



**Best available techniques (BAT) conclusions for Slaughterhouses and Animal by-products Industries, under Directive 2010/75/EU of the European Parliament and of the Council**

**In accordance with Article 14, 3 of the Directive on Industrial Emissions 2010/75/EU (IED) *“BAT conclusions shall be the reference for setting the licence conditions”.***

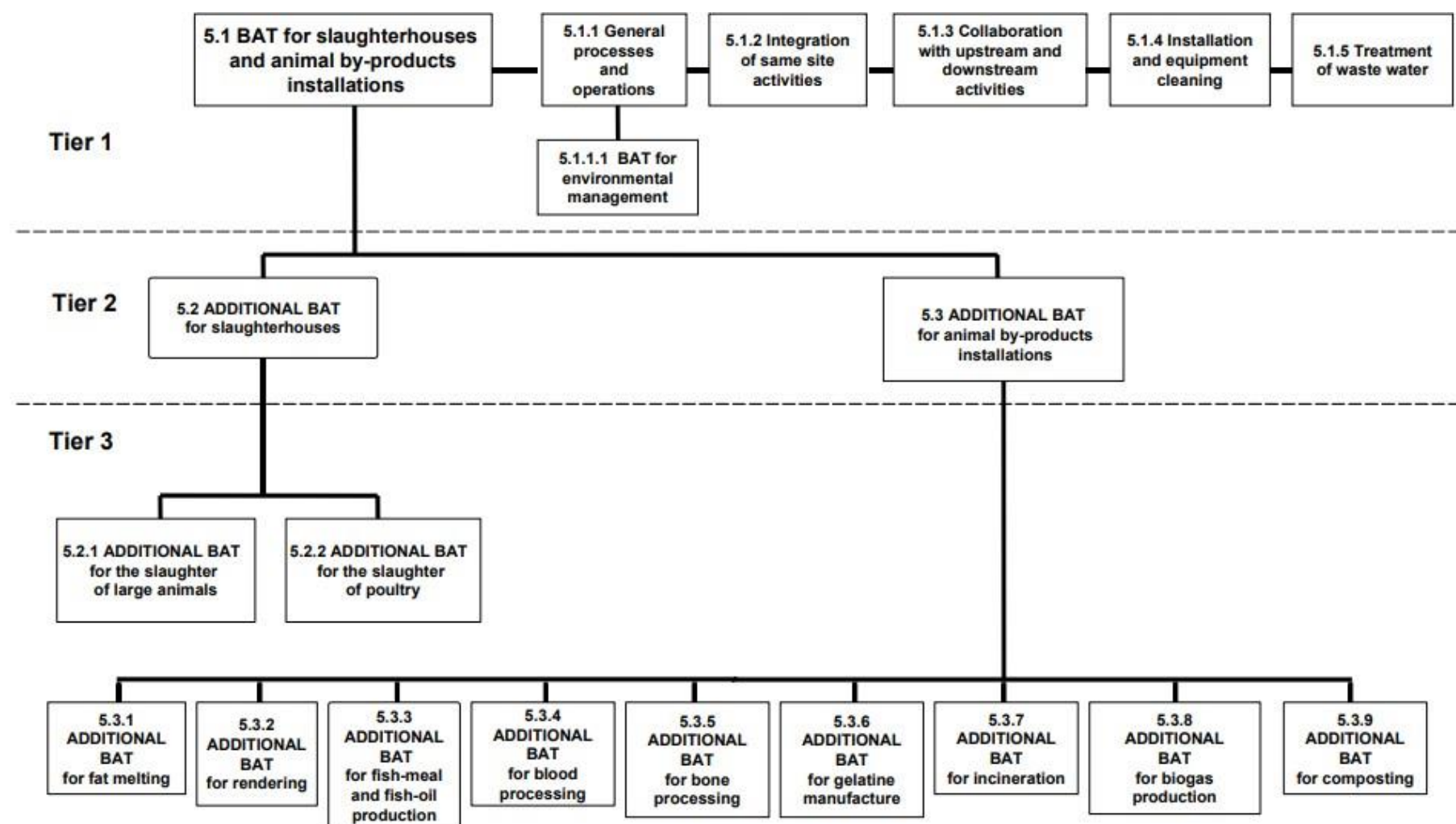


Figure 5.1: How the BAT conclusions are presented for slaughterhouses and animal by-products installations

Annex I: Comparison of the processes at Facility with the BREF for Slaughterhouses and Animal by-products Industries ([published May 2005](#)).

## Part 1. Slaughterhouses and animal by-products installations

Aspect of BAT	BAT	STATUS AT INSTALLATION: [WasteServ, TTF] DATE: [30.09.2022]  Applicability Assessment (describe how the technique applies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FOR IMPLEMENTATION	ERA comments	WSM Reply
<b>5.1.1 General processes and operations</b>	<p>For all slaughterhouses and animal by-products installations, BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>1. use an environmental management system (see BREF Section 4.1.1 and 5.1.1.1)</li> <li>2. provide training (see BREF Section 4.1.2)</li> <li>3. use a planned maintenance programme (see BREF Section 4.1.3)</li> <li>4. apply dedicated metering of water consumption (see BREF Section 4.1.4)</li> <li>5. separate process and non-process waste water (see BREF Section 4.1.5)</li> <li>6. remove all running water hoses and repair dripping taps and toilets (see BREF Section 4.1.7)</li> <li>7. fit and use drains with screens and/or traps to prevent solid material from entering the waste water (see BREF</li> </ol>	<ol style="list-style-type: none"> <li>1. The QEMS is being updated to incorporate the use and monitoring of Boiler, PPIS, RTO, and Dual Fuel Burner. Following commissioning by contractor, procedures shall be drafted to capture checks and acceptable parameter ranges, aimed at ensuring safe operation of the new equipment. Furthermore, storage procedure shall be updated to include Marshalling Shed.</li> <li>2. Training shall be provided by the contractors and thereafter documented. The Management Systems Unit within WasteServ shall map the operation of the equipment, routines and/or processes into procedures.</li> <li>3. New equipment introduced shall be maintained and kept in good condition. Refer to Annex 08.</li> </ol>		<ol style="list-style-type: none"> <li>1. Regarding Point 1 and 2 kindly indicate timeframes for implementation.</li> </ol>	<ol style="list-style-type: none"> <li>1. By end of September of 2023</li> <li>2. By end of September of 2023</li> </ol>

