to the site manager.

9. If you produce an end of waste material at your facility, your contingency planning must consider storage capacity for end of waste products and materials that fail the end of waste specification.

Contingency plans – AD plants only

This additional measure only applies to AD plants.

10. You must stop accepting waste or reduce feeding rates unless you have a clearly defined method of gas management when national grid capacity is restricted.

5.11 Plant commissioning, validation and decommissioning,

The following measures apply to all processes and operations.

1. The term commissioning means to bring an item of plant or equipment into working condition. You must notify the Environment Agency before you start commissioning. You must consider communicating with local communities during the commissioning phase, to comply with your management system and odour management plan.

2. You must consider the arrangements for commissioning your plant at the design stage. You must have a commissioning plan in place before you start commissioning to minimise the risks of pollution and harm to human health and the environment. The level of detail can be based on the complexity of, and risks associated with, the process.

3. You must define the suite of indices you will use to determine and monitor process performance and efficiency.

4. You must review and refine the relevant monitoring parameters during the facility's operation as part of an on-going process of system optimisation.

5. You must test and validate all systems and components of your plant and building(s) against operational requirements identified at the design stage. This must include, for example, the air extraction and abatement system and containment structures.

6. You must have completion certificates (for each commissioning phase) in place, signed by an appropriately qualified person.

7. Commissioning must be carried out to relevant industry standards where they are available, or follow manufacturers' guidelines. As a minimum, the commissioning plan must include summaries of:

- commissioning phases (and sequences) including milestones and timeframes (for example pre, cold, hot commissioning)
- procedures and mechanical tests at each phase including relevant industry test standard (or otherwise), for example manufacturers' guidelines

Mechanical tests could include, for example:

- tests for leaks
- pressure tests of piping and equipment

- purging or inerting requirements
- pressure and vacuum safety relief where required
- temperature
- flow and pressure control
- mixing
- air flow ventilation
- extraction

8. Your commissioning plan must also include the:

- scope of performance tests, for example, acceptance criteria, measurement requirements, sampling requirements, reference to analytical procedures, chemical and biological analysis
- identification of potential releases to the environment of displaced and generated emissions and measure to mitigate these, for example, lean burn flares
- scope of responsibilities of the person(s) related to the test procedures, including the sign-off process
- qualifications of the responsible person(s) involved
- process for dealing with failed tests and problems that you may encounter
- health and safety precautions and protective measures employed

Plant commissioning – AD plants only

The following measures only apply to AD plants.

9. When commissioning AD plants that have mixing systems installed, you must test the mixing system is effective. You should document the methodology in the commissioning plan.

10. You can only seed and commission AD plants using waste after the Environment Agency has issued your environmental permit. The permit must contain the relevant LoW code and description for the seeding material.

11. You must allow enough time for the Environment Agency to issue your permit when planning the start of your commissioning and any tariff guarantee date. Sending correct and exact information with your application means that the Environment Agency can issue your permit more quickly.

12. You should source the biomass (inoculum) used in seeding a digester that matches the type of feedstock the facility is designed to process. This will provide a more stable substrate.

5.12 Decommissioning and mothballing,

The following measures apply to all processes and operations.

1. You must consider plant decommissioning or ceasing activities (mothballing) at the design stage.

2. You must have plans that minimise risks during the time decommissioning or mothballing takes place. This includes removing or replacing individual items of plant throughout the life of the facility.

3. Before you decommission plant you must notify the Environment Agency and provide a copy of your decommissioning plan.

4. Once decommissioning is complete you must provide a written report to the Environment Agency verifying that you have carried out activities in line with your plan.

5. If you bring plant back into service after a period of dormancy you must follow the commissioning requirements set out in this document or be directed by a suitably qualified person.

6. You must have a decommissioning plan to demonstrate that:

- plant can be decommissioned without causing pollution
- the site will be returned to a satisfactory condition, for example in line with your site condition report

7. The decommissioning plan must include details of (but not limited to):

- removing or flushing out pipelines and vessels where appropriate and completely emptying any potentially harmful contents
- drawings showing all the underground pipes and vessels
- the method and resources needed for clearing lagoons
- how you will dismantle buildings and other structures in a way that protects surface water and groundwater at construction and demolition sites
- the soil testing needed to understand the degree of any pollution caused by the site activities, and information on what remediation is needed to return the site to a satisfactory state as defined by the initial site report
- the measures proposed, once activities have ceased, to avoid any pollution risk and to return the site to a satisfactory state (including, where appropriate, those covering the design and construction of the plant)
- how you will clear any residues, waste, and any contamination resulting from the waste treatment activities

Decommissioning and mothballing – AD plants

The following measures only apply to AD plants.

8. Decommissioning plant and equipment, where there are potentially explosive atmospheres, is a specialist activity. You must make sure you have written procedures in place and follow it to support the safe removal or closure of plant on site.

9. You must make sure that equipment permanently taken out of use is decontaminated and removed from the site.

10. You must have a procedure and follow it for inspecting, maintaining and validating the recommissioning of plant and equipment following periods of dormancy.

6. Waste pre-acceptance, acceptance and tracking

Appropriate measures for waste pre-acceptance, acceptance and tracking.

The following measures apply to all processes and operations.

1. Wastes accepted at sites must be capable of biological treatment and be fully recovered and suitable for their intended end use.

2. A waste is only suitable for biological treatment if your treatment process is designed to:

- treat the types of wastes included on your environmental permit
- manage variability in feedstock and optimise process conditions
- make sure there is sufficient capacity to treat waste within the retention time of the process

3. You must implement waste pre-acceptance and acceptance procedures for all new waste streams so that you know enough about a waste (including its composition, characteristics and predicted age) before it arrives at your facility. You need to do this to assess and confirm the waste is technically and legally suitable for your facility.

4. You must document you waste pre-acceptance and acceptance procedures in your management system.

5. You must assess waste on initial acceptance and periodically to ensure constancy.

6. You must obtain representative test data and undertake upstream auditing of the production process to fully characterise the waste and identify the substances it contains.

7. You must not include wastes in the process solely for dilution.

8. You must have a system in place to track waste from receipt, handling on site and transfer off site.

9. You cannot accept waste containing animal by-products unless your facility has been validated following the regulations and approved by the Animal and Plant Health Agency (APHA). You must monitor your process in line with animal by-products regulations where required to do so.

6.1 Waste pre-acceptance and characterisation,

1. You must use WM3 technical guidance on waste classification to be able to assign the correct waste classification code.

2. When you receive a customer enquiry and before the waste arrives at the facility, you must obtain the following in writing or in an electronic form:

- details of the waste producer including their organisation name, address and contact details
- the source and nature of the waste, at the point of production (the process that gives rise to the waste)
- a description of the waste including its physical form
- the full characteristics of the waste including the variability of each waste (for example, liquid effluents must be individually assessed and tested, understanding of the waste's composition and characterisation must be based on representative samples)
- a description of any hazardous properties including potential risks to process safety, occupational safety and the environment
- the odour potential
- the type of packaging and risks of contamination
- an estimate of the quantity you expect to receive in each load and in a year
- the potential for self-heating, self-reactivity or reactivity to moisture or air
- the age of the waste

3. During pre-acceptance you must consider how you will manage and control the nutrient balance of the waste feedstock, the moisture and any toxic compounds which may inhibit biological activity.

4. You must verify the pre-acceptance information by contacting or visiting the producer. Dealing with staff directly involved in waste production can help to fully characterise a waste.

5. You must keep pre-acceptance records for at least 3 years (in a computerised waste tracking system) following receipt of the waste. If an enquiry does not lead to receipt of the waste, you do not need to keep records.

6. You must reassess the information you had at pre-acceptance yearly. You must also reassess information required at pre-acceptance if the:

- waste changes
- process giving rise to the waste changes
- waste received does not to conform to the pre-acceptance information

Before you accept waste you must consider its potential odour and emissions impact (description and intensity), for example:

- mercaptans, ammonia or other volatile organic compounds (VOCs)
- low molecular weight amines, for example, decaying fish or meat
- other high-nitrogen and odorous materials or chemicals, for example from highly decomposed food waste or poultry manure

You can only accept odorous wastes using special handling and storage arrangements such as in adequately covered or air contained and abated areas.

7. You must keep separate the roles and responsibilities of sales staff and technical staff. If sales staff are involved in waste enquiries then technical staff must carry out a final assessment before approval.

8. You must use this final technical check to make sure that you:

- only accept wastes that are suitable and permitted for the site
- avoid over accumulating waste
- have enough storage and treatment capacity

When you agree that you will accept waste from a customer, you must decide and record what parameters you will check at the acceptance stage. The checks could be visual (for example colour, phase, fuming), physical (for example pumpability, temperature, form) and chemical (for example pH, metals content) parameters.

9. You must also record the criteria for non-conformance or rejection.

10. You must make sure that your facility can comply with other regulatory requirements, for example the Animal By-Products Regulations.

11. You must advise your customers that they must avoid contaminating waste because it can cause handling difficulties and inhibit the biological treatment process. You must tell them what wastes are likely to contaminate your process.

12. You must not transfer waste unnecessarily between waste facilities.

13. You must obtain a representative sample or analysis, or analyse a representative sample of a waste, if:

- the chemical composition or variability of the waste is unclear from the information supplied by the customer
- there are doubts about whether the sample analysed is representative of the waste
- you will treat the waste at your facility (this will allow you to carry out tests to determine if the planned treatment will be safe and effective)

Where you rely on a customer sample you must record that you have done this and the reason why the customer sample is acceptable.

If the customer has a number of containers holding the same waste, you can apply the industry standard applying the square root of (N)+1 rule to sampling those containers.

For example: N = 28 containers +1 = √28 = 5.29 You would need to take 5 samples.

If the waste is variable, you must take a sample from each container.

You may not need a sample analysis at the pre-acceptance stage where the waste is:

- packaged food waste from food manufacturers or food retailers – however, you must have confirmation of its origin and enough information to understand how it will affect your biological treatment process
- biodegradable agricultural waste direct from the agricultural premises – however, you must have confirmation of its origin and enough information to understand how it will affect your biological treatment process
- green waste
- food waste and co-mingled green and food waste from local authority collections only
- a pure product chemical or where the chemical composition and hazardous properties are available in a REACH compliant safety data sheet, for example manufactured glycerol product

14. You must make sure that feedstock testing and testing frequency reflects the nature of the material, how it arises and any potential variation within it. For example, taking account of seasonal variations.

After fully characterising a waste, you must technically assess the waste's suitability for treatment and storage to make sure you can meet your permit conditions and any other regulatory requirements. You must make sure that the waste complies with the site's treatment capabilities and capacities.

Waste types for standard rules permits

The wastes listed on the biowaste treatment standard rules permits have already been characterised and risk assessed. The Environment

Agency considers that they are generically suitable for the biological treatment process allowed by the permit. You must make sure that all the waste types you received match and comply with those wastes listed and described in the standard rules permits.

6.2 Bespoke wastes,

The biological treatment process must be capable of fully treating the waste feedstock received. For example, within the time-temperature conditions of your process, the biodegradation of any packaging and full recovery of the waste should take place.

1. You must fully assess and manage:

- any effects or inhibition on the biological treatment process and quality of the final waste or product – critical where you accept novel waste streams or multiple waste streams as it may prevent or delay associated landspreading deployments
- the effects of any potential carry-over of residual chemical components into the outputs and on using the final outputs

For novel or water based liquid waste, you may perform laboratory scale tests to predict the treatment's performance, for example on breaking emulsion or biodegradability.

Personnel and waste acceptance

The following measures apply to all processes and operations.

Non-hazardous wastes

2. For non-hazardous wastes, someone with enough training to determine if the waste is suitable and permitted at the site can do the technical appraisal.

3. At sites where the waste needs only a visual check, for example green waste, the person receiving the waste must have received training to recognise and deal with non-conformant loads

Mirror entries and hazardous waste

4. If you accept hazardous, mirror-entry hazardous, or bespoke wastes, you must follow the requirements of Technical Guidance WM3 Waste Classification and the Chemical waste: appropriate measures for permitted facilities, in addition to this guidance.

If you are permitted to accept mirror entries or hazardous wastes, the person carrying out the technical appraisal of a waste's suitability for receipt (at pre-acceptance) must be competent.

If you receive multiple hazardous wastes then the person carrying out the technical appraisal must have the minimum of an HNC in chemistry (or equivalent qualification). You must keep training records of qualifications or relevant experience of staff for all waste acceptance processes.

5. You must comply with our guidance on Chemical waste: appropriate measures for permitted facilities when receiving, handling, storing and treating hazardous waste.

6.3 Waste acceptance and reception,

The following measures apply to all processes and operations.

1. You must implement waste acceptance procedures to check the characteristics of the waste received matches the information you obtained during waste pre-acceptance. This is to confirm the waste is as expected and you can accept it, or that you must reject it.

Your procedures must follow a risk based approach, considering:

- the source and nature of the waste
- the variability of a waste (for example, liquid effluents) – you must carry out individual assessment and testing
- any hazardous properties the waste may have
- potential risks, process safety, occupational safety and the environment (for example from odour and other emissions)
- knowledge about the previous waste holder(s) and the age of the waste
- the waste's potential for self-heating, self-reactivity or reactivity to moisture or air

2. You must identify the effects of any seasonal variance on the waste’s composition.

3. You must only receive bespoke waste onto site that you have pre booked and that matches the pre-acceptance information.

If you need to take samples on site, they must be representative of the waste and taken by a technically competent person. This means they must be appropriately trained or hold the relevant qualifications.

4. You must visually check wastes and verify them against pre-acceptance information and transfer documentation before you accept them on site. The extent of the initial visual check is determined by the waste type and how it is packaged.

5. You must check and validate all transfer documentation and resolve discrepancies before you accept the waste. If you believe the incoming waste classification and description is incorrect or incomplete, you must address this with the original waste producer during waste acceptance.

6. You must record any non-conformances.

If you have assessed the waste as acceptable for storage or treatment at your facility, you must document this.

7. You must have clear criteria that you use to identify non-conforming wastes and wastes to be rejected.

8. You must also have written procedures for recording, reporting and tracking non-conforming and rejected wastes. These must include:

- using quarantine storage
- notifying the relevant customer or waste producer
- recording a summary of your justification for accepting non-conforming waste in your electronic (or equivalent) system

9. You must take measures to prevent the recurrence of non-conforming and rejected wastes.

10. You must weigh and record each load of waste on arrival to confirm the quantities against the accompanying paperwork, unless

there are other reliable systems (for example, based upon density and volume). You must record the weight in a system that enables tracking.

The person carrying out waste acceptance checks must be trained to effectively identify and manage any non-conformances in the loads received.

After the initial visual inspection and confirmatory checks, you must offload the waste into a dedicated reception or storage area to wait for detailed checks or sampling. Wastes that do not require further checking can go into the appropriate storage area.

11. You must not offload wastes if you do not have enough space and capacity to treat the waste at that time.

12. Tankered wastes must not be discharged to the head of a waste water treatment works when storm tanks are in operation as this may result in the waste discharging directly into the watercourse.

If you need to offload feedstock deliveries to inspect them, or carry out acceptance sampling before treatment, you must segregate the reception areas (typically into bays).

13. You must verify the waste is compliant as soon as possible.

14. If you use a bay every day you must clean it at least weekly. You must clean it more often (depending on the waste) if weekly cleans do not deal with the risk of vermin or fugitive emissions.

15. The waste reception area must be inside an enclosed building for the following:

- if receiving, storing or pre-treating (for example, de-packaging food waste) as the waste may lead to fugitive emissions
- for food waste
- for all waste containing animal by-products

A building is a covered structure, enclosed on all vertical sides, that is designed to provide sheltered cover and contain emissions of noise, particulate matter, odour and litter.

16. You must design enclosed buildings with an air extraction that is capable of negative pressure within the waste reception area and have air-lock controls. You must make sure the ventilation extraction and air treatment is suitably designed and engineered.

17. You must collect and treat all emissions in an appropriately engineered abatement system or air suction system close to the source. For in vessel systems, you can use exhaust air to aerate composting piles before treatment and discharge.

18. If you accept food and putrescible wastes, you must fit existing reception buildings with fast-acting roller shutter doors to allow delivery and other vehicles to enter and leave. You may need additional measures to minimise fugitive emissions, for example installing an airlock entry system.

19. You must design and maintain buildings used for feedstock reception and storage in a way that minimises fugitive emissions.

A reception building should have enough space to minimise the time waste is held before treatment, and to allow you to follow the first-in, first-out principle for waste treatment.

You should operate an alternate bay system or single bay all-in, all-out approach.

All bays used to segregate wastes must have defined and visibly clear storage demarcation boundaries.

Where there is a likelihood you will generate bioaerosols and dust you must treat the air with a dust filter before releasing emissions.

If you accept and store large volumes of ammonia-rich feedstock, for example poultry litter and manures, you must store it in a way that minimises the release of ammonia. You can do this by:

- covering it with a sheet or with an organic layer such as straw or compost to form a ‘biofilter’
- using a 3-sided walled area

You may need additional measures to reduce odour or ammonia if your site is located in sensitive areas.

20. You must design reception areas for easy cleaning and include contained drainage so you can collect wash-water separately for disposal or reuse.

21. If you are permitted to accept animal by-products you must:

- segregate these from other waste
- keep liquors and leachate separate and provide wheel-wash facilities for disinfecting delivery vehicles on exit from the reception building

You may need additional cleaning methods, for example steam cleaning. You must carry this out in an enclosed area.

22. You must characterise wash-down water containing cleaning chemicals, for example disinfectants, and dispose of them appropriately.

23. For outside reception areas, you must have impermeable surfacing and a contained drainage system.

24. You must minimise the time you store putrescible waste in reception before treatment and hold it for no longer than 5 working days. You must treat waste promptly and within 24 hours if there is risk of:

- attracting vermin
- causing fugitive emissions such as odour

You can store green waste and agricultural wastes for longer providing you follow all other appropriate measures to prevent uncontrolled decomposition and emissions.

You may store stable waste material for longer periods as long as it does not degrade and is stored in a way that does not encourage vermin or result in fugitive emissions.

Once offloaded, and as soon as is practicable to do so, you must assess the waste and verify it for acceptance, following your procedures.

25. You must put non-conforming containers and wastes into quarantine and deal with them immediately. You must record all non-conformances.

26. Where pallets are used to hold containers, you must stack them no more than 1.8m high (including the height of the pallet) and secure them with clear or transparent shrink-wrap.

The containers must not extend beyond (over-hang) the sides of the pallet. The shrink-wrap must be clear or transparent so that you can identify waste types, damaged containers, leaks or spillages and incorrectly stacked containers.

27. If you identify a non-conforming waste during a spot check, you must take measures to prevent a recurrence (including contacting the customer).

6.4 Waste acceptance – AD plants,

The following measures only apply to AD plants.

1. Operators of AD plants must characterise the feedstock to understand its effect on the biological treatment process.

This includes understanding, for example:

- particle size distribution and physical contaminants
- total solids and volatile solids
- biogas potential
- total organic carbon (TOC)
- chemical oxygen demand (COD)
- nutrient analysis
- fibre content
- pH and alkalinity
- volatile fatty acids (VFA)
- ammonia and total nitrogen content – carbon to nitrogen (C to N) ratio
- heavy metals and potentially toxic elements (PTEs)
- carbohydrates and lipids

Where the waste is from a known supplier and is consistent you can carry out these checks on initial acceptance and then periodically.

6.5 Waste acceptance – aerobic plants,

The following measures only apply to aerobic plants.

1. Operators of composting and aerobic treatment plants must characterise the feedstock to understand its effect on the biological treatment process. This includes understanding, for example:

- particle size distribution and physical contaminants
- total moisture
- TOC
- pH and alkalinity
- ammonia and nitrogen content (kjeldahl nitrogen)
- heavy metals and PTEs

6.6 Waste acceptance – bespoke wastes,

The following measures apply to all processes and operations.

These measures cover assessing the suitability of accepting waste that is not listed in the standard rules permits or quality protocols.

The waste producer must follow the guidance document WM3 when characterising and classifying waste. Producers must fully characterise the waste to include all the chemical components so you can adequately assess whether the waste is suitable for biological treatment.

1. You must understand and be able to demonstrate what happens to the substances in the bespoke waste material when it undergoes biological treatment. You must demonstrate that these substances will completely degrade during the treatment process.

2. You must provide details of any pre-treatment or additional process control measures needed.

Treating non-standard or bespoke wastes must result in full mineralisation and stabilisation of the waste. Mineralisation is the advanced stage of decomposition where organic matter completely

breaks down into available nutrients, water (H_2O) and carbon dioxide (CO_2).

Treating non-standard or bespoke wastes must also result in recovery of the waste or must benefit the biological treatment process itself.

3. For each bespoke waste type you must fully describe or demonstrate the:

- source and process that gives rise to the waste
- characteristics, including chemical, physical and biological make-up of the waste
- variability potential, considering source production methods
- biodegradability rate or biogas potential
- inhibition effects on the biological process
- residual by-products
- substances within the waste are biodegradable and recoverable under the conditions of the biological treatment process

4. Using the information in these bullet points (point 3), you must have a sampling and testing plan to demonstrate how you will make sure the waste is as described and remains suitable for treatment.

Sampling plans must meet the requirements of BS EN 14899:2005.

The testing plan must adequately reflect the waste and include the:

- objectives of the testing
- details of the testing needed
- test parameters based on chemical and physical characteristics
- the sampling approach including population, number of sampling events, number of samples, sample weight and reliability of the outcome
- sampling methodology

5. You must demonstrate the additional measures you will take if the waste is not within the suggested inhibition values. Guideline references are given in section 13 Bespoke waste assessment.

6.7 Removing packaging and plastic,

1. If you accept a waste load and only identify a non-conformance after the waste has been deposited, for example loose green waste with high levels of metal or plastic, you must remove and quarantine the contaminants.

You must address the non-conformance with the waste producer as part of your waste acceptance procedures and record these events. You should tell them the actions you have taken, for example, removed it for disposal.

2. You must remove packaging and non-biodegradable packaging items that are not independently certified as industrially or home compostable (or both). You must do this before and during treatment to minimise the contamination of outputs.

Non-packaging items include:

- non-biodegradable materials integral to the product, for example tea bags
- items used when consuming food or drink, for example straws, single-use tableware
- plastic bags, used for example, in a kitchen caddy, food bin liners, or garden waste sacks

You can accept industrially compostable packaging and non-packaging items that are independently certified as compliant with at least one of the following:

- EN 13432
- EN 14995
- ASTM D6400

You can accept home compostable packaging and non-packaging items that are independently certified as compliant with at least one of the following:

- EN 17427
- AS 5810-2010
- NF T51-800

- TUV Austria’s certification requirements for home compostable packaging under their ‘OK compost HOME’ scheme

3. You must only accept separated loads of plastic packaging and non-biodegradable packaging items (for example, from closed loop sources such as festivals, coffee shops or individual buildings) if both of these apply, the:

- packaging is independently certified as industrially or home compostable (or both)
- load complies with your permit acceptance criteria

6.8 Acceptance of bulk loads, drums and intermediate bulk containers (IBCs),

1. You must only offload bulk loads (liquid, sludge or solid) after they have been fully verified. You must not accept a non compliant bulk load for interim storage except in an emergency.

Verification testing must include:

- checking consistency with the pre-acceptance information
- compatibility with the receiving vessel contents
- where appropriate, checking treatability by using laboratory scale simulation

Deliveries in a bulk road tanker must be accompanied by a ‘wash-out’ certificate or a declaration that previous loads do not pose a risk of cross contamination. This will not apply to dedicated tankers carrying only one type of waste.

2. You must take representative samples when sampling from:

- tankers of chemical production waste or hazardous waste
- new customers
- emergency deliveries

3. You must sample from each compartment if the tanker is divided into multiple compartments. If you have to take a sample from the back valve, you must avoid spillages.

When storing drummed waste, each drum must have a contents identification label.

Mixing wastes (by bulking, blending or repackaging)

4. You must take operational and design precautions when mixing or blending wastes, depending on their composition and consistency.

5. Mixing must have a clear and defined benefit to the process (for example, adjusting moisture content or solid fraction). You must only mix wastes together under controlled and safe conditions. You may need air handling, extraction and treatment.

6. You must complete a pre-acceptance and acceptance process that assesses the compatibility of wastes in the mixing process. You must not allow dangerous reactions to take place, for example those caused by:

- polymerisation
- gas evolution
- exothermic reaction
- decomposition
- crystallisation
- precipitation

7. You must understand the compatibility effects before:

- combining waste batches
- discharging from a tanker to bulk storage
- tank to tank transfer
- transfer from a container to a bulk tank
- bulking into drums or intermediate bulk containers
- bulking solid waste into drums or skips

If you do not clearly understand the compatibility effects, you must not blend or mix the waste until you can demonstrate compatibility.

Compatibility tests are risk based considering, for example:

- the hazardous properties of the waste
- the risks posed by the waste in terms of process safety
- occupational safety and environmental impact
- the knowledge of the previous waste holder(s)

8. You must prevent substances mixing if they react strongly with each other (causing heat, fire or gas formation). Mixing must not lead to increased risks to human health or the environment, either during the mixing operation itself or during the subsequent treatment process. Before wastes are combined, you must assess whether this combination can take place safely.

9. You must guarantee the traceability of wastes when mixing wastes.

10. You must only mix or blend waste in a dedicated area.

11. Mixing wastes must lead to the best possible level of waste management. For example, you must not mix:

- a waste which could be recovered with other wastes, meaning that the waste must now be sent for disposal or a lower form of recovery
- liquid wastes with other wastes for the purpose of landfilling
- waste to deliberately dilute it

12. When mixing wastes you must follow the joint Environment Agency and HSE Compatibility Testing Guidance for Bulking Operations in the Waste Treatment Industry.

Acceptance sampling

This does not apply to:

- green wastes
- food wastes and co-mingled food and green wastes from local authority collections
- food slurry that has been pre-treated and pre-pasteurised at separately permitted facilities
- biodegradable wastes from agriculture
- sewage sludge and septic tank sludge

13. You must still visually check the waste and carry out periodic audits of the waste against pre-acceptance and duty of care criteria. You must record the reason why you did not sample the waste in your waste tracking system.

14. You must representatively sample bulk or containerised waste (including from every container). You do not need to do this if the waste you receive has been representatively sampled and fully characterised during the pre-acceptance stage and you have verified the information as correct.

You can make a composite sample if each of the containers holds the same waste and you know the waste is not variable.

15. You must obtain a representative sample by taking a core sample down to the base of the container.

16. You must make sure that you replace lids, bungs and valves immediately after sampling.

17. You must have a sampling and analysis procedure. You must design it based on the risk factors for the waste, including:

- the type of waste (for example hazardous or non hazardous)
- knowledge of the customer (for example waste producer)
- the impact of potential mixing or blending and the possibilities for subsequent treatment

A representative sample is one that considers the full variation and any partitioning of the load so you can account for worst case scenarios.

Qualified staff must supervise on site sampling.

You must have suitable absorbents and spill kit material available to deal with any spills.

18. Where a driver arrives at the site with a sample taken from elsewhere, you must verify the sample as representative, reliable and obtained by a person technically competent to take it.

On site sampling may not be possible for health or safety reasons, for example, where you have previously taken a sample and there are specific risks regarding the waste handling.

Sampling must not increase the risk of incompatible substances coming into contact with one another, for example within a sump serving the sampling point, or because of contaminated sampling equipment.

19. Apart from packaged waste you must make sure that all waste is free from visual contaminants as far as practicable.

20. You must keep a record of the sampling regime, process, and justification in your waste tracking system.

Depending on the constancy, variability and confidence in the waste stream, you may need to keep samples on site after you have:

- treated a waste and removed its treatment residues from the facility
- transferred a waste from your site

21. You must customise sampling procedures for bulk liquids.

22. You must determine and record the following information:

- the sampling regime for each load, together with your justification for selecting each option
- a suitable location for the sampling points
- the capacity of the sampled vessel (for samples from drums, an additional parameter would be the total number of drums)
- the number of samples and degree of consolidation
- the operating conditions at the time of sampling

23. Wherever possible, you must sample waste in accordance with:

- EN 14899 Characterization of waste – Sampling of waste materials – Framework for the preparation and application of a sampling plan

- CEN/TR 15310 1 Characterization of waste – Waste Collection – Part 1: Guide on the selection and application of criteria for sampling under various conditions
- CEN/TR 15310 2 Characterization of waste – Waste Collection – Part 2: Guide on sampling techniques
- CEN/TR 15310 3 Characterization of waste – Waste Collection – Part 3: Guide on procedures for sub sampling in the field
- CEN/TR 15310 4 Characterization of waste – Waste Collection – Part 4: Guide to the packaging procedures for storage, conservation, transportation and delivery of samples
- CEN/TR 15310 5 Characterization of waste – Sampling of waste – Part 5: Guide on the process of developing a sampling plan

Testing and analysis

24. Where you sample a waste, you must test the waste for acceptance according to the parameters decided at pre-acceptance. You must record the results of the tests in the computerised waste tracking system. You must note and investigate any discrepancies.