	<p>Section 4.1.11)</p> <p>8. dry clean installations and transport by-products dry (see BREF Section 4.1.12), followed by pressure cleaning (see BREF Section 4.1.10) using hoses fitted with hand-operated triggers (see BREF Section 4.1.9) and where necessary hot water supplied from thermostatically controlled steam and water valves (see BREF Section 4.1.23)</p> <p>9. apply overfilling protection on bulk storage tanks (see BREF Section 4.1.13)</p> <p>10. provide and use bunds for bulk storage tanks (see BREF Section 4.1.14)</p> <p>11. implement energy management systems (see BREF Sections 4.1.16 and 4.1.17)</p>				
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	<p>12. implement refrigeration management systems (see BREF Section 4.1.18)</p> <p>13. operate controls over refrigeration plant running times (see BREF Section 4.1.19)</p> <p>14. fit and operate chill room door closing switches (see BREF Section 4.1.21)</p> <p>15. recuperate heat from refrigeration plants (see BREF Section 4.1.22)</p> <p>16. use thermostatically controlled steam and water blending valves (see BREF Section 4.1.23)</p> <p>17. rationalise and insulate steam and water pipework (see BREF Section 4.1.24)</p> <p>18. isolate steam and water services (see BREF Section 4.1.25)</p> <p>19. implement light management systems (see BREF Section 4.1.26)</p> <p>20. store animal by-products for short periods and possibly to refrigerate them (see BREF Section 4.1.27)</p> <p>21. audit odour (see BREF Section 4.1.28)</p> <p>22. design and construct vehicles, equipment and premises to ensure that they are easy to clean (see BREF Section 4.1.30)</p>	<p>21. Odour monitoring is being discussed with the Authority. That said, the introduction of the PPIS and RTO are specifically intended to improve performance in terms of odour mitigation.</p>		Point 21 is noted	/

	<div>23. clean materials storage areas frequently (see BREF Section 4.1.31)</div> <div>24. implement a noise management system (see BREF Section 4.1.36)</div>	<div>24. Once all equipment has been installed, a noise survey shall be commissioned.</div>		<div>Point 24. Kindly indicate timeframes for implementation.</div>	<div>24. Noise Survey Timeframes:</div> <table><tr><td>Original Date</td><td>Resurvey Date</td><td>Scenario</td></tr><tr><td>29/10/2022</td><td>26/03/2023</td><td>Off weekend day</td></tr><tr><td>30/10/2022</td><td>24/03/2023</td><td>Off weekend night</td></tr><tr><td>02/11/2022</td><td>23/03/2023</td><td>Off weekday</td></tr><tr><td>03/11/2022</td><td>21/03/2023</td><td>Off week night</td></tr><tr><td>13/11/2022</td><td>05/03/2023</td><td>On weekend day</td></tr><tr><td>13/11/2022</td><td>03/03/2023</td><td>On weekend night</td></tr><tr><td>15/11/2022</td><td>17/03/2023</td><td>On weekday</td></tr><tr><td>16/11/2022</td><td>20/04/2023</td><td>On weeknight</td></tr><tr><td></td><td>AHUs/Ionisers started working since 19/12/22</td><td></td></tr></table> <div>Noise Management Plan timeframe: By Q4 of 2023.</div>	Original Date	Resurvey Date	Scenario	29/10/2022	26/03/2023	Off weekend day	30/10/2022	24/03/2023	Off weekend night	02/11/2022	23/03/2023	Off weekday	03/11/2022	21/03/2023	Off week night	13/11/2022	05/03/2023	On weekend day	13/11/2022	03/03/2023	On weekend night	15/11/2022	17/03/2023	On weekday	16/11/2022	20/04/2023	On weeknight		AHUs/Ionisers started working since 19/12/22	
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	<p>25. reduce noise at, e.g. roof extract fans, balance lagoon blowers and refrigeration plants (see BREF Sections 4.1.3, 4.1.36, 4.1.37, 4.1.38 and 4.1.39)</p> <p>26. replace the use of fuel oil with natural gas, where a natural gas supply is available (see BREF Section 4.1.40)</p> <p>27. enclose animal by-products during transport, loading/unloading and storage (see BREF Section 4.1.29)</p> <p>28. where it is not possible to treat blood before its decomposition starts to cause odour problems and/or quality problems, refrigerate it as quickly as possible and for as short a time as possible, to minimise decomposition (see BREF Section 4.2.1.8) and</p> <p>29. export any heat and/or power produced which cannot be used on-site.</p>	<p>25. Key areas of the RTO shall be insulated by means of mineral wool and sheet aluminium to finish. The value of Sound Pressure Level (SPL) of the RTO shall be 85 dBA at 1.5m of distance. This level is expected to decrease downstream as distance (from the equipment increased).</p> <p>Reference to the PPIS, for the largest of the two of theAir Handling Units (Model 10.5), the average SPL value is 65 dBA at 1m of distance. The full spectrum of noiselevels at different frequencies is provided in the Units' drawings themselves. Refer to Annex 06 for details.</p> <p>With regards to the dual fuel burner, the possible source for noise and vibration are the pumps needed totansfer the tallow from the silos to the kiln. Given that the tallow shall however be heated, its viscosity shall decrease, thus pumps used shall be of a regular size with limited potential for noise.</p> <p>26. The utilisation of tallow as fuel may in fact contribute toless emission, for the reason that tallow contains lower sulphur content than regular heating fuel oil. Therefore, less SOx gases can be expected. RTO and boiler use LPG which is considered a clean fuel.</p>		<p>Point 25 Noted</p> <p>Point 26 Noted</p>