Laboratory samples must be analysed by a UKAS approved laboratory.

Quarantining waste

25. Your facility must have a dedicated waste quarantine area.

Where there is a risk of fugitive emissions from quarantined waste you must store it in closed or covered containers or within a building or covered skip.

Your quarantine storage must be separate from all other storage and clearly marked as a quarantine area.

26. You must not keep quarantined waste longer than 5 working days.

27. You must have written procedures in place for dealing with wastes held in quarantine, together with a maximum storage volume. The

maximum storage time must take account of the potential for odour generation, pest infestation and storage conditions such as temperature effects. If the waste is infested or odorous you must remove it as soon as possible and in any event within 24 hours.

28. The waste off-loading area, any sampling points, and quarantine areas, must have an impermeable surface with self contained drainage. This is to prevent any spillage entering the storage systems or escaping off site.

29. You must design all surfaces to allow effective cleaning.

6.9 Waste tracking,

The following measures apply to all processes and operations.

1. You must use a waste tracking system which records information about the available capacity of the waste quarantine, reception, general and bulk storage areas of your facility. Your information must include treatment residues and end of waste product materials.

Your tracking system must hold all the information produced during:

- pre-acceptance
- acceptance
- non-conformance or rejection
- storage
- repackaging
- treatment
- removal off site

This information must be in a readily accessible format. Where possible this should be computerised.

2. You must create records and update them to reflect deliveries, on site treatment and despatches. Your tracking system will operate as a waste inventory and stock control system. It must include this information as a minimum:

- the date the waste arrived on site
- the original producer’s details

- all previous holders
- a unique reference number
- the pre-acceptance and acceptance analysis results
- the package type and size
- the intended treatment or disposal route
- the nature and quantity of wastes held on site
- where the waste is physically located on site
- where the waste is in the designated disposal route
- staff (name and position) who have taken any decisions about accepting or rejecting waste streams and who have decided on recovery or disposal options
- details that link each waste container accepted to its consignment or transfer note
- non-conformances and rejections

The tracking system must be able to report:

- the total quantity of waste present on site at any one time and how that compares with the limits authorised by your permit
- the total quantity of end of waste product materials on site at any one time
- a breakdown of the waste quantities you are storing pending on-site treatment or waiting for onward transfer
- a breakdown of the waste quantities by hazardous property
- where a batch or load of waste is located based on the site plan
- the length of time a waste has been on site

3. You must store back up copies of computer records off site. Records must be easily accessed in an emergency.

4. You must hold acceptance records for a minimum of 2 years after you have treated the waste or removed it off site. You may have to keep some records for longer if they are required for other purposes, for example hazardous waste consignment notes.

7. Waste storage, segregation, transfer and handling

Appropriate measures for waste storage, segregation, transfer and handling.

The following measures apply to all processes and operations.

1. Your facility must have enough physical and permitted capacity for the wastes, raw materials and ‘end of waste’ materials that you store on site.

2. You must comply with the limits set in your environmental permit and with any additional regulatory requirements that may apply, for example, the:

- Animal By-Products (Enforcement) (England) Regulations 2013
- COMAH regulations

3. You must store all waste on an impermeable surface with contained drainage that meets the recommendations of CIRIA 736.

4. Storage area drainage must:

- contain all possible contaminated run off
- prevent incompatible wastes coming into contact with each other
- make sure that fire cannot spread
- be designed to allow access for inspection and cleaning

5. Where possible you must keep clean rainwater separate from wastes and waste waters to limit storage requirements.

6. You must store waste in locations that minimise handling waste and have handling procedures in place.

Only competent staff must handle waste. They must use appropriate equipment.

7. Where possible, you must locate storage areas away from watercourses and sensitive perimeters (for example those close to public rights of way, housing or schools).

8. You must store all waste within the security protected area of your facility to prevent unauthorised access and vandalism.

9. Your management system and odour management plan must clearly state the maximum storage capacity of the site and the designated storage areas.

10. You must provide signage that clearly states the maximum quantity and types of waste that can be stored in an area. You must communicate these maximum capacities to site operatives.

11. You must define capacity in clear terms, for example:

- maximum tank or vessel capacities
- tonnage
- number of pallets or containers

12. You must regularly monitor the quantity of waste stored on the site and in designated areas to check you do not exceed the maximum storage capacities.

13. For in vessel composting and AD, available storage capacity and throughput will be influenced by the period of time the waste is in the treatment vessels. You must make sure you have sufficient capacity to store waste inputs and outputs, taking account of the loading rate and capacity for treatment. Information on determining capacity is available in Regulatory Guidance Note 2.

14. You must store highly putrescible wastes, including odorous and ammonia-rich wastes and wastes containing animal by-products, in a contained or enclosed building.

The building should be fitted with an appropriately engineered extraction and ventilation system, with the air extracted and directed to a suitable abatement system. You can install localised point source air extraction in buildings to minimise a source emission from that locality.

For liquid wastes this is either:

- a sealed tank fitted with an air control system which may include air circulation
- local extraction to a gas recovery plant or engineered abatement system

15. Your storage areas must be large enough to manage foreseeable changes in feedstock supply and your ability to despatch outputs without causing pollution. For example, during:

- public holidays
- periods of adverse weather
- seasonal peak volumes of waste acceptance

16. You must not over accumulate wastes. You must treat wastes or remove them from the site as soon as possible. You must prioritise the treatment or off-site transfer of waste based on:

- its type
- its age on arrival
- date of arrival
- duration of storage on site

17. Storage area surfaces used for putrescible waste must be of a type and quality suitable for effective cleaning and or disinfection. You must put procedures in place and use them to make sure that surfaces are regularly cleaned or disinfected (or both).

18. You must design your storage facilities and procedures to make sure there is no cross-contamination between inputs and outputs of the process, and during the treatment cycle (where applicable). For example, during the sanitisation and stabilisation of composting waste.

19. For waste in storage you must follow the first-in, first-out principle. You must also identify and prioritise dealing with wastes with a higher risk of causing odour, litter or pest problems. You can do this by filling and emptying bays alternately or operating an all-in, all-out approach.

20. You must make your on-site waste inventory readily available.

21. You site must have safe pedestrian and vehicular access (for example, for forklifts) (at all times) to storage areas so that you can retrieve waste safely.

22. You must design bunkers, bays and pits so that waste and debris does not build-up in inaccessible areas such as corners. You must regularly clean bunkers, bays and pits.

7.1 Above ground tank and ‘bulk’ storage,

The following measures apply to all processes and operations.

1. You must locate all above ground tanks used for storing and treating waste on an impermeable surface with secondary containment.

2. You must have a drainage plan.

3. You must use tanks and associated equipment that are suitably designed, constructed and maintained.

4 You must do a risk assessment to validate the design and operation of bulk storage systems.

5. You must make sure any new tanks and equipment are leakproof and working correctly before using them.

6. You must cover all bulk storage tanks. Where possible you must contain and vent tanks and vessels through suitable abatement, or direct emission to a gas recovery system.

7. Storage systems must conform to the following CIRIA guidance:

- C535 Above ground proprietary prefabricated oil storage tank systems (where relevant)
- C736 Containment systems for the prevention of pollution

8. You must locate bulk storage vessels on an impermeable surface which is resistant to the material being stored. The surface must have self contained drainage to prevent any spillage entering the storage systems or escaping off site. Impermeable surfaces must have sealed construction joints.

9. Secondary containment (bunds) must:

- be constructed to CIRIA 736 Containment systems for the prevention of pollution
- have regular visual inspections – you must pump out or otherwise remove any contents under manual control after checking for contamination
- be fitted with a high level probe and an alarm
- have tanker connection points within the bund or provide adequate containment for spillages or leakage
- have programmed engineering inspections (extending to water testing if structural integrity is in doubt)
- be emptied of rainwater regularly to maintain the containment capacity

10. You must be able to close all connections to vessels, tanks and secondary containment using suitable valves. You must fit a valve close to the tank if you have bottom outlets and have at least 2 isolation points in case of valve failure.

11. You must direct overflow pipes to a contained drainage system (for example the relevant secondary containment) or to another vessel where suitable control measures are in place.

7.2 Submerged or underground tanks,

The following measures apply to all processes and operations.

1. All below-ground tanks (including those partially and fully submerged) used for storing and treating waste must be constructed with secondary containment and an engineered leak detection system. They must be constructed in accordance with CIRIA 736 or an alternative recognised standard.

2. All tanks must have alarms and cut-out systems or an inspection process designed to prevent and detect over topping and leakage.

3. All storage tanks that require additional management, including agitation, active gas collection or aeration, must be contained and the air collected and appropriately abated or recovered.

7.3 Lagoon storage,

The following measures apply to all processes and operations.

1. You must make sure lagoons and tanks used for storing composting liquors and digestate have enough capacity to account for times when the landbank is unavailable. Document these procedures in your management system. You must prearrange a contingency so you have adequate storage.

2. Lagoons must have a freeboard of at least 750mm at all times.

You must cover new lagoons with an engineered, impermeable, rigid or flexible cover. They must have gas collection and extraction to abatement or a gas recovery system. All new lagoons must be constructed in accordance with CIRIA 736.

3. Existing lagoons must be risk-assessed by a suitably qualified engineer. You must maintain the structural integrity of the lagoon. You must address and resolve any problems identified during the assessment.

4. Existing lagoons can use floating covers or a crust (formed where there is a high dry matter content) to manage emissions. Coverage must be sufficient to minimise the surface to air ratio to prevent emissions.

5. Floating covers must:

- be applied in line with manufacturers' recommendations and re-applied as necessary
- cover the whole surface area

6. You must design fixed lagoon covers to prevent emissions. Use them to prevent rainwater ingress and reduce the volume of material stored. More information on how to control emissions specifically from slurry stores is available in the intensive farming environmental permitting guidance.

7.4 Storage in containers, IBCs and drums,

The following measures apply to all processes and operations.

1. You must store all waste containers, for example drums and IBCs in a way that allows safe access and inspection.

2. Where practicable, you must store containerised waste under cover. Covered areas must have good ventilation. This applies to any container held in storage, reception (pending acceptance) or quarantine.

Under cover storage provides better protection for containers than open air storage and minimises production of contaminated water. Covered storage also:

- lowers temperature fluctuations that can cause a pressure build-up in containers
- reduces container degradation through weathering

3. Where wastes are known to be sensitive to heat, light, air or water, you must make sure they are protected from such ambient conditions. These storage provisions apply to any container held in any storage area, or which is being emptied, sorted, repackaged or otherwise managed.

4. You must empty, re-package or otherwise manage containerised waste under cover. If this activity could produce emissions, you must carry it out in an enclosed building with suitable air extraction, abatement and drainage.

5. All waste containers must be fit for purpose, that is:

- undamaged
- not corroded, if metal
- have well fitting lids
- suitable for the contents
- with caps, valves and bungs in place and secure
- within the manufacturers' use by date, particularly for plastic containers (this does not apply to certified compostable packaging destined for treatment)

6. You must check on a daily basis any containers (and pallets they may be stored on) for leaks and spills.

7. Containers and pallets must be made safe where there is evidence or risk of spills.

8. You must label all containers during storage in the way they were labelled at acceptance. You must handle and store containers so that the label is readily visible and continues to be legible.

9. You must deal with poorly labelled or unlabelled containers, for example, by re labelling, over drumming and transferring the container's contents.

10. You must not use containers, tanks and vessels beyond their specified design life. You must only use them for the purpose, or substances, they were designed for.

11. To minimise emissions and reduce spills, you must maintain the integrity of waste packaging at all times, until it enters the treatment process.

12. You must never throw, walk on or handle wastes in a way that might damage the integrity of the packaging.

13. You must train forklift drivers in how to handle palletised goods to minimise forklift truck damage to the integrity of containers.

14. You must design and operate your facility in a way that minimises waste handling.

15. All containers must have a lid, and the lid must be closed except when the container is being sampled, loaded or unloaded.

16. You must not stack skips containing waste.

17. You must inspect storage areas, containers and infrastructure on a daily basis. You must deal with any issues immediately. You must keep written records of the inspections. You must rectify and log any waste spills.

18. You must only move wastes between different locations on site (or load for removal off site) following written procedures. You must amend your waste tracking system to record these changes where necessary.

19. You must not carry out activities with a clear fire risk within any storage area. Examples include:

- grinding
- welding or brazing metal
- smoking
- parking normal road vehicles, except while unloading
- recharging forklift truck batteries

20. If you need to carry out maintenance which may involve for example, grinding and welding, you must first remove all flammable materials. You must then carry out a detailed risk assessment following safe systems of work or permit to work.

7.5 Transfer of waste into and from sealed tankers and containers,

This section also applies to the transfer of liquid effluents, digestate and slurries.

The following measures apply to all processes and operations.

1. You must transfer the waste from or to a tanker, or to a drum or tank, in a dedicated area.

2. You must have a documented process and make sure staff are trained on how to complete checks and transfers.

3. Your staff must supervise tanker discharges or transfers.

You should book in tankers and allow the appropriate amount of time for safe transfer.

4. You must have a system to prevent a vehicle pulling away whilst still coupled. You must have measures for making sure couplings are correctly fitted. This will prevent couplings from loosening or becoming detached.

5. You must provide, maintain and clean your own couplings to guarantee their integrity and fitness. You must also:

- make sure that a coupling can withstand the maximum shut valve pressure of the transfer pump

- maintain a sound coupling at each end of the transfer hose, even when a gravity feed system is in place, and you must protect the transfer hose
- contain all leaks or drips from coupling devices using as a minimum drip trays

6. You must make sure that transfers from tankers only take place after you have completed waste acceptance checks and then only with the approval of a responsible person. You must record:

- which batch or load of material is for transfer
- the receiving storage vessel
- the equipment required, including spillage control and recovery equipment
- any special provisions relevant to that batch or load, including minimising fugitive emissions

7. You must have measures for preventing over filling such as a shut-off valve.

8. You must only transfer waste after completing a suitable verification and after compatibility testing.

9. You must unload tankers containing animal by-products using a sealed pipe. You must do this in a building fitted with an appropriately designed and engineered air collection and abatement system.

10. You must carry out routine maintenance checks on pump seals and filter pots.

11. You must have emergency containment areas for leaking vehicles to prevent pollution.

You should have a lockable isolating valve fitted to the loading connection. This is kept locked during periods when the unloading points are not supervised.

12. If you use a delivery tanker to collect and transport digestate (from AD or TAD), you must make sure there is no risk of cross-contamination, for example delivering mixed food waste and leaving with pasteurised digestate.

13. You must have systems and procedures for making sure that wastes for transfer comply with The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG) when they are packaged and transported.

14. You must retain spillages within the contained areas and collect those promptly using pumps or absorbents. You must record any spillages.

15. If you use rotary type pumps, they must be equipped with a pressure control system and safety valve.

16. You must pump liquids and sludges instead of using open movement.

7.6 Drainage,

The following measures apply to all processes and operations.

1. You must inspect on a weekly basis all drainage channels, aeration channels and collection sumps to identify blockages caused by debris and condensate.

2. You must remove debris and clean the channels and sumps to prevent odour, pest infestations and maximise drainage and air flow through aeration channels.

3. You must appropriately characterise leachate or liquors sent for off-site recovery or disposal in line with WM3. This waste is coded as either 16 10 01* or 16 10 02 depending on assessment and characterisation.

7.7 Tank inspection and maintenance,

The following measures apply to all processes and operations.

1. You must monitor substrate levels in all storage tanks, vessels and lagoons used to hold liquids, sludge's and digestate.

2. Storage vessels used for liquids, sludges and digestate must have a freeboard as recommended by the plant manufacturer.

3. You must equip all storage tanks with an automatic level monitoring system and an associated alarm and cut-out out system to protect

against over-filling. These systems must be sufficiently robust (for example, be able to work if sludge and foam are present) and regularly maintained.

4. A competent person must inspect tanks, pipework and fittings, following a written programme of inspection. A competent person must also determine the scope and frequency of the examination. You must work out how often to carry out these internal examinations using a risk assessment approach. This should be based on the:

- design, specified design life and intended use of tank, pipework or fittings
- age, maintenance and service history
- known and potential damage mechanisms and their rates of occurrence
- operational and thermal stresses
- influence of cyclic and pressure loadings
- bio-chemical influence of the substrate stored or carried

5. You must act on the results of all inspections and carry out any necessary repairs to make sure the tanks remain fit for service. You must keep records of the results of inspection and any repairs.

6. You must have systems in place to make sure that loading, unloading and storage are safe, considering any associated risks. This can include:

- having pipework and instrumentation diagrams
- using ticketing systems
- using key locked coupling systems
- having colour coded points, fittings and hoses
- using specific coupling or hose sizes for certain waste transfers

7. If you operate a new facility, you must cover tanks, vessels or lagoons that store or treat hazardous or liquid wastes with fixed covers.

8. The following must be fit for purpose and resistant to the wastes being stored and carried:

- pipes
- hoses
- connections
- couplings
- transfer lines

9. You must use a suitable pipework coding system (for example RAL European standard colour coding).

10. You must monitor the transfer of liquids and sludges between tanks and this must be linked to an alarm or cut-out system.

11. Your staff must supervise loading and unloading activities, either directly or using CCTV.

12. You must work out how often to carry out external inspections using non-destructive testing (NDT) methods.

13. You must schedule removing grit and sediment from storage tanks and lagoons at appropriate intervals, determined by a written programme of inspection. Grit and sediments removed from tanks and grit traps will be a waste when discarded and therefore subject to waste regulatory control. You must not deposit them into lagoons.

8. Waste treatment

Appropriate measures for waste treatment.

The following measures apply to all processes and operations.

1. You must not receive waste if you do not have enough capacity to store and treat it in line with your design criteria.

2. For all stages of the process, you must manage the waste to make sure the process is stable and to minimise the risk of:

- over-heating
- re-heating
- foaming
- uncontrolled biological activity
- leachate breakout

3. Waste treatment must have a clear and defined benefit and result in a fully recovered material. You must fully understand, monitor and optimise the waste treatment process to make sure that you treat waste effectively and efficiently. The treated output must be suitable for its intended use.

4. You must identify risks and characterise emissions from the process and take appropriate measures to control them at source or abate them.

5. You must have accurate and up-to-date written details of your treatment activities and process controls. The complexity of the waste you treat and the processes on site will determine the level of detail. You should include:

- information about the control system philosophy and how the control system incorporates environmental monitoring information
- simple process flow sheets that show the origin of emissions
- process instrumentation diagrams
- process flow diagrams (schematics) for waste, water and air and gas flow

- descriptions of process integrated techniques and waste water or waste gas treatment at source including their performances
- an equipment inventory, detailing plant type and design parameters, for example, time, temperature, pressure
- details of chemical reactions and the rate of reaction and energy balance
- venting and emergency relief provisions
- operating and maintenance procedures

6. You must use material flow analysis to identify potential contaminants in waste inputs, outputs and emissions; in particular where you accept packaged or bespoke waste streams.

7. You must ensure you fully understand the fate of any contaminants to make sure that you minimise, remove and recover them from the process.

You may need pre-treatment methods to minimise the carry-over of contaminants through to the treatment process.

8. You must not dilute undesired materials into the recycling or product cycle.

9. You must not proceed with the treatment if your material flow analysis indicates that losses from a process will cause:

- a breach of an Environmental Quality Standard or your permit
- a breach of a benchmark
- a significant environmental impact
- an issue in using the end material beneficially

10. You must clearly define the objectives and reaction (chemical, physical or biological) steps for each treatment process. You must define the end point to the process so that you can monitor and control the reaction.

11. You must define the suitable inputs to the process, and the design must consider the likely variables expected within the waste stream.

12. You must sample and analyse the waste to check that you have reached an adequate end point.

13. You must manage the pre-treatment of waste and biological treatment activities in a way that minimises the risk of pollution from:

- odour
- bioaerosols
- dusts
- other emissions

14. You must use plant and equipment that you can contain to minimise fugitive emissions.

8.1 Abnormal operating conditions,

The following measures apply to all processes and operations.

1. You must assess the likelihood of abnormal operating conditions. You must make sure you continue to comply with permit conditions by taking steps to prevent, alert and mitigate these events. Abnormal operating conditions include:

- unexpected releases or loss of containment
- start up
- unplanned stoppages and breakdowns
- shutdown

8.2 Pre-treatment,

The following measures apply to all processes and operations.

Pre-treatment may include one or more of the following:

- hand-sorting
- de-packaging
- removing contaminants, for example using screening, separation, sifting, pressing or floatation
- mixing and blending – to obtain correct carbon to nitrogen or substrate characteristic ratios
- screening and thickening, for example adding polymers
- using additives, for example trace elements

- optimising particle size, for example using shredding or maceration

1. You must make sure you carry out particle size reduction where required:

- by the animal by-products regulations for sanitisation or pasteurisation
- to optimise substrate characteristics for effective and efficient processing

2. You must make sure that particle size reduction does not simply result in smaller contaminants entering the biological treatment process.

3. You must also:

- apply the correct technology to pre-treat the waste to provide optimal substrate characteristics
- retain the correct biological conditions to biodegrade the feedstock into an output that meets expectations and is suitable for its intended end use
- comply with additional regulatory requirements, for example, animal by-products regulations

4. You must carry out the pre-treatment of putrescible wastes in a suitably designed building. This must have an air ventilation and extraction system designed to make sure you comply with any associated emission limit in your permit. The ventilation and extraction system must be connected to an appropriately engineered air abatement system or gas recovery plant. Putrescible wastes include odorous wastes, ammonia-rich wastes and wastes containing animal by-products.

You can apply a risk-based approach when designing air containment for the pre-treatment of agricultural wastes only.

5. You must demonstrate that all process equipment is made of materials suitable for use and is being used according to its design capability and the manufacturers’ design life.

6. A qualified and competent person must justify and verify the use of operating plant and equipment beyond its design life, to demonstrate there is no additional risk of failure.

7. You must remove all non-compostable plastic and other contaminants in the feedstock, or reduce them to levels that are as low as reasonably practicable.

8. You must not rely solely on post-treatment technology to remove known contaminants. Where you use hammer mills to treat packaged waste you must take additional measures to make sure that you remove non-compostable or digestible plastics before or during the process.

9. You must take measures to remove any remaining non-compostable or digestible contaminants from the final material.

10. You must be able to demonstrate the removal technology is effective at removing contaminants.

11. You must consider your pre-treatment requirements at the design stage. Pre-treatment methods must give you the flexibility you need to process the types of feedstock you plan to accept at the facility.

12. Pre-treating waste feedstock may be done off-site from a treatment facility but there must be a process to ensure that feedstock is of a high quality.

8.2 Process monitoring systems,

1. You must install and operate a manual or automatic monitoring system that supports effective operational management and minimises operational difficulties. For example by displaying (visually and audibly) early warning signals to prevent system failures.

2. You must calibrate monitoring equipment and maintain your plant and equipment in line with manufacturers' recommendations and your maintenance and inspection programme. This includes, for example, doing daily and weekly inspection checks and holding records of completion.

8.3 Mechanical treatment,

The following measures apply to all processes and operations.

1. You must segregate and condition the waste inputs before biological treatment. This may include:

- using shredders for opening bags
- using metal separators to extract undesirable components that might obstruct later processes
- using sieves or shredders to optimise particle size and segregate biodegradable fractions
- using air separation to segregate high calorific materials such as textiles, plastics and paper
- homogenising materials
- sterilising waste in an autoclave – before mechanical treatment

8.4 Aerobic treatment and process control,

The following measures only apply to aerobic treatment.

An aerobic treatment waste facility may include the following processes (or combination of processes):

- in vessel composting (including rotating drum systems, containers and vertical towers)
- open-air windrow composting (animal by-products excluded)
- hall (housed) composting
- static aeration
- bio drying and bio stabilisation (MBT)
- thermophilic aerobic digestion (TAD)
- aerated lagoons and activated sludge (for waste water treatment)

Vessels used for batch processing of solid waste (for example in vessel composting or bio stabilisation for MBT) must be able to carry out continuous, representative temperature monitoring during sanitisation. You must link monitoring to an alarm system that you can check remotely and that gives a remote alarm notification.

To improve environmental performance and reduce emissions to air, you must monitor and control the main waste and process parameters, including:

- waste input characteristics (for example, C to N ratio, particle size, pH, porosity)
- temperature and moisture content (at different points if in a windrow)
- aeration (for example, through windrow turning frequency, O_2 and CO_2 concentrations, air stream temperatures for forced aeration)
- for windrow composting, the height and width of composting piles
- a visual and olfactory assessment of the material, to detect actinomycetes, fly infestation and odours

You can monitor the moisture content for enclosed processes before loading the waste into the enclosed composting stage. You can adjust it when the waste exits the enclosed composting stage, or when you move it from stage 1 to 2 to meet the requirements of the animal by-products regulations.

1. You must maintain optimal parameters to these ranges:

- pH 5.5 to 8.0
- particle size 10mm to 50mm
- temperature 55°C to 70°C (reducing after sanitisation and during stabilisation and maturation)
- moisture 60% to 65% (start of the process), 30% to 65% (during the process)
- carbon to nitrogen ratio 20:1 to 40:1

These ranges are advised optimal parameters. If you operate outside these ranges, you must justify your reasons and demonstrate there is no adverse impact on the treatment process or the environment as a result.

Temperature and moisture

2. You must monitor moisture and temperature during both treatment and storage and adjust the moisture in dry periods to prevent dusty conditions. You must keep records of monitoring data.

3. As a minimum you must monitor daily the temperature of composting waste during sanitisation and stabilisation. This can reduce to weekly during maturation if you can demonstrate the material is stable.

4. You must install continuous monitoring where it is required in your permit or under the animal and by-products regulations (such as for catering and food waste).

5. You must locate your monitoring points so they give representative data. If you insert monitoring probes into windrows and static piles you must first work out what length of probe you will need to get representative data, based on the size of the waste pile.

6. You must get data from within the core of the pile. For example, for a 4m stack you will need a probe that is over 2m long to make sure you can take a representative sample of the core temperature. Longer windrows will require more monitoring points.

7. You must control moisture using visual control and one of the following methods, a:

- squeeze or fist test (when carried out by an experienced operator)
- moisture monitoring device with read-out or connectivity to a data capture system
- an accurate oven-drying method

8. You must periodically validate your monitoring methods, for example, by drying if you rely on squeeze tests. You must keep records of your validation tests.

If you use portable aeration pipework you must clean it after each treatment batch.

9. You must assess all the monitoring data you collect to make sure you have a continually effective and stable process and that you can:

- take action and make safe and informed processing adjustments where needed
- minimise operational difficulties

- prevent creating anaerobic conditions

10. You must minimise oxygen deficiency and avoid anaerobic conditions occurring during the composting process.

11. You should take measures against excessive moisture in the waste by:

- adding input materials with high carbon to nitrogen ratio
- balancing the mix of materials and maximising porosity
- making sure windrows are appropriately structured and the construction allows for passive drainage and temperature convection
- placing oversized material at the base of the windrow

12. You must keep a record of:

- your temperature and moisture assessments
- the watering date and the origin of water used, for example composting liquor or roof water

Sanitisation and stabilisation periods

13. You must clearly segregate composting batches undergoing sanitisation, stabilisation or maturation.

14. You must clearly label batches to allow traceability from the receipt of the waste to its despatch from site.

15. You must not combine multiple stabilising or maturing waste piles or windrows into single larger piles that could result in:

- the inability to carry out representative monitoring and safe handling
- increased fugitive emissions, odour or over-heating
- anaerobic conditions developing

The Environment Agency does not consider lock composting or deep clamp systems to be an appropriate measure because they do not allow adequate monitoring or process control.

Leachate and liquors

16. You must stop composting liquors from pooling at the base of waste piles and windrows. You can do this by:

- installing sloping ground infrastructure and appropriate drainage
- regular cleaning
- minimising over-watering

17. To minimise the risk of cross contamination, you must keep the run-off from composting liquors separate from sanitising and stabilising waste if you want to reuse liquor on stabilising waste.

18. You must not use liquor drained from waste in sanitisation and reception areas on stabilising or maturing waste.

8.5 Open air composting,

The following measures only apply to open air composting.