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<b>General processes and operations</b>	A number of environmental management techniques are determined as BAT (see BREF Section 4.1.1).			
<b>5.1.1.1 BAT for environmental management</b>	<p>The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have.</p> <p>BAT is to implement and adhere to an Environmental Management System (EMS) that incorporates, as appropriate to individual circumstances, the following features: (see BREF Chapter 4)</p> <ul style="list-style-type: none"> <li>a) definition of an environmental policy for the installation by top management (commitment of the top management is regarded as a precondition for a successful application of other features of the EMS)</li> <li>b) planning and establishing the necessary procedures</li> <li>c) implementation of the procedures, paying particular attention to <ul style="list-style-type: none"> <li>i. structure and responsibility</li> <li>ii. training, awareness and competence</li> <li>iii. communication</li> <li>iv. employee involvement</li> <li>v. documentation</li> <li>vi. efficient process control</li> <li>vii. maintenance programme</li> <li>viii. emergency preparedness and response</li> <li>ix. safeguarding compliance with environmental legislation.</li> </ul> </li> <li>d) checking performance and taking corrective action, paying particular attention to <ul style="list-style-type: none"> <li>i. monitoring and measurement (see also the Reference document on Monitoring of Emissions)</li> <li>ii. corrective and preventive action</li> </ul> </li> </ul>	<p>a) Yes</p> <p>b) Yes</p> <p>c) Yes</p> <p>d) Yes</p>		Noted



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	<p>iii. maintenance of records</p> <p>iv. Independent (where practicable) internal auditing in order to determine whether or not the environmental management system conforms to planned arrangements and has been properly implemented and maintained.</p> <p>e) Review by top management.</p> <p>Three further features, which can complement the above stepwise, are considered as supporting measures. However, their absence is generally not inconsistent with BAT. These three additional steps are:</p> <p>f) having the management system and audit procedure examined and validated by an accredited certification body or an external EMS verifier</p> <p>g) preparation and publication (and possibly external validation) of a regular environmental statement describing all the significant environmental aspects of the installation, allowing for year-by-year comparison against environmental objectives and targets as well as with sector benchmarks as appropriate</p> <p>h) implementation and adherence to an internationally accepted voluntary system such as EMAS and EN ISO 14001:1996. This voluntary step could give higher credibility to the EMS. In particular EMAS, which embodies all the above-mentioned features, gives higher credibility. However, non-standardised systems can in principle be equally effective provided that they are properly designed and implemented.</p> <p>Specifically for slaughterhouses and animal by-products installations, it is also important to consider the following potential features of the EMS:</p>	<p>e) Yes</p> <p>f) Internal audits are carried out regularly and at least once a year.</p> <p>g) Aspects &amp; Impacts exercise carried out as part of the EMS. Objectives are reviewed thrice a year and discussed in Management Review Meetings.</p> <p>h) EMS is certified to ISO 14001:2015.</p>		

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	<p>i) giving consideration to the environmental impact from the eventual decommissioning of the unit at the stage of designing a new plant</p> <p>j) giving consideration to the development of cleaner technologies</p> <p>k) where practicable, sectoral benchmarking on a regular basis, including energy efficiency and energy conservation activities, choice of input materials, emissions to air, discharges to water, consumption of water and generation of waste.</p>	<p>i) The RTO, PPIS, Dual Fuel Burner shall, in the future, be decommissioned in an environmentally safe manner. As a generic approach, the following steps would be taken:</p> <ul style="list-style-type: none"> <li>Unit is disconnected (electrically);</li> <li>Unit is purged of waste (as applicable) and cleaned;</li> <li>WEEE is removed / stripped away;</li> <li>Unit is disassembled and waste types are separated;</li> <li>All necessary permits (CPs, CNs, TFS, etc.) are obtained and/or compiled.</li> <li>Resulting waste is directed preferably for recovery or, where that is not feasible, to disposal or destruction in authorised facilities locally and/or abroad.</li> </ul> <p>j) RTO shall use LPG which is considered a clean fuel. Emissions to air are considered negligible.</p> <p>The Boiler too shall use LPG.</p> <p>There shall be no air emissions for the Dual Fuel Burner system. Heating of tallow shall be done via electric heaters, thus there is no combustion and consequently no air emissions. Also, tallow has a lower sulphur content, thus less emissions will be generated.</p> <p>The PPIS shall not consume fuel or chemicals.</p> <p>k) The thermal recovery efficiency of the RTO is &gt;96.5%. The RTO operates at near constant conditions; this means that there are minimal fluctuations in air and fuel intake, thus combustion is as per design and emissions are limited or negligible.</p> <p>Both the RTO and PPIS shall not have any waste water discharge.</p> <p>The use of the Dual Burner and the incineration of tallow (instead of heating gas oil) shall result in less (traditional)</p>		<p>Point J: Noted.</p> <p>Point K: Noted, kindly indicate by when procedures will be in place.</p>	<p>/</p> <p>K) By end of September of 2023.</p>