1. To minimise dust, odour and bioaerosol fugitive emissions to air from open air composting processes, you must:

- actively manage material to prevent anaerobic conditions developing and to prevent overheating
- prevent dry and dusty conditions occurring

2. You must work out the appropriate dimensions of your windrows taking account of:

- waste type
- heat generation and loss
- space availability
- effective retention time
- aeration requirements
- monitoring capability
- seasonal variation

3. You must provide enough space between composting windrows so that:

- there is sufficient passive aeration
- plant and equipment can access the windrows without compacting the waste or causing cross-contamination

4. You must adapt your operations to the meteorological conditions. For example, by:

- avoiding turning waste, screening or shredding during adverse weather conditions
- orientating windrows so that the smallest possible area of composting mass is exposed to the prevailing wind
- locating windrows and piles at the lowest elevation within the overall site layout

5. You must:

- maintain adequate moisture and control high temperatures to prevent anaerobic conditions, bioaerosols and odour plume dispersal
- dampen roadways and working areas

6. You must also consider using one or a combination of the following techniques where bioaerosols, dust or odour are a problem:

- cover actively composting windrows using semi-permeable membranes (particularly if there is an increased risk to receptors) – using alternative targeted containment may be acceptable
- use purpose made windrow turners
- use dust and bioaerosols suppressants during turning, shredding and screening, for example, back actor water sprayers or aprons on plant
- install static aeration with an aeration system that is the correct size to deliver enough air to the waste to prevent anaerobic conditions developing

Static-pile aeration

7. You must design your aeration system to cope with differences in feedstock and the demands of the treatment process. The system must be able to treat emissions from the process.

Positive or forced aeration is not considered by the Environment Agency to be an appropriate measure to control fugitive emissions. Forced aerated piles should be additionally covered with semi-permeable membranes to prevent fugitive emissions.

Negative aeration means drawing air down through the waste into the base of the waste and provides improved control and opportunity to treat emission.

8. You must remix statically aerated composting waste periodically to prevent preferential pathways developing. Your procedures must minimise emissions during this activity.

Remixing static piles is not usually a routine operation if the windrows and aeration systems are maintained and the windrow is well-constructed.

8.6 In vessel and enclosed systems aerobic processes,

The following measures only apply to in vessel and enclosed systems.

1. Batch operated treatment vessels must have localised air control and extraction systems.

2. An in vessel batch system must incorporate air extraction above the loading and unloading doors. This minimises the emissions released when the doors are opened, directing them to appropriate abatement.

3. You must regularly inspect and maintain your aeration and exhaust system to make sure it remains fit for purpose, this means it is both:

- free from debris
- functioning correctly at all times in line with designed performance specifications

8.7 Mechanical and biological treatment and mechanical heat treatment,

The following measures only apply to mechanical and biological treatment (MBT) and mechanical heat treatment (MHT).

1. You must characterise your process air and gas stream inventory and manage and treat it to reduce emissions.

2. You must only recirculate waste air with a low pollutant content in the biological process.

3. You may need to condense the water vapour contained in the waste air gas before reuse. In this case, cooling is necessary. Recirculate the condensed water when possible or treat it before discharge.

4. You must treat air from negatively aerated piles and enclosed systems with an appropriately designed and engineered air abatement system. The design must treat the maximum air flow and the full range of chemical contaminants and bioaerosols the exhaust air may contain.

8.8 AD and TAD plants treatment and process control,

The following measures only apply to AD and TAD plants.

1. The anaerobic treatment of waste may include a combination of multiple and complex activities. You must ensure these are listed in your permit.

2. You must identify and define all operational parameters and limits in your management system.

Digester stability

3. To reduce emissions to air and to improve the overall environmental performance, you must monitor manually or automatically to:

- make sure digesters are stable
- minimise operational difficulties
- provide sufficient early warning of system failures which may lead to containment failing and explosions

4. To demonstrate digester stability you must monitor and control the main waste and process parameters, including:

- pH and alkalinity of the digester feed
- temperature – continuously
- digester operating temperature
- hydraulic and organic loading rates of the digester feed
- concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate
- biogas quantity, composition and pressure – continuously
- liquid and foam levels in the digester

5. You must define the optimum operating temperature depending on the digester's biology and system design. You must keep the digester within the optimal operating temperatures and document this in your management system.

6. You must maintain a stable temperature in the digester preventing overheating and cooling.

You should consider insulating the digester.

7. You must understand the process parameters and make changes in the feedstock and micro-nutrient dosing to:

- maintain the digester to optimum performance
- be able to demonstrate maximised efficiencies for volatile solids reduction or chemical oxygen demand (COD) reduction in the substrate

8. You must install an alarm mechanism that is interlocked so that reactor feeding automatically stops when a gas pressure alarm condition occurs.

9. You must use Supervisory Control and Data Acquisition Equipment (SCADA) to monitor, record and display data for continuously monitored parameters.

10. You must carry out a daily visible inspection of your digesters using inspection ports.

11. Feeding systems installed inside buildings must have a hazardous gas warning system. You must consider these areas as part of your HAZOP and DSEAR risk assessment.

Preventing foaming and over topping tanks

12. You must take all measures to prevent and detect foaming by:

- actively managing the assessment and digester feeding rate
- monitoring the digestate stability
- fitting high level probes or sensors on tanks used for the treatment

13. If you use foam suppressants, you must have procedures in place to support their deployment.

14. If you use chemical additions, you must have appropriate controls and procedures in place for chemical storage, handling and use.

15. You must avoid decanting sacks or drums of chemicals directly into treatment tanks or vessels. You must monitor any reactions and make sure control mechanisms are in place to manage such reactions.

16. You must equip vessels and tanks used for liquid-based waste treatment, for example anaerobic and TAD digesters, with continuous temperature and level monitoring capability.

17. You must install pressure monitoring if there is a risk of pressurisation in the vessel.

18. You must link all monitoring to an alarm system that you can monitor remotely. The alarm system must give you an audible and remote alarm notification in the event of over or under-heating and over-filling.

19. You must install mixing systems to all liquid-based treatment vessels, these may include one (or a combination) of the following:

- mechanical stirrers using agitators
- hydraulic mixing using pumps that recirculate the substrate

- pneumatic mixing by recirculation (for example biogas in AD digesters)

20. Mixing or stirring mechanisms must be appropriate for the type of vessel used and the feedstock you are processing. This is to make sure there is:

- efficient mixing
- adequate oxygenation (TAD)
- uniform heat transfer
- sedimentation prevention

21. You must know the mixing efficiency and sediment loading in your vessels. Sediment must not impede mixing, which may lead to pressurisation or plant failure. You can demonstrate this by, for example:

- monitoring the agitation ampage of your mixing system
- using lithium tracing
- heat conduction thermal imaging

22. Tank design must:

- allow for sludge draw-off, debris and grit removal
- account for routine and expected pressure variations

23. You must also install pressure monitoring if there is a risk of over or under pressurisation in the vessel.

24. Vessels used for batch processing in solid waste systems (for example dry AD) must be able to carry out continuous temperature monitoring

8.9 Biogas production and management – AD plants,

The following measures only apply to AD plants.

1. You must manage gas production volumes within the processing constraints of the facility.

2. You must have contingency measures in place and appropriately manage any excess gas produced, including when there is limited gas to grid availability during low demand periods.

3. You must use measures such as decreasing loading rate and diverting feedstock if gas demand is compromised.

4. When determining gas storage capacity, you must consider how changes in climatic conditions, such as high temperatures in the summer, affect the volume of gas for storage.

5. You must protect your biogas upgrading and energy recovery plant with flame arrestors and slam shut valves.

6. You must install a permanent back-up generator to power critical plant and equipment in the event of power failure. Critical plant and equipment would include, for example:

- lighting
- maintain the integrity of gas storage systems
- flares for preventing plant failure and to manage health and safety risks

Leak detection and repair (LDAR)

7. You must implement a leak detection programme that identifies and controls methane slippage from all processes and storage on site.

8. Your procedures must make sure propane and odorants (for example mercaptans) are handled safely.

Combustion units

9. You must inspect and maintain all gas utilisation plant and equipment, as a minimum, following manufacturers' recommendations. You must record all routine and non-routine inspection and maintenance.

10. Gas combustion stacks must be vertical and unimpeded by cowls or caps.

11. Stacks for releasing point source emissions must have an ‘effective stack height’ unless otherwise stated in your permit, for example, if you operate under a standard rules permit.

12. You must monitor emissions following the requirements in your permit.

13. You must submit a record of each combustion unit and fuel type yearly.

14. You must consider whether you can use the heat from processing or combustion.

Combustion plant – medium combustion plant, specified generators and boilers

The guidance medium combustion plant and specified generators: environmental permits has more information about complying with the medium combustion plant directive and specified generator regulations.

15. You must comply with the emission limits in your permit and you must use the relevant monitoring standards.

8.10 Pressure and vacuum relief control – AD and TAD plants,

1. You must install pressure relief and vacuum relief valves (PVRVs) on all tanks where there is a risk of over or under pressurisation.

2. An appropriate qualified engineer must design the PVRVs and gas pipework fitted to your biogas storage vessels.

3. You must demonstrate that PVRVs are able to and can cope with the anticipated maximum gas production volumes and pressures to operate within the design of the plant.

4. For all tanks, pipes and vessels where PRVs are fitted the plant manufacturer must provide design pressures.

5. You must only use PVRVs designed, tested and manufactured in line with recognised standards such as BS EN ISO 28300:2008 or API2000.

6. You must design and monitor gas production rates and organic loading so the excess pressure in the tank does not exceed the ISO28300 or AP12000 certified leak test rate of the PVRV.

7. Pressure relief valves and gas pipe work must be able to cope with the anticipated maximum gas production volumes and pressures. Under the highest gas flow scenario, back pressure on tanks containing biogas must be less than the maximum allowable operating pressure and more than the minimum operating vacuum.

8. When determining pressure set points you must consider:

- that maximum operating pressure must be no higher than the certified leak test pressure
- the pipework dimensions

9. You must incorporate gas production rates in the calculated maximum flow rates for the following conditions:

- changes in temperature
- changes in atmospheric conditions
- safety requirements.

10. Valves must be set so that they do not produce fugitive emissions during normal tank pressure fluctuations.

11. You must fit pressure sensors to your digestion tanks and gas storage vessels. You must maintain safe operating pressure by managing gas production and directing biogas to:

- gas storage
- treatment
- utilisation plant
- flare

12. You must specify a maximum pressure for each digester above which there is no further feed to the digesters.

13. If excess gas pressure builds up in the tanks this must trigger an alarm which immediately instigates the venting systems.

You should locate pressure relief and vacuum devices independently from gas off-take lines and install stand-by valves to allow for down time during maintenance.

14. You must inspect, maintain and calibrate PRVs regularly and after foaming or over topping events. You must inspect and protect PVRVs against environmental and climatic conditions, for example by providing frost protection and barriers to prevent damage.

15. You must incorporate isolating valves so you can remove PVRVs from a live system for maintenance without producing large fugitive emissions or compromising site safety.

16. You must locate isolation valves before a fully bolted spool under PVRVs so they can be removed without affecting security of the isolating valve.

17. You must record the gas pressure.

18. Data logging on SCADA must be in place to record release events within operational pressure ranges. You must record the date, time and duration of the release. You must not make modifications to the PVRV without manufacturer’s approval or you will void the ATEX classification and you will not meet DSEAR Regulations.

19. You must record gas pressure events that are out of the expected operating range, including the date, time and duration of the pressure relief events.

PRVs inspection and calibration

20. You must correctly calculate the safety set point of PRVs. You must review these when there are changes to the operating process. You must then do any required adjustments.

21. A competent person must correctly set and fit each PVRV.

22. All PVRVs must be correctly maintained and inspected, following manufacturers' recommendations. You must have an agreed, written scheme of examination in place for their inspection and maintenance.

23. You must be able to demonstrate that a qualified engineer checks PRV function, and caries out testing and maintenance.

24. You must give your personnel safe access to all PVRV's.

25. The PRV manufacturer must provide the certified capacity flow curve of the PRV and demonstrate that the test was completed according to BS EN ISO28300 or API2000 on approved test apparatus.

26. Each PVRV must have a current functional test certificate based on BS EN ISO28300 or API2000 procedures for production testing. This certificate will include details of the retained pressure at specified flow rates. This figure must exceed 75% of the set point using calibrated and independent measurement technology.

27. The test certificate is valid for 3 years from the date of production or the previous test. You will need to get an earlier revalidation and certification if the following is evident or has occurred:

- maintenance inspections indicate that the contamination build up is excessive
- corrosion
- a foaming incident
- tank overfill

8.11 Biogas treatment and storage – AD plants,

The following measures only apply to AD plants.

1. You must prevent the emission of uncontrolled release of biogas and biomethane.

2. You must inspect, maintain, routinely test and keep a record of all gas storage and treatment plant and equipment following the manufacturers' recommendations or your inspection regime.

3. You must identify the intended end use of the biogas to determine the appropriate treatment method. You must consider the following factors:

- dewatering
- removing hydrogen sulphide which may corrode gas engines
- removing oxygen and nitrogen
- removing ammonia
- removing siloxanes, particularly from digesting sewage sludge
- removing particulates
- removing carbon dioxide particularly when upgrading from biogas to biomethane
- adding propane to improve calorific value for biomethane gas grid injection

4. You must assess hydrogen sulphide levels in the biogas to determine the efficiency of the removal methods applied. You should do this by monitoring gas quality before and after using gas cleaning equipment.

5. You must continuously monitor biogas flow, quality, pressure and composition. Monitoring systems must be interlocked where possible and have remote alarm capability.

6. You must remove water (condensate) from the biogas to protect the collection system, energy recovery plant and auxiliary flare. Condensate must be discharged into a contained drainage system or recirculated back into a digester. Condensate storage must not produce odorous emissions.

7. You must collect biogas from all digesters and all other treatment and storage vessels where methane is actively generated.

8. Biogas storage facilities must be gas tight, pressure-resistant, weather proof, and resistant to ultraviolet light and fluctuations in temperature.

9. You must not allow biogas and air to mix unless it is used for desulphurisation. If you use oxygen to desulphurise biogas you must automatically monitor oxygen levels. You must also use high-level

alarms which are set to automatically stop adding air before the lower explosive limit is reached.

10. If you use carbon filters, for example to clean gas before combustion, you must use procedures that minimise the risk of exothermic reactions during their maintenance, for example, by purging with nitrogen. You must contain and treat purged gases.

Flares or surplus gas burners

11. You must install or have a gas flare available for use at all times. You must not routinely use flares or vent directly to the atmosphere.

12. You should use enclosed (ground) design flares on all new plants. They should be capable of achieving a minimum of 1,000°C with 0.3 seconds retention time at this temperature.

13. On existing sites where shrouded or open flare are installed you must make sure that gas can effectively combust to destroy trace elements.

14. You must make sure that the finish on the exterior of the flare is weatherproof as well as heat-resistant. The structure of the flare must be designed to withstand wind stresses.