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		<p>fuel consumption.</p> <p>As a general comment on this BAT, the EMS is being updated to incorporate the use and monitoring of Boiler, PPIS, RTO, and Dual Fuel Burner. Following commissioning by contractor, procedures shall be drafted to capture checks and acceptable parameter ranges, aimed at ensuring safe operation of the new equipment.</p> <p>Furthermore, storage procedure shall be updated to include Marshalling Shed.</p>			
<b>5.1.2 Integration of same site activities</b>	<p>For slaughterhouses and/or animal by-products installations, operating on the same site, BAT is to do the following:</p> <ul style="list-style-type: none"> <li>a) re-use heat and/or power produced in one activity in other activities (see BREF Sections 4.4.1, 4.4.2 and 4.4.3) and</li> <li>b) share abatement techniques, where these are required, e.g. WWTPs.</li> </ul> <p>For rendering and incineration on the same site, BAT is to do the following:</p> <ul style="list-style-type: none"> <li>a) burn non-condensable gases produced during rendering in a same site incinerator (see BREF Sections 4.4.2 and 4.4.3).</li> </ul>	<ul style="list-style-type: none"> <li>a) Steam at the incinerator shall be used to heat the tallow silos and autoclave.</li> <li>b) The odour abatement measures highlighted in this variation aim to mitigate odour generated from both Incinerator and Autoclave.</li> </ul> <p>The Waste Water Treatment Plant on site, processes water from both the Incinerator and Autoclave.</p> <ul style="list-style-type: none"> <li>a) Non-condensable gases (air from those Autoclave processes which contribute to heavy odour) shall be treated in the RTO.</li> </ul>		<p>Point A on the reuse of heat/power: It is understood that when the tallow silos where in operation prior to accident in 2020, steam from the incineration process was not being used for this purpose. Is there any infrastructural changes that are required to implement this.</p> <p>Point A on non-condensable gases: Is there any part of the process which will generate condensable gases that can be a potential source of</p>	<p>This was already in place prior to accident in 2020.</p> <p>There is a source of condensable gases which will be treated directly by RTO.</p>

				odour?	
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<b>5.1.3 Collaboration with upstream and downstream activities</b>	<p>The operations of those involved in the supply of animals to slaughterhouses, including the farmers and the hauliers, can have environmental consequences in the slaughterhouse. The suppliers of feedstock to animal-by-products installations and other downstream users can also influence the environmental impact of those installations. Their impact can be affected by the properties of the feedstock, e.g. the freshness, degree of separation of different materials and the specification.</p> <p>BAT is to seek collaboration with upstream and downstream partners, to create a chain of environmental responsibility, to minimise pollution and to protect the environment as a whole, (see, e.g. BREF Sections 4.2.2.1.1, 4.2.2.1.2, 4.1.27, 4.3.1.4, 4.3.4.1, 4.3.8.7 and 4.2.2.9.10).</p>	<p>WasteServ signed a Memorandum of Understanding (MoU) with VRD. The MoU highlights a higher disposal rate for fallen animals and/or ABPs which are found to be in an advance stage of decomposition. This shall prompt waste producers / farmers to bring to the facility fresh waste.</p>		<p>Noted, it is understood that such a procedure is already in place. Kindly confirm.</p>	<p>Confirmed that this is in place.</p>
<b>5.1.4 Installation and equipment cleaning</b>	<p>For the cleaning of slaughterhouses and animal by-products installations, BAT is to do the following:</p> <ol style="list-style-type: none"> <li>1. manage and minimise the quantities of water and detergents consumed (see BREF Section 4.1.42.1)</li> <li>2. select those detergents which cause minimum impact on the environment (see BREF Section 4.1.42.2), without compromising the efficacy of cleaning</li> <li>3. avoid, where possible, the use of cleaning and disinfectant agents containing active chlorine (see BREF Section 4.1.42.3) and</li> <li>4. where the equipment is suitable, operate a cleaning-in-place system (see BREF Section 4.2.4.3).</li> </ol>				
<b>5.1.5 Treatment of waste water</b>	<p>Waste water treatment is an “end-of-pipe” treatment which is required because waste water is produced from various sources. These include water from vehicle, equipment and installation cleaning and from the washing of carcasses and animal by-products. Waste water also arises as a by-product of some of the treatment and</p>	<p>RTO and PPIS shall not generate waste water.</p>		<p>Noted</p>	<p>/</p>

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	<p>disposal processes for animal by-products, where water is may be either evaporated, leached or run-off. WWTPs consume energy and produce residues which in some cases are used in further treatments and which in others are disposed of.</p> <p>“Process-integrated” BAT which minimise both the consumption and the contamination of water should be applied. The selection of waste water treatment techniques can then be made based on the capacity required to treat the waste water produced after BAT minimising its quantity and load have been applied.</p> <p>No conclusions were reached about whether it was better to treat waste water from slaughterhouses and/or animal by-products installations on-site or at a municipal WWTP.</p> <p>For the treatment of waste water from slaughterhouses and animal by-products installations, BAT is to do the following:</p> <ol style="list-style-type: none"> <li>1. prevent waste water stagnation (see BREF Section 4.1.43.3)</li> <li>2. apply an initial screening of solids using sieves (see BREF Section 4.1.43.4) at the slaughterhouse or animal by-products installation</li> <li>3. remove fat from waste water, using a fat trap (see BREF Section 4.1.43.9)</li> <li>4. use a flotation plant, possibly combined with the use of flocculants, to remove additional solids (see BREF Section 4.1.43.10)</li> <li>5. use a waste water equalisation tank (see BREF Section 4.1.43.11)</li> <li>6. provide a waste water holding capacity in excess of routine requirements (see BREF Section 4.1.43.1)</li> </ol>			

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	<p>7. prevent liquid seepage and odour emissions from waste water treatment tanks, by sealing their sides and bases and either covering them or aerating them (see BREF Sections 4.1.43.12 and 4.1.43.13)</p> <p>8. subject the effluent to a biological treatment process. Aerobic and anaerobic treatments which are applied to waste water from slaughterhouses and animal by-products installations are described in BREF Sections 2.3.1.2, 2.3.2.1.3, 4.1.43.14, 4.1.43.15, 4.2.6.2, 4.2.6.3 and 4.3.3.15</p> <p>9. remove nitrogen and phosphorus. Someinformation is given in BREF Section 2.3.1.2</p> <p>10. remove the sludges produced and subject them to further animal by-product uses. These routes and their conditions of application are regulated by ABP Regulation 1774/2002/EC</p> <p>11. use CH<sub>4</sub> gas produced during anaerobic treatment for the production of heat and/or power</p> <p>12. subject the resulting effluent to tertiary treatment and</p> <p>13. regularly conduct laboratory analyses of the effluent composition and maintain records (see BREF Section 4.1.43.2). Further information on monitoring techniques is available in the current “Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector” BREF [341, EC, 2002].</p> <p>Note: The emission levels given in Table 5.1 are generally considered to be appropriate for protecting the water environment and are indicative of the emission levels that would be achieved with those techniques generally considered to represent BAT. They do not necessarily</p>			

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	<p>represent levels currently achieved within the industry but are based on the expert judgment of the TWG.</p> <p><b>Table 5.1: Emission levels associated with BAT for minimising waste water emissions from slaughterhouses and animal by-</b></p> <table><tr><th></th><th></th></tr><tr><th>Parameter</th><th>Achievable emission level</th></tr><tr><td></td><td>(mg/l)</td></tr><tr><td>COD</td><td>25 - 125</td></tr><tr><td>BOD<sub>5</sub></td><td>10 - 40</td></tr><tr><td>SS</td><td>5 - 60</td></tr><tr><td>Nitrogen (total)</td><td>15 - 40</td></tr><tr><td>Phosphorus (total)</td><td>2 - 5</td></tr><tr><td>FOG</td><td>2.6 - 15</td></tr></table>			Parameter	Achievable emission level		(mg/l)	COD	25 - 125	BOD <sub>5</sub>	10 - 40	SS	5 - 60	Nitrogen (total)	15 - 40	Phosphorus (total)	2 - 5	FOG	2.6 - 15			
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## Part 2. Additional BAT for slaughterhouses

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5.2 BAT for slaughterhouses	<p>In addition to the general measures in the previous Section “Slaughterhouses and animal by-products installations” of this document, for all slaughterhouses BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>1. dry scrape delivery vehicles (see BREF Sections 4.2.1.1) and prior to cleaning with a high-pressure hose (see BREF Section 4.2.1.2)</li> <li>2. avoid carcase washing and where this is not possible to minimise it, combined with clean slaughter techniques (see BREF Section 4.2.1.4)</li> <li>3. continuously collect by-products dry and segregated from each other, along the length of the slaughter- line (see BREF Section 4.2.1.6), combined with optimising bleeding and the collection of blood (see BREF Section 4.2.2.2.1) and segregating the storage and handling of different kinds of by-products (see BREF Section 4.2.5.1)</li> <li>4. operate a double drain from the bleed hall (see BREF Section 4.2.1.7)</li> <li>5. collect floor waste dry (see BREF Section 4.2.1.9)</li> <li>6. remove all unnecessary taps from the slaughter-line (see BREF Section 4.2.1.13)</li> <li>7. insulate and cover knife sterilisers (see Section 4.2.1.14), combined with sterilising knives using low-pressure steam (see BREF Section 4.2.1.17)</li> <li>8. operate hand and apron cleaning cubicles, with a “water off” default (see BREF Section 4.2.1.18)</li> <li>9. manage and monitor compressed air use (see BREF</li> </ol>	Not applicable for TTF.		Non–applicability is noted.

Aspect of BAT	BAT	STATUS AT INSTALLATION: [WasteServ, TTF]DATE: [30.09.2022]  Applicability Assessment (describe how the technique applies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	ERA comments
	<p>Section 4.2.1.19)</p> <p>10. manage and monitor ventilation use (see BREF Section 4.2.1.20)</p> <p>11. use backward bowed centrifugal fans in ventilation and refrigeration systems (see BREF Section 4.2.1.21)</p> <p>12. manage and monitor the use of hot water (see BREF Section 4.2.1.22) and</p> <p>13. trim all hide/skin material not destined for tanning immediately after removal from the animal, except if there is no outlet for the use/valorisation of the trimmings (see BREF Section 4.2.2.9.10).</p>			
<b>5.2.1 Additional BAT for the slaughter of large animals</b>	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for slaughterhouses” of this document, for all large animal slaughterhouses, BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>1. stop feeding animals 12 hours prior to slaughter (see BREF Section 4.2.2.1.1), combined with minimising the animals’ time in the slaughterhouse to reduce manure production (see BREF Section 4.2.2.1.2)</li> <li>2. apply demand-controlled drinking water (see BREF Section 4.2.2.1.4)</li> <li>3. shower pigs using water saving timer controlled nozzles (see BREF Section 4.2.2.1.5)</li> <li>4. dry clean the lairage floor and to periodically clean it with water (see BREF Section 4.2.2.1.6)</li> <li>5. use a squeegee for the initial cleaning of the blood collection trough (see BREF Section 4.2.2.2.2)</li> <li>6. steam scald pigs (vertical scalding) (see BREF Section</li> </ol>	Not applicable for TTF.		