15. You must protect ancillary items such as control and instrumentation equipment, including cabling. Providing housing makes maintenance tasks easier, but you must consider any explosion hazards.

16. You must minimise the operation of the flare and use it only for emergencies and during maintenance to protect the integrity of the plant (for example, during start-ups or shutdowns).

17. You must specify measures in your procedures to minimise flare use during routine maintenance. This includes, for example, to:

- reduce feed rates to lower gas production
- increase the safe storage of gas where capacity is available
- install stand-by gas utilisation plant

18. You must monitor and record the use of your flare. Your records must include the date, duration and number of flaring events.

19. Your SCADA systems must be able to continuously monitor gas flow and when the flare is activated.

20. You must be able to quantify emissions if required and identify any potential improvements that would reduce flaring events.

21. You must routinely measure other parameters, for example:

- composition of gas flow
- gas temperature
- ratio of assistance
- velocity
- purge gas flow rate

22. You must routinely measure pollutant emissions, for example:

- oxides of nitrogen (NOx)
- carbon monoxide (CO)
- VOCs

23. Monitoring and interlocking must be linked to your SCADA system.

24. Flares must be automatically activated when the quantity of biogas exceeds a set maximum limit and before venting of biogas occurs.

25. During commissioning, you should consider lean burn flares where gas quality is poor to prevent venting and pollution.

Flare noise

26. Flares can cause noise. This can come from the vents, the combustion process and smoke suppressant injection. You must design new flares to minimise noise emissions.

Noise avoidance can include the following measures:

- reducing or attenuating the high-frequency steam jet noise by using multi-port steam injectors – designing the orifice to cope with potential coke formation is essential
- installing the injectors in a way that allows the jet stream to interact and reduce the mixing noise
- increasing the efficiency of the suppressant with better and more responsive forms of control
- restricting the steam pressure to less than 0.7MPa gauge
- using a silencer around the steam injector as an acoustic shield for the injectors
- using enclosed ground flares

9. Outputs

Appropriate measures related to the outputs from the waste treatment process.

9.1 Record keeping for treatment outputs and residues,

The following measures apply to all processes and operations.

1. You must record in the waste tracking system:

- that you have treated a waste
- what output materials you have produced and their weight
- what the treatment residues are and their weight

2. You must keep records of recovered and certified ‘non-waste’ materials leaving the site, including the:

- type of material
- batch number
- date of export off-site
- tonnage exported off-site
- area dispatched to

9.2 Outputs from aerobic processes – compost,

The following measures apply to all processes and treatments from aerobic processes.

1. Material stored after composting and screening must not cause pollution and you must demonstrate it is stable.

2. You must use the correct LoW code and description for the waste outputs you produce.

3. You must only describe your waste compost as ‘off-specification’ using LoW 19 05 03 if it has completed the composting cycle and 1 or more of the following criteria apply, it:

- does not meet a market specification such as publicly available specification (PAS) 100 – for example, it has failed a PAS 100 test parameter
- is composed of waste not listed in the Compost Quality Protocol
- is composed of waste not considered typically suitable for biological treatment, for example from the waste types listed in relevant standard rules permits
- is not certified compliant with the Compost Certification Scheme

You cannot describe your compost as ‘off-specification’ for waste that has only been through sanitisation (and not stabilisation). This is because it has not completed a full compost treatment. It must be sanitised and stabilised before you can be described it as compost.

4. You must correctly characterise and describe partially treated (sanitised) waste that will be transferred off-site to complete the composting process elsewhere. This waste is either 19 05 01 or 19 05 02. LoW 19 05 03 should not be used for classifying sanitised only waste.

9.3 MBT and MHT outputs,

Waste outputs from MBT or MHT are described as either compost like output (CLO) or refuse derived fuel (RDF).

These outputs are not suitable for use on agricultural land. For more guidance on applying these outputs to non-agricultural land read the guidance How to comply with your landspreading permit.

The waste code for these outputs is 19 12 12 – compost like output derived from residual waste streams.

If you export RDF you will need to notify this under the transfrontier shipment regulations – see the guidance about importing and exporting waste.

9.4 Outputs from anaerobic processes – digestate,

1. You must test your digestate to confirm that it is stable and has minimal biogas potential to prevent fugitive emissions.

Digestate separation

2. You must separate digestate in a way that prevents or mitigates emissions.

3. Where digestate is from food waste, you should treat it in a building with an appropriate air ventilation and extraction system. This must direct exhaust air to an abatement system or for recovery. You must design the extraction system so that:

- it provides a safe working environment
- air exchanges meet the recommended ventilation standards

4. You must effectively minimise fugitive emissions from dewatered digestate fibre and digested sewage sludge cake. This applies to all stored material. For example, you must store it:

- under a suitable cover
- in an enclosed building fitted with an air ventilation and extraction system
- in field stores in line with farming rules for water

5. You must separate and process digestate on an impermeable surface with a contained drainage system that meets CIRIA 736.

Composting digestate fibre

6. If you compost digestate fibre, you must compost it following the requirements for the aerobic treatment of waste.

7. You must compost digestate fibre to promote aerobic conditions either in:

- an enclosed building fitted with a suitably designed ventilation, extraction and air abatement system
- the open, either with negative aeration connected to an appropriate air extraction system with abatement, or a suitable covered system

8. You must control the risk of bioaerosols and demonstrate this by carrying out a site specific risk assessment.

Drying digestate

9. You must contain, collect, extract and treat all the emissions generated when drying digestate by applying heat.

10. All extraction and abatement systems must be appropriately engineered, sized and designed to a relevant industry standard to treat the emissions produced. These emissions may include:

- ammonia
- residual biogas
- odorous chemicals
- particulates and bioaerosols

11. You must consider within your risk assessments any health and safety hazards associated with all of your digestate treatment and storage areas. For example:

- biogas release from processing digestate
- potentially creating confined spaces within bunds and buildings

12. You must comply with health and safety regulation concerning DSEAR and confined spaces.

Ammonia recovery from drying digestate

13. You must have the activity in your permit and comply with any relevant emission limits.

14. Raw materials used in this process must be stored in areas with secondary containment. Ammonia must be stored safely in a building.

15. The end user must comply with the farming rules for water and landspreading guidance.

Contingency measures

16. You must have contingency measures for managing any untreated or unscreened digestate in the event of technology failure.

You must consider potential hazards (for example the release of residual biogas emissions and ammonia) and manage these in line with appropriate measures.

10. The Control of Major Accident Hazard Regulations 2015 (COMAH)

COMAH related appropriate measures for biological waste treatment.

The following measures apply to all processes and operations.

The COMAH Regulations apply to establishments holding dangerous substances above certain quantities.

The hazardous substances and mixtures are classified in the European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP).

1. You must work out if the COMAH regulations 2015 apply to your activities. This will depend on the quantity of dangerous substances you store on site.

The aggregation rule

2. To work out if the COMAH regulations apply to your activities, you must apply the aggregation rule. This involves adding together quantities of all the dangerous substances held at your site.

3. If you store any individual hazardous substance (or mixtures) at quantities lower than the relevant threshold, you must add together the partial fractions of their threshold quantities. If the total equals or exceeds 1, the COMAH regulations apply.

4. You only add together quantities of substances with similar hazards, so all oxidising, explosive and flammable substances are added together. Para 381 of COMAH guidance (L111) contains further details.

5. If the quantities of dangerous substances you store may fluctuate, you must base your calculation for the aggregation rule on the maximum quantities you could have on site during normal activities. This covers seasonal variations, deliveries or fluctuations in demand.

6. Category 1 and 2 flammable gases have a lower tier COMAH threshold of 10 tonnes. If your site stores less than 10 tonnes, you must apply the aggregation rule.

Upgraded biogas

The qualifying threshold in tonnes is 50te for lower tier (LT) and 200te for upper tier (UT) COMAH.

Biogas is aggregated with other flammable gases or liquids, such as liquid petroleum gas (LPG, propane or butane) or diesel. These have individual lower tier COMAH limits of 50 tonnes and 2500 tonnes respectively. If the aggregation is greater than 1 then COMAH applies.

Here are 2 examples.

Example 1: injecting gas to the grid

AD sites which inject upgraded biogas to the national gas grid need to consider the quantity of both the:

- biogas in the headspaces and storage facilities on site
- liquefied flammable gases stored

For example:

8 tonnes of raw biogas (lower tier limit is 50)

25 tonnes of LPG (lower tier limit is 50)

5 tonnes of sulphuric acid (lower tier limit is 50)

Aggregation for the COMAH assessment is:

8 ÷ 50 = 0.4

25 ÷ 50 = 0.5

5 ÷ 50 = 0.1

0.4 + 0.5 + 0.1 = 1.0 0.0

As this figure adds up to 1 the COMAH regulations apply.

Example 2: biogas burnt on site to generate electricity

AD sites which use gas to generate electricity, with a store of diesel for back-up generators, would need to consider the quantity of both the:

- biogas in the headspaces and storage facilities on site
- diesel stored

For example:

9.4 tonnes raw biogas (lower tier limit is 10)

600 tonnes diesel (lower tier limit is 2500)

Aggregation for the COMAH assessment is:

9.4 ÷ 10 = 0.94 600 ÷ 2500 = 0.24 0.24 + 0.94 = 1.18

As this figure is above 1 the COMAH regulations apply.

Operators should contact the HSE for more information on COMAH.

11. Emissions control

Emissions control related appropriate measures for biological waste treatment.

1. You must review your activities to identify opportunities to minimise and where possible contain, treat and abate emissions.

2. All air and emissions treatment (including gas clean-up) must be engineered, commissioned and validated by a chartered engineer.

3. Equipment must be tested, operated and maintained following manufacturers recommendations, operational requirements and design criteria.

4. When determining the complexity of the control measure you need to apply you must consider if you need to comply with mandatory AEL. Otherwise you can follow a risk based approach and must consider the:

- inventory of emissions
- type or composition of emissions, for example dust, bioaerosols, odour, organic compounds or litter
- source of emissions
- site location and proximity to sensitive receptors
- the impact on any sensitive receptors
- likelihood of release, taking account of seasonal and process variations
- measures you can take that will break the source pathway receptor relationship

11.1 Emissions inventory,

The following measures apply to all processes and operations.

1. You must identify, characterise and control all emissions from your activities that may cause pollution. This includes all emissions to air and water (including emissions to sewer) from your facility.

2. Your emissions inventory must include information about the relevant characteristics of the emission to air and water, such as:

- flammability, lower and higher explosive limits and reactivity
- other substances present that may affect the waste gas treatment system or plant safety (for example, oxygen, nitrogen, water vapour, dust)
- average and maximum values and variability of flow, pH, temperature, and conductivity
- average and maximum concentration and load values of relevant substances and their variability – for example, COD and TOC, nitrogen species, phosphorus, metals, priority substances or micro pollutants speciated organic compounds and ammonia
- data on bio eliminability – for example, BOD, BOD to COD ratio, Zahn Wellens test, biological inhibition potential (such as, inhibition of activated sludge)

11.2 Emissions monitoring and limits,

The following measures apply to all processes and operations.

We may set emission limits and monitoring requirements in your permit, based upon your emissions inventory and environmental risk assessment. We may set additional limits and monitoring requirements for certain processes, for example dust and total volatile organic compounds.

1. Where you are required to monitor emissions to comply with the requirements of your environmental permit you must follow our monitoring guidance.

2. For relevant emissions to water or sewer identified by the emissions inventory, you must monitor key process parameters (for example, waste water flow, pH, temperature, conductivity, or BOD) at key locations. For example, these could either be at the:

- inlet or outlet (or both) of the pre treatment
- inlet to the final treatment
- point where the emission leaves the facility boundary

11.3 Meteorological conditions,

1. You must monitor and record meteorological conditions or have access to meteorological data for the site location. This is so you can forecast wind speed, air temperature and wind direction.

2. You must put weather monitoring stations at appropriate locations on your site.

3. You should calibrate meteorological monitoring equipment every 4 months or follow manufacturers' recommendations.

11.4 Bioaerosols,

1. You must take measures to minimise the release of bioaerosols from your process.

2. You must document potential bioaerosol emission sources and identify measures to minimise their release. Measures include, for example:

- processing waste promptly and monitoring it according to defined processing conditions
- taking corrective measures to address unfavourable conditions
- using slow-speed shredders in sensitive locations with misting devices fitted or carrying out these activities in covered areas
- taking into account meteorological conditions when managing activities
- avoiding activities such as turning and shredding in unfavourable meteorological conditions
- stopping activities when the wind is blowing in the direction of sensitive receptors
- dampening haul roads and processing areas and stopping activities when the wind is blowing in the direction of sensitive receptors
- using static aeration and covering piles where possible and practicable

3. If your facility is within 250 metres of a sensitive receptor, you must:

- write and implement a site specific bioaerosol risk assessment

- monitor bioaerosols to make sure that the control methods you have stated are effective

4. You must implement the control measures identified in your risk assessment. You must also consider the exposure of staff and visitors and take measures to avoid or reduce prolonged exposure to bioaerosols.

11.5 Emissions of odour,

The following measures apply to all processes and operations.

1. You must develop and implement an odour management plan.

2. Where you expect odour pollution at a sensitive receptor, or it has been substantiated, you must monitor:

- using dynamic olfactometry following EN 13725 to determine the odour concentration
- to EN 16841 1 or 2 to determine the odour exposure
- to an alternative ISO, national or other international standards

3. You must review your odour management plan as part of your environmental management system. It must include all of the following elements:

- actions and timelines to address any issues
- a procedure for doing odour monitoring
- a procedure for responding to identified odour incidents, for example, complaints
- an odour prevention and reduction programme designed to identify the source(s), to characterise the contributions of the sources and to implement prevention and reduction measures

11.6 Point source emissions to air,

The following measures apply to all processes and operations.

The Environment Agency views all abatement and gas clean up systems as point source channelled emissions regardless of whether they are open or have a stack.

1. To reduce point source emissions to air (for example ammonia, dust, organic compounds and odorous compounds) from your biological treatment process, you must use one or more of the relevant abatement techniques, such as:

- bio filtration, bio trickling or bio scrubbing
- scrubbing (for example wet or chemical)
- adsorption, for example activated carbon
- thermal oxidation
- fabric filter – for mechanical biological treatment to remove dust

2. You must assess the fate and impact of the substances emitted to air, following the Environment Agency's air emissions risk assessment methodology.

3. To make sure the abatement system is effective in treating odorous and other emissions you must monitor and maintain your abatement to achieve optimum conditions at all times.

To demonstrate effective control, monitoring and assessment may include the following parameters:

- gas flow or loading rate
- bacterial viability (applicable to bio-oxidisation treatment systems)
- pH
- acid growth (indicated by pH)
- gas temperature
- pollutant removal efficiency rate
- chemical injection (redox potential – applies to chemical scrubbing and bio-oxidisation systems)
- spent solutions (for waste recovery or disposal)
- humidity or moisture content
- back-pressure
- thatching and compaction of media in biofilters (thatching is forming a natural barrier to prevent the ingress of additional water to the surface layer)

- channelling (preferential pathways for gas flow) and vegetation growth in biofilters
- ammonia, hydrogen sulphide and odour concentrations (in both input and exhaust gas streams)
- energy requirements for providing adequate and continuous airflow

4. You must observe trends and changes over time which could indicate that additional maintenance or replacement is needed.

5. You must have:

- procedures to deal with a loss in abatement efficiency due to toxic compounds
- a program of filter media replacement which is informed by performance and condition
- a program to replenish chemical reagents in abatement scrubbers
- procedures for commissioning new filter media or abatement

6. At least once a year, you must carry out an efficiency assessment of your abatement system.

Biofilters (open and closed fixed bed systems)

The following measures apply to all processes and operations.

7. You must use a filter bed material that is suitable for maintaining bacterial communities and that will hold its structure integrity.

8. You must consider water retention capacity, bulk density, porosity, surface area, nutrient viability and particle size.

9. The biofilter must be connected to a suitable ventilation and air circulation system. It must provide uniform waste gas distribution through the bed and enough residence time to make sure treatment takes place.

10. You may need to pre-treat the waste gas before it enters the biofilter, for example, with a water, acid or alkaline scrubber. You must

make sure you pre-treat the waste gas if chemicals in untreated gas can poison the biofilter, for example ammonia.

11. You should design biofilters on a modular basis so they can keep operating during staged refurbishment.

12. You must drain any liquid which accumulates in the base of the biofilter to an appropriate leachate collection or treatment system.

13. The pipework to the biofilter must be made from corrosion resistant materials. It must incorporate low drain points to prevent the build-up of condensate, corrosion and loss in efficiency.

14. You must monitor your biofilter for the following:

- gas inlet temperature (inlet and outlet on closed systems)
- gas inlet flow rate (inlet and outlet on closed systems)
- filter media moisture
- thatching and compaction using back-pressure measurement
- pH (this should be monitored from the biofilter drainage effluent)
- gas inlet humidity
- gas inlet and outlet concentrations for ammonia, hydrogen sulphide and odour
- bacterial viability

15. You must visually monitor your biofilter for:

- vegetation, moss and fungus – the media must be in good condition and clear of vegetation, you can use a photographic record of the media bed to see how it changes over time
- media depth to identify decomposition and compaction over time – you can do this using vertical rulers located in the biofilter bed
- surface condition – to identify any channelling, gaps or signs that the biofilter bed is shrinking
- irrigation – to identify wet and dry spots and the uniformity of any sprinkler systems

16. You must maintain your biofilter with a vigorous and healthy microbial community operated at optimum designed values. You should periodically review:

- media health, for example bacterial viability, particle size distribution and depth
- volumetric air flow or surface air flow distribution in open biofilters
- emission removal efficiency, for example odour removal

Calculate removal efficiency using the concentrations sampled from the biofilter inlet and outlet.

17. You must carry out periodic sampling to make sure your abatement system is functioning as designed and is able to treat and mitigate emissions.

18. You must re-mix or replace biofilter media, either during planned routine maintenance or more frequently if your monitoring assessment identifies it is needed.

For other key monitoring parameters and information on biofilters, see Understanding Biofilter Performance and Determining Emission Concentrations under Operational Conditions.

Pre-treatment abatement scrubbers

The following measures apply to all processes and operations.

19. You must select the most appropriate aqueous absorbing solutions for treating pollutants in the waste gas stream. Where you have identified a mix of pollutants you may require a multi-stage process.

Flow rates must allow for sufficient gas residence time and minimise carry-over of scrubbing solution into the waste gas stream.

20. You must monitor your abatement scrubber for the following:

- gas temperature and flow rate, inlet and outlet
- moisture content or humidity

- back-pressure, for packing scrubbers
- pH of scrubber solution
- chemical injection rate (redox potential)

21. You must continuously monitor the scrubber solution for:

- flow rate
- pressure
- temperature
- pH

You should periodically measure the inlet and outlet of the scrubber for:

- ammonia
- hydrogen sulphide
- odour.

Activated carbon

The following measures apply to all processes and operations.

22. You must monitor your activated carbon filter for the following parameters:

- inlet and outlet gas temperature and flow rate by continuous monitoring
- inlet moisture content or humidity
- back-pressure
- carbon bed temperature
- ammonia
- hydrogen sulphide
- odour

23. You must make sure you either replace or regenerate the carbon before saturation.

24. You must make sure the concentrations of volatile organic compounds within the gas stream are below their lower explosive limit.

25. You must make sure you follow the manufacturers' recommended maximum operating temperature.

26. You must use a cooling system if you exceed the upper temperature limit.

27. You must minimise particulates in the waste gases before they reach the carbon filter.

28. You must not allow exothermic reactions when maintaining activated carbon filters.

29. You must store activated carbon safely to prevent spontaneous combustion. You must store it following supplier or manufacturers' recommendations.

Stacks and vents

The following measures apply to all processes and operations.

30. Stack or stack and vents must release at an appropriate height, temperature and velocity to make sure the emissions disperse well. You must use dispersion modelling to demonstrate the emissions do not impact on sensitive receptors.

31. You must install a suitable monitoring point on stacks and vents with appropriate safe access.

32. You must monitor emissions following the Environment Agency guidance on monitoring stack emissions.

11.7 Masking agents, chemical neutralising agents and topical barriers,

The following measures apply to all processes and operations.

1. You must only use masking agents, chemical neutralising agents and topical barriers together with comprehensive process

management control. Any topical chemical barrier must be approved for use.

You should use masking or chemical treatments (for example neutralising agents) to destroy or to reduce odorous compounds.

2. Using chemical treatments must not affect the quality of the compost or digestate.

3. You must take care when using masking agents (for example deodorisers) as these may cause pollution and amenity impacts.

4. You must only use topical barriers, where you can achieve the following conditions, you:

- can demonstrate you apply the barrier in line with manufacturer's instructions
- maintain records of the application rate, time and conditions
- continue to monitor other process parameters for example, temperature and moisture

5. You must review your water-efficiency measures when considering the use of neutralising agents and topical barriers.

11.8 Fugitive (diffuse) emissions to air,

The following measures apply to all processes and operations.

1. You must use appropriate measures to prevent emissions of odour, ammonia, dust, bioaerosols and particulates, mud and litter.

2. You must design, operate and maintain plant in a way that prevents or minimises fugitive emissions to air, for example by:

- limiting drop heights
- using wind barriers
- using gravity transfer rather than pumps

This also applies to associated equipment such as:

- screeners
- shredders

- conveyors
- skips or containers
- building fabric, including doors and windows
- pipework and ducting

3. You must use high integrity components, for example seals or gaskets or leak test certificated PVRVs.

4. You must have a programme of work that covers the maintenance of all plant and equipment. This must also include protective equipment such as curtains and fast action doors used to prevent and contain fugitive releases.

5. You must identify the frequency of maintenance in your management system. As a minimum you must follow manufacturers' recommendations.

6. To identify and manage wastes that could cause, or are causing fugitive emissions to air, you must do:

- pre-acceptance checks
- waste acceptance checks
- site inspections

7. When you identify any such wastes you must:

- take appropriate risk-assessed measures to prevent and control emissions
- prioritise their treatment or transfer

8. Where necessary you must use a combination of one or more of the following measures:

- cover any conveyers, hoppers, container that are outside
- store and handle the waste within a suitably enclosed area (for example bays), a building or enclosed building
- keep doors closed except when access is needed
- use an appropriate abated air circulation or extraction system to keep enclosed buildings and equipment under adequate

negative pressure, locating air extraction points close to potential emission sources

- use fast-acting or ‘airlock’ doors that default to closed
- use suitable covers (these can include textile sheeting, synthetic membranes and organic materials such as straw and woodchip) – the choice of cover depends on the risk to receptors

You should install localised containment, for example air extraction over a waste shredder, to minimise and treat air.

You should install ventilation to BS EN 13779:2007 or follow the HSE Exhaust Ventilation Guide.

You must use suitably qualified engineers to design and install systems and make sure relevant standards are applied.
The HSE provides guidance on selecting, using and maintaining local exhaust ventilation (LEV) correctly.

9. You must review the integrity and containment effectiveness of any building, covers and contained air systems during commissioning. You must then do this periodically following manufacturers guidelines, or at least every 2 years.

10. You must carry out assessments to recognised standards, for example BS EN ISO 9972:2015.

You can use a smoke test to identify emission leaks from buildings. This may show where you need to make improvements before you carry out a more thorough survey.

11. You must replace or repair damaged building, containers covers as soon as possible.

12. You must stop using any vessel or tanks immediately if their integrity is compromised.

13. You must regularly inspect and clean all waste storage and treatment areas and equipment, including conveyor belts. You must identify the frequency of inspection and cleaning in your management system.

14. You must take measures to prevent plant and equipment, conveyors and pipes corroding. This includes using appropriate construction materials, corrosion inhibitors and regularly inspecting and maintaining plant.

15. You must consider dampening potential sources of fugitive dust emissions with water or fog, for example when turning open windrows or on areas where traffic moves.

16. You must prevent or minimise litter.

17. You must stop outdoor processing activities, for example waste shredding or windrow turning when weather conditions may either:

- increase the risk of impact on local receptors
- cause wind-blown litter, dust, odour or bioaerosols

If you need a dust management plan, you must develop and implement it following our guidance.

11.9 Leak detection and repair,

The following measures only apply to AD, MBT and TAD.

1. You must implement a leak detection and repair (LDAR) plan. It must link to your regular monitoring, maintenance and DSEAR plan. You must use it to quickly identify and carry out repairs, or to replace plant and equipment.

2. The LDAR plan must include:

- a map of the site and an inventory that identifies locations (point and area sources) for potential emissions
- a method for locating unknown emission sources
- estimates of the type and volume of release from each leak location
- prioritised locations (from highest risk to lowest risk) based on the potential quantity of release, its environmental impact, and DSEAR
- your monitoring methods and frequency to quantify significant emissions
- mitigation measures

3. You must consider all potential sources of leakage within your LDAR plan, for example:

- double membrane roofs (air blower vent)
- roof and cover fixings
- pressure relief valves and vents
- feeding and digestate separation units
- gas pipes
- conveyors and presses
- compressor
- combined heat and power plant (methane slippage)
- gas upgrading plant
- grid injection
- reception storage
- digestate storage
- pits and sumps, for example condensate pits
- building containment

4. You must identify and reduce emissions of volatile organic compounds and other substances to air.

Methods for identifying leaks include:

- sniffing using organic compound analysers and bag sampling, carried out to EN15446 standards
- optical gas imaging using hand-held cameras to enable visualisation of gas leaks

Methods for quantifying emissions include:

- solar occulation flux
- differential absorption light detection and ranging

Information on methane leakage from AD plants is available from the Department of Business Energy and Industrial Strategy (BEIS) and the International Energy Agency.

11.10 Pests,

The following measures apply to all processes and operations.

1. You must manage waste in a way that prevents pests and vermin.

2. You must make your pest and vermin management plan part of your environmental management system and it must include procedures for:

- inspecting for pests and vermin and for controlling them
- rejecting loads of infested waste
- treating pest and vermin infestations promptly
- storing, handling and using approved pest and vermin control products

Information on using pest control chemicals at work is available from the HSE.

Fly prevention and management

3. Making sure you implement fully all appropriate measures will proactively decrease the incident of flies on site.

4. You must have a process to count and record the number of flies on site.

5. You must have a process to investigate and resolve fly infestation.

6. You must reject maggot and fly infested waste.

7. You must make sure you have effective cleaning and housekeeping.

8. You must use fly treatment equipment and chemicals where approved and appropriate.

The HSE require that anyone using pesticides professionally should have received adequate instruction, training, and guidance in their correct use.

9. Under the COSHH Regulations (2002) you must document all activities involving pesticides (for example, storage, use and disposal). You must keep these records for a period of at least 3 years.

10. You must use all knockdown sprays, pesticides and larvicides according to the manufacturer's instructions and licence.

You may be required to submit a pest management plan for approval by the Environment Agency.

11.11 Emissions of noise and vibration,

The following measures apply to all processes and operations.

You should locate potential sources of noise (including building exits and entrances) away from sensitive receptors and boundaries.

1. You must locate buildings, walls, and embankments so they act as noise screens.

2. You must use measures to control noise, including:

- maintaining plant or equipment parts which may become more noisy as they wear out (for example, bearings, air handling plant, the building fabric, and specific noise attenuation kit associated with plant or machinery)
- closing doors and windows to prevent noise breakthrough
- avoiding noisy activities at night or early in the morning
- minimising drop heights and the movement of waste and containers
- using white noise reversing alarms and enforcing the on site speed limit
- using low noise rated equipment (for example, drive motors, fans, compressors, pumps)
- adequately training and supervising staff
- providing additional noise and vibration control equipment for specific noise sources (for example, noise reducers or attenuators, insulation or sound proof enclosures)

3. You should have a noise and vibration management plan. This must be part of the environmental management system and must include:

- actions and timelines to address any issues
- a procedure for doing noise and vibration monitoring

- a procedure for responding to identified noise and vibration events, for example, complaints

For noise, a noise impact assessment using the BS 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’ methodology must inform your plan.

For vibration, a vibration impact assessment using the BS 6472-1:2008 ‘Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting’ methodology must inform your plan.

11.12 Point source emissions to land and water (including indirect discharge to sewer),

The following measures apply to all processes and operations.

1. You must ensure you have the relevant trade effluent consents in place with your local water company.

2. You must reduce emissions to water (direct or indirect) using an appropriate combination of techniques, for example:

- neutralisation
- adsorption
- stripping
- flotation
- filtration

3. You must assess the fate and impact of the substances emitted to water and sewer following the Environment Agency’s risk assessment guidance).