Aspect of BAT	BAT	STATUS AT INSTALLATION: [WasteServ, TTF]DATE: [30.09.2022]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	ERA comments
	<p>4.2.2.3.1)</p> <p>7. in those existing slaughterhouses, where it is not yet economically viable to change to steam scalding, insulate and cover pig scalding tanks (see BREF Section 4.2.2.3.2) and control the water level in those tanks (see BREF Section 4.2.2.3.3)</p> <p>8. re-use cold water within pig de-hairing machines (see BREF Section 4.2.2.4.1) and replace irrigation pipes with flat jet nozzles (see BREF Section 4.2.2.4.2)</p> <p>9. re-use cooling water from pig singeing kilns (see BREF Section 4.2.2.5.1)</p> <p>10. recover heat from pig singeing exhaust gases, for preheating water (see BREF Section 4.2.2.5.2)</p> <p>11. shower pigs after singeing, using flat jet nozzles (see BREF Section 4.2.2.5.3)</p> <p>12. replace irrigation pipes with flat jet nozzles for rind treatment in pig slaughterhouses (see BREF Section 4.2.2.6.1)</p> <p>13. sterilise chest-opening saws in a cabinet with automated hot water nozzles (see BREF Section 4.2.2.7.1).</p> <p>14. regulate and minimise the water used for moving intestines (see BREF Section 4.2.2.7.2)</p> <p>15. use either water-spray/mist-cooling or blast-chilling/shock-cooling tunnel to cool pigs (see BREF Sections 4.2.2.8.1 and 4.2.2.8.2)</p> <p>16. not shower pigs before they are chilled in a chilling tunnel (see BREF Section 4.2.2.8.3)</p> <p>17. empty stomachs dry (see BREF Section 4.2.2.9.2)</p>			

Aspect of BAT	BAT	STATUS AT INSTALLATION: [WasteServ, TTF]DATE: [30.09.2022]  Applicability Assessment (describe how the technique applies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FOR IMPLEMENTATION	ERA comments
	<p>18. collect the contents of small intestines dry (see BREF Section 4.2.2.9.3), whether or not they are intended to be used for casings (see BREF Section 4.2.2.9.4)</p> <p>19. regulate and minimise the water consumption during small and large intestine washing (see BREF Section 4.2.2.9.6)</p> <p>20. regulate and minimise the water consumption during rinsing of tongues and hearts (see BREF Section 4.2.2.9.9)</p> <p>21. use a mechanised fat trap for removing fat from water (see BREF Section 4.2.2.9.7)</p> <p>22. according to the current Reference Document on Best Available Techniques for the Tanning of Hides and Skins [273, EC, 2001] BAT “is to process fresh hides and skins as far as they are available”.</p> <p>23. when it is impossible to process hides and skins before 8 – 12 hours, with the actual range depending on local conditions, to immediately store hides between 10 and 15 °C (see BREF Section 4.2.2.9.11)</p> <p>24. when it is impossible to process hides before a period of between 8 – 12 hours and 5 – 8 days, with the actual ranges depending on local conditions, to immediately refrigerate hides at 2 °C (see BREF Section 4.2.2.9.15) and</p> <p>25. always immediately drum-salt all hides and skins, if they have to be stored for longer than 8 days, e.g. if they have to be transported overseas (see BREF Section 4.2.2.9.12), combined with the dry collection of salt residues (see BREF Section 4.2.2.9.14).</p>			
<b>5.2.2 Additional BAT for the</b>	In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and	Not applicable for TTF.		

Aspect of BAT	BAT	STATUS AT INSTALLATION: [WasteServ, TTF]DATE: [30.09.2022]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	
slaughter of poultry	<p>“Additional BAT for slaughterhouses” of this document, for all poultry slaughterhouses, BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>1. apply dust abatement at bird reception, unloading and hanging stations (see BREF Sections 4.2.3.1.2, 4.2.3.1.3 and 4.2.3.1.4)</li> <li>2. stun birds in their modules, using inert gases at new installations and when existing stunning equipment and bird delivery vehicles are due for renewal (see BREF Section 4.2.3.2.1)</li> <li>3. reduce water consumption in poultry slaughter, by removing carcase washing equipment from the line except after de-feathering and evisceration (see BREF Section 4.2.1.11)</li> <li>4. steam scald poultry (see BREF Section 4.2.3.3.1)</li> <li>5. insulate scalding tanks in those existing premises where it is not yet economically viable to change to steam scalding (see BREF Section 4.2.3.3.2)</li> <li>6. use nozzles instead of irrigation pipes to shower poultry, during de-feathering (see BREF Section 4.2.3.4.1)</li> <li>7. use recycled water, e.g. from the scalding tank, for the carriage of feathers (see BREF Section 4.2.3.4.2)</li> <li>8. use water efficient shower heads to wash poultry, during evisceration (see BREF Section 4.2.3.5.1) and</li> <li>9. chill poultry by immersion/spin chilling and to control, regulate and minimise the water consumption (see BREF Section 4.2.3.6.2).</li> </ol>			