4. Discharges to water or sewer must comply with the conditions of an environmental permit or trade effluent consent.

Relevant sources of waste water include:

- process water
- condensate collected from a treatment process
- waste compactor run-off

- vehicle washing
- vehicle oil and fuel leaks
- washing containers, tanks and vessels
- spills and leaks in waste storage areas
- loading and unloading areas

5. If you need to treat waste water before discharge or disposal, you must use an appropriate combination of these techniques:

- preliminary or primary treatment – for example, equalisation, neutralisation or physical separation
- physico chemical treatment – for example, adsorption, distillation or rectification, precipitation, chemical oxidation or reduction, evaporation, ion exchange, or stripping
- biological treatment – for example, activated sludge process or membrane bioreactor
- nitrogen removal – for example, nitrification and denitrification
- solids removal – for example, coagulation and flocculation, sedimentation, filtration or flotation

6. You must direct wash waters from cleaning vessels to foul sewer or a contained drainage system for off site disposal or re-circulation.

You may need to pre treat the wash waters to meet any limits on the effluent discharge consent. The degree of recirculation will be limited by the water balance of your plant, the content of impurities, or characteristics of the water streams, for example nutrients.

Discharges to surface water or storm drains (except for clean, uncontaminated rainwater) are not permitted.

You should use all of the following techniques:

- segregate leachate seeping from compost piles and windrows from surface water
- re-circulate process water streams – for example, from de-watering liquid digestate, or by using water streams like surface water run-off as much as possible
- optimise the waste’s moisture to minimise generating leachate

11.13 Fugitive emissions to land and water,

The following measures apply to all processes and operations.

1. You must use appropriate measures to control potential fugitive emissions to land and water and make sure they do not cause pollution.

2. You must have the following measures in place in operational areas:

- an impermeable surface
- spill containment kerbs
- sealed construction joints
- connection to a contained drainage system

3. You must collect and treat separately each water stream generated at the facility, for example, surface run off water or process water. Base how you separate it on the pollutant content and the treatment needed.

4. You must make sure that you segregate uncontaminated water streams from those that need treatment.

5. You must use suitable drainage infrastructure to collect surface drainage from areas of the facility where you store, handle and treat waste. You must also collect wash waters and any spillages. Depending on the pollutant content, you must either recirculate what you have collected or send it for further treatment.

6. You must take measures to prevent emissions from washing and cleaning activities, including:

- directing liquid effluent and wash waters to foul sewer, or collecting them in a contained system for off site disposal – you must not discharge them to surface or storm drains
- using biodegradable and non corrosive washing and cleaning products
- storing all detergents, emulsifiers and other cleaning agents in suitable bunded or containment facilities within a locked storage area, or in a building away from any surface water drains

- preparing working strength cleaning or disinfection solutions in contained areas of the site and never in areas that drain to the surface water or groundwater

7. Container washing equipment must be purpose built, located in a designated area of the facility provided with self-contained drainage.

8. You must design the container wash to collect and contain all wash waters, including any spray.

9. You must use trained staff to operate the container wash and you must inspect and maintain it regularly.

10. You must have measures to prevent pollution from the on-site storage, handling and use of oil and fuel.

11. You must produce and implement a spillage response plan and train staff to follow it and test it.

12. You must have procedures and associated training in place to make sure that you deal with spillages immediately.

13. You must locate spill kits close to areas where spillages could occur and make sure relevant staff know how to use them. You must replenish the kits after use.

14. You must stop spillages from entering drains, channels, gullies, watercourses and unmade ground. You must have the following available, to use when needed:

- proprietary sorbent materials
- sand
- booms or drain mats (or both)

15. You must make sure your spillage response plan includes information about how to recover, handle and correctly dispose of all waste produced from a spillage.

16. For subsurface structures, you must:

- establish and record the routes of all site drains and subsurface pipework

- identify all sub surface sumps and storage vessels
- engineer systems to minimise leaks from pipes and make sure you can detect them quickly if they do occur, particularly for hazardous substances
- provide secondary containment and leakage detection for sub surface pipework, sumps and storage vessels
- establish an inspection and maintenance programme for all subsurface structures, for example, pressure tests, leak tests, material thickness checks or CCTV

17. You must design appropriate surfaces and containment or drainage facilities for all operational areas, taking into account:

- collection capacities
- surface thicknesses
- strength and reinforcement
- falls (of the land)
- materials of construction
- permeability
- resistance to chemical attack
- inspection and maintenance procedures
- available relevant standards of construction

18. You must have a documented inspection and maintenance programme to review the integrity of impermeable surfaces and water containment facilities. This must consider the plant and equipment manufacturers’ recommended maintenance practices.

12. Process efficiency

Process efficiency related appropriate measures for biological waste treatment.

The following measures apply to all processes and operations.

1. You must monitor and review how much:

- water, energy and raw materials you use each year
- residue and waste water you generate each year

Residues include the waste and non-waste classified composts and digestate produced.

12.1 Energy efficiency,

The following measures apply to all processes and operations at installations only.

1. You must create and implement an energy efficiency plan at your facility in accordance with BAT reference document BAT 23.

2. You must regularly review and update your energy efficiency plan as part of your facility’s management system.

3. You must have operating, maintenance and housekeeping measures in place to make sure you use energy efficiently, for example for:

- air conditioning, process refrigeration and cooling systems (leaks, seals, temperature control, evaporator or condenser maintenance)
- motors and drives
- compressed gas systems (leaks, procedures for use)
- steam distribution systems (leaks, traps, insulation)
- space heating and hot water systems
- lubricating to avoid high friction losses
- boiler operation and maintenance, for example, optimising excess air

- other maintenance relevant to the activities within the facility

4. You must have basic, low cost physical techniques in place to avoid gross energy inefficiencies. These may include for example:

- insulation
- containment methods (such as seals and self closing doors)
- avoiding the unnecessary release of heated water or air (for example, by fitting simple control systems such as timers and sensors)

5. You must regularly review and update your energy balance record as part of your facility's management system, alongside the energy efficiency plan.

12.2 Raw materials,

The following measures apply to all processes and operations.

1. You must keep a list of the raw materials you use at your facility and their properties. This includes materials and other substances that could have an environmental impact.

2. You must check if you can use raw materials new to the market that have less environmental impact. This must include, where possible, substituting raw materials with waste.

3. You must justify why you continue to use any substance which has a beneficial alternative.

4. You must have quality assurance procedures in place to control the content of raw materials.

12.3 Water use,

The following measures apply to all processes and operations at installations only.

Whilst this is an IED requirement for installation operations, all operations should consider using potable and clean water efficiently and reducing its use.

1. You must take measures to make sure you optimise water use to:

- reduce the volume of waste water generated
- prevent or, where that is not practicable, reduce emissions to soil and water

2. Measures you must take include:

- implementing a water saving plan (which involves establishing water efficiency objectives, flow diagrams and water mass balances)
- optimising how you use water for washing (for example, dry cleaning instead of hosing down, using trigger control on all washing equipment)
- recirculating and reusing water streams within the plant or facility, if necessary after treatment
- where relevant, reducing water used for vacuum generation (for example, using liquid ring pumps with high boiling point liquids)

3. You must carry out a review of water use (water efficiency audit) at least every 4 years.

4. You must also:

- produce flow diagrams and water mass balances for your activities
- establish water efficiency objectives and identify constraints on reducing water use beyond a certain level (usually this will be site specific)
- have a time-tabled improvement plan for implementing additional water reduction measures

5. To reduce emissions to water, you must apply these general principles in sequence:

- use water efficient techniques at source where possible
- reuse water within the process, by treating it first if necessary – or if not practicable, use it in another part of the process or facility that has a lower water quality requirement
- if you cannot use uncontaminated roof and surface water in the process, you must keep it separate from other discharge

streams – at least until after you have treated the contaminated streams in an effluent treatment system and have carried out final monitoring

6. You should establish the water quality requirements for each activity and identify whether you can substitute water from recycled sources and where you can, include it in your improvement plan.

7. Where there is scope for reuse (possibly after some form of treatment) you must keep less contaminated water streams, such as cooling waters, separate from more contaminated streams.

8. You must directly measure fresh water use and record it regularly at every significant usage point – ideally on a daily basis.

12.4 Waste minimisation, recovery and disposal,

The following measures apply to all processes and operations at installations only.

1. You must create and implement a residues management plan that:

- minimises residues generated from treating waste
- optimises the reuse, regeneration, recovery, recycling or energy recovery of residues, including packaging
- makes sure residues are disposed of properly if recovery is technically or economically impractical

2. Where you must dispose of waste, you must carry out a detailed assessment identifying the best environmental options for waste disposal.

3. You must review, on a regular basis, options for recovering and disposing the waste produced at the facility. You must do this as part of your management system. This is to make sure you are still using the best environmental options and promoting the recovery of waste where technically and economically viable.

13. Bespoke waste assessment

Inhibition values for aerobic and anaerobic processes.

Waste you accept must be suitable for biological treatment. This section applies to bespoke waste types which are more novel, for example chemical process waste and sets out inhibition values.

Inhibition values for aerobic and anaerobic processes,

Table A: general inhibitors for anaerobic processes

Determinant	Threshold
pH hydrolysis and fermentation acido and aceto genesis	Optimal pH 5 to 7
Methanogenesis	Optimal pH 7 to 8, Operational 6.5 to 8.5
Temperature below optimum (mesophillic optimum temperature 37°C, thermophillic optimum temperature 55°C)	The rate of activity will drop by approximately 50% for every 10 degrees below the respective optimum temperature (Caine, 1990).

Determinant	Threshold
Temperature above optimum (mesophillic optimum temperature 37°C)	Where the temperature is raised gradually above the mesophillic optimum, the cultures will adapt and thermophiles will become established. During this period performance will be reduced. Where temperature is raised suddenly by 10°C performance may reduce significantly.
Temperature above optimum (thermophilic optimum temperature 55°C)	Performance of thermophiles will drop if temperature is raised above the optimum values but will survive extreme increase up to 100°C
Ammonium inhibition	Ammonium build up may inhibit the anaerobic process.

Table B: general inhibitors for aerobic processes

Determinant	Threshold
Moisture content	Optimal range of 50 to 70%

Determinant	Threshold
pH	Optimal range of 6 to 8
C/N	Optimal range of 25:1 to 40:1

Table C: specific guideline inhibitors for aerobic treatment

The following table contains indicative inhibitive concentrations for a range of substances for aerobic treatment processes.

Blanks mean that no data is available in literature.

The first column of data for aerobic treatment is based on the inhibition of respirometric activity, the second is based on the inhibition of nitrification.

You must show that where you receive waste that falls within these inhibition ranges you can manage and maintain a stable process.

The waste must be capable of being treated and recovered by the aerobic process.

This table does not list every substance which may be inhibitory to aerobic or anaerobic organisms. You must also consider the potential inhibitory effect of other substances used or generated at your facility.

Parameter	Aerobic treatment threshold mg/L	
	Activated sludge	**Nitrification**
Anthracene ug/l	500	
Arsenic (As)	0.1	1.5
Cadmium (Cd)	1 to 10	5.2
Chloride mg/kg		180
Chromium (Cr) III	10 to 50	
Chromium (Cr) total	1 to 100	0.25 to 1.9

Parameter	Aerobic treatment threshold mg/L	
	Activated sludge	**Nitrification**
Chromium (Cr) VI	1	1 to 10 (as chromate)
Copper (Cu)	1	0.05 to 0.48
Cyanide	0.1 to 5	0.34 to 0.5
Iodine (I)	10	
Lead (Pb)	1 to 5 or 10 to 100	0.5
Mercury (Hg)	0.1 to 1; 2.5 as Hg(II)	

Parameter	Aerobic treatment threshold mg/L	
	Activated sludge	**Nitrification**
Naphthalene	500 (EPA); 29 to 670	IC50 (mg/L) for Nitrosomonas and aerobic heterotrphs respectively
Nickel (Ni)	1.0 to 2.5; 5	0.25 to 0.5; 5
Phenantherene ug/l	500	
Sulphide	25 to 30	
Total ammonia nitrogen	480	

Parameter	Aerobic treatment threshold mg/L	
	Activated sludge	**Nitrification**
Zinc (Zn)	0.3 to 5; 5 to 10	0.08 to 0.5

Table D: specific inhibitors for anaerobic treatment

The following table contains guideline indicative inhibitive concentrations for a range of substances for anaerobic treatment processes. Blanks mean that no data is available in literature. You must show that where you receive waste that falls within these inhibition ranges you can manage and maintain a stable process. The waste must be capable of being treated and recovered by the anaerobic process. This table does not list every substance which may be inhibitory to aerobic or anaerobic organisms. You must also consider the potential inhibitory effect of other substances used or generated at your facility.

Parameter	Anaerobic treatment threshold g/l
Acrylates	62 to 150 mg/l

Parameter	Anaerobic treatment threshold g/l
Alcohols	22 to 43000 mg/l
Alkylbenzenes	160 to 580 mg/l
Aluminium (Al)	1 (2% inhibition of methane production after 59 days)
Amines	13000 1-methylpyrrolidine mg/l
Arsenic (As)	0.0016
Cadmium (Cd)	0.15 to 0.33
Calcium (Ca)	2.5 to 4

Parameter	Anaerobic treatment threshold g/l
Chlorinated aliphatics	0.5 to 600 mg/l
Chromium (Cr) total	0.2
Copper (Cu)	0.009
Fluoride (F)	0.018
Halobenzenes	20 to 750 mg/l
Halogenated alcohols	0.3 to 630 mg/l
Halogenated carboxylic acids	< 0.001 to 0.01 mg/l

Parameter	Anaerobic treatment threshold g/l
Halogenated phenols	2-300 for mono,-di and trichloros; 0.04 and 0.13 for penta and tetra mg/l
Ketones	6000 to 50000 mg/l
Lead (Pb)	3.2 to 8
Magnesium (Mg)	12
Nickel (Ni)	0.1 to 1.6
Nitriles	90 to 28000 Acrylonitrile and Acetonitrile respectively mg/l
Nitrobenzenes	13 nitrobenzene

Parameter	Anaerobic treatment threshold g/l
Nitrophenols	4 to 12 mg/l
Phenol and alkylphenols	phenol 1850; o,m,and p-cresol 850, 925, 975 mg/l
Potassium (K)	2.8 to 14
Silver (Ag)	0.1
Sodium (Na)	5.6 to 53
Sulphate	Methane production is reduced by one mole for every mole of sulphate added due to sulphate reduction dominating over methanogenesis
Sulphide	100 to 800

Parameter	Anaerobic treatment threshold g/l
Surfactants	For example, alkyl dimethylbenzylammonium chloride: 6.7; sodium alkyl ethersulfate: 11 mg/l
TiO2 (mg/gTS)	150
Total ammonia nitrogen	1.7 to 14
Zinc (Zn)m as ZnO nanno particles	0.03

(Inhibitory values are under review. Subject to that review, substances may be added or removed, or values amended).