### Part 3. Additional BAT for animal by-products installations

Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	ERA comments	WSM Reply
<b>5.3 BAT for animal by-products installations</b>	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” of this document, for all animal by-products installations, BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>1. operate continuous, dry and segregated collection of animal by-products throughout animal by-products treatment (see BREF Section 4.3.1.1)</li> <li>2. use sealed, storage, handling and charging facilities for animal by-products (see BREF Section 4.3.1.3)</li> <li>3. where it is not possible to treat animal by-products before their decomposition starts to cause odour problems and/or quality problems, refrigerate them as quickly as possible and for as short a time as possible (see BREF Section 4.3.1.4) and</li> <li>4. where inherently malodorous substances are used or are produced during the treatment of animal by-products, pass the low intensity/high volume gases through a biofilter (see BREF Section 4.1.33).</li> </ol>	<p>2. The Marshalling Shed shall be receiving ionised air from the PPIS, thus mitigating odours in the said shed. Transfer of tallow from silos to the Dual Fuel Burner (and into the kiln) shall take place via an enclosed system, thus eliminating manual handling.</p> <p>4. The low intensity high volume gases shall be neutralised by ionized air produced by the PPIS.</p>		<p>In the case of failure of the proposed introduction of the odour mitigating equipment, are there any envisioned impacts in terms of the operation of the plant.</p>	<p>Refer to CD Controlled Document 401 TTF Mitigation Measures for Failure of OMS_Rev00.</p>
<b>5.3.1 Additional BAT for fat melting</b>	<p>For fat melting no additional BAT have been identified in addition to those in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document.</p>				
<b>5.3.2 Additional BAT for rendering</b>	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document, for rendering installations, BAT is to doall of the following:</p> <ol style="list-style-type: none"> <li>1. totally enclose the rendering line (see BREF Section 4.3.3.1)</li> </ol>	<p>1. Both rendering lines shall be sealed off to maximize efficiency of the proposed air treatment plant.</p>		<p>Point 1: It is understood that this was already the case. If not kindly confirm whether there is any infrastructural changes needed to effect this</p>	<p>There were some infrastructural changes such as the ceiling of the control room, thus reducing the operational volume by 20%, which in turn increases the</p>

				requirement.	efficiency.
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Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FOR IMPLEMENTATION	ERA comments	WSM Reply
	<ol style="list-style-type: none"> <li>reduce the size of carcasses and parts of animal carcasses before rendering (see BREF Section 4.3.3.2)</li> <li>remove water from blood, by steam coagulation, prior to rendering (see BREF Section 4.3.3.4)</li> <li>for raw material throughputs less than 50000 t/yr, to use a single effect evaporator to remove water from liquid mixtures (see BREF Section 4.3.3.5) and</li> <li>for raw material throughputs greater than, or equal to 50000 t/yr, to use a multiple-effect evaporator to remove water from liquid mixtures (see BREFSection 4.3.1.5).</li> </ol> <p>When it has been impossible to use fresh raw materials and thereby to minimise the production of malodorous substances, BAT is to do either of the following:</p> <ol style="list-style-type: none"> <li>burn the non-condensable gases in an existing boiler (see BREF Section 4.3.3.11) and to pass the low intensity/high volume odours through a biofilter (see BREF Section 4.1.33) or</li> <li>to burn the whole vapour gases in a thermal oxidiser (see BREF Section 4.3.3.10) and to pass the low intensity/high volume odours through a biofilter (see BREF Section 4.1.33).</li> </ol>	<p>Air from the Autoclave process, particularly the rendering and the pressing, shall be directed and treated in the RTO. The air in proximity of the heating units of the Dual Burner shall too be directed to the RTO. The PPIS shall produce ionised air that shall neutralise odorous air from the Incinerator's Marshalling Shed and Shredder Room, and also the Autoclave's Shed.</p>		<p>WSM to clarify is there any potential sources of malodorous air from the rendering operations which will not have the air treated.</p>	<p>All sources are captured.</p>
<b>5.3.3 Additional BAT for fish-meal and fish-oil production</b>	<p>In addition to the general measures in previous Sections "Slaughterhouses and animal by-products installations" and "Additional BAT for animal by-products installations" of this document, for fish-meal and fish-oil production installations, BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>use fresh, (low total volatile nitrogen) feedstock (see BREF Section 4.3.4.1)</li> <li>use heat from the vapour evaporated during the</li> </ol>				



Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	ERA comments
	<p>drying of fish-meal in a falling film evaporator to concentrate stickwater (see BREF Section 4.3.4.2)</p> <p>3. incinerate malodorous air, with heat recovery (see BREF Section 4.3.4.3) and</p> <p>4. wash air using condensate liquid instead of using clean seawater (see BREF Section 4.3.4.4).</p>			
<b>5.3.4 Additional BAT for blood processing</b>	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document, for blood processing installations BAT is to do one of the following:</p> <p>1. concentrate plasma, prior to spray drying, using reverse osmosis (see BREF Section 4.3.5.1)</p> <p>2. concentrate plasma, prior to spray drying, using vacuum evaporation (see BREF Section 4.3.5.2) or</p> <p>3. remove water from blood, by steam coagulation, prior to spray drying (see BREF Section 4.3.3.4).</p>			
<b>5.3.5 Additional BAT for bone processing</b>	<p>For bone processing, no additional BAT have been identified in addition to those in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document.</p>			
<b>5.3.6 Additional BAT for gelatine manufacture</b>	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document, for gelatine manufacturing installations, BAT is to do the following:</p> <p>insulate bone de-fatting equipment (see BREF Section 4.3.7.1).</p>			

Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	ERA comments	WSM Reply
5.3.7 Additional BAT for the incineration of animal by-products	<p>BAT listed for incineration, apply to those issues related only to the dedicated incineration of animal by-products. BAT for issues related to the incineration of all wastes,come within the scope of the Reference document on Best Available Techniques in waste incineration [329, EC, 2003].</p> <p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document, for the incineration of animal by- products, BAT is to do all of the following:</p> <ol style="list-style-type: none"> <li>1. enclose buildings used for delivery storage, handling and processing of animal by-products (see BREF Section 4.3.8.1)</li> <li>2. clean and disinfect delivery vehicles and equipment, after each delivery/use (see BREF Section 4.3.8.2)</li> <li>3. carry carcasses (not drag them) (see BREF Section 4.3.8.3)</li> <li>4. reduce in size animal carcasses and parts of animal carcasses, before incineration (see BREF Section 4.3.8.4)</li> <li>5. restrict feedstock to exactly that tested during trials (see BREF Section 4.3.8.5)</li> <li>6. agree the fat:moisture:ash content of animal meal, with the renderer (see BREF Section 4.3.8.6)</li> <li>7. avoid receipt of material for incineration in PVC packaging (see BREF Section 4.3.8.10)</li> <li>8. either auger feed (see BREF Section 4.3.8.11), orpump (see BREF Section 4.3.8.12) parts of carcasses or animal meal to the incinerator</li> <li>9. incinerate incineration waste water (see BREF</li> </ol>	<p>1. The Marshalling Shed shall encapsule the current Marshalling Area where slaughterhouse waste and animal carcasses are temporarily stored upon arrival at the Incinerator. The shed shall provide closure and protection from the elements, particularly direct sunlight, thus avoiding accelerated waste decomposition and associated odour. The Marshalling Shed shall be receiving ionised air from the PPIS, thus mitigating odours in the said shed.</p> <p>8. Reference to the Dual Fuel Burner, tallow from the silos is directed to the kiln via pump/s and other ancillary equipment.</p>		<p>Point 1 ,8 , 10 and 11 are noted. With respect to the following comment “ a portion of the air from the shredder room shall be directed to the primary combustion’ ’how is this enabled?</p>	<p>This is enabled via a set-up entailing blower and ducting.</p>

Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FOR IMPLEMENTATION	ERA comments
	<p>Section 4.3.8.13), if there is no suitable WWTP on the site</p> <p>10. seal the storage, handling and charging of animal by-products to incinerators (see BREF Section 4.3.8.14)</p> <p>11. duct air from the installation and the pre-combustion equipment to combustion chambers (see BREF Section 4.3.8.15)</p> <p>12. alarm and interlock combustion temperatures to charging mechanisms (see BREF Section 4.3.8.16).</p> <p>13. operate continuous incineration (see BREF Section 4.3.8.20)</p> <p>14. operate an ash burnout chamber (see BREF Section 4.3.8.21), where adequate combustion is not otherwise achievable, e.g. immediately downstream from rotary kilns</p> <p>15. operate automated continuous de-ashing (see BREF Section 4.3.8.22)</p> <p>16. operate a monitoring regime for emissions, including a protocol for monitoring burnout, including biohazard from TSE prions, in ash (see BREF Section 4.3.8.25)</p> <p>17. to achieve emission levels as low as reasonably practicable below those shown in Table 5.2 (see BREF Section 4.3.8.17)</p> <p>18. regularly clean and disinfect installations and equipment (see BREF Section 4.3.8.26)</p> <p>19. operate odour arrestment techniques, when the incinerator is not working (see BREF Section 4.3.8.27), when odour prevention is not reasonably</p>	<p>10. Most of the incoming waste (clinical and abattoir) is delivered to the plant in closed bins. Fast roller shutters are installed at the main doors of the Marshalling Shed, Shredder Room and Plant Room. Tallow shall be directed tothe dual burner via pump.</p> <p>The PPIS shall also neutralise odours from the shredder room, thus limiting odour. Furthermore, a portion of the air from the shredder room shall be directed to the primary combustion.</p> <p>19. Even when the incinerator is off, the PPIS shall be switched on and set to mitigating odour originating from the Marshalling Shed and Shredder Room.</p>		

Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]  Applicability Assessment (describe how the techniqueapplies or not to your installation)	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FOR IMPLEMENTATION	ERA comments
	<p>practicable and</p> <p>20. use a carbon filter for odour abatement, when incinerators are not operating (see BREF Section 4.3.8.29) and where odour prevention is not reasonably practicable.</p> <p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document and those listed above, for the incineration of animal by-products, BAT is to do one of the following:</p> <ul style="list-style-type: none"> <li>➤ incinerate animal carcasses, parts of carcasses and animal meal in bubbling fluidised bed incinerators (see BREF Section 4.3.8.17), with suitable flue gas treatment equipment or</li> <li>➤ incinerate animal carcasses, parts of carcasses and animal meal in circulating fluidised bed incinerators (see BREF Section 4.3.8.18), with suitable flue gas treatment equipment or</li> <li>➤ incinerate animal carcasses, parts of carcasses and animal meal in rotary kiln incinerators (see BREF Section 4.3.8.19), with suitable flue gas treatment equipment.</li> </ul>			
<b>5.3.8 Additional BAT for biogas production</b>	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document, for biogas production, BAT is to do the following:</p> <p>re-use heat during biogas production (see BREF Section 4.3.10.3).</p>			

Aspect of BAT	BAT	STATUS AT INSTALLATION: [ENTER NAME OF OPERATOR]DATE: [ENTER DATE OF ASSESSMENT]	STATE WHETHER IT IS IN PLACE OR STATE SCHEDULE FORIMPLEMENTATION	ERA comments
		Applicability Assessment (describe how the techniqueapplies or not to your installation)		
5.3.9 Additional BAT for composting	<p>In addition to the general measures in previous Sections “Slaughterhouses and animal by-products installations” and “Additional BAT for animal by-products installations” of this document, for composting, animal by-products, BAT is to do the following:</p> <p>provide sufficient drainage capacity for a windrow on ahard standing (see BREF Section 4.3.11.1) constructed from concrete (see BREF Section 4.3.11.2).</p>			

Releases to air		Performance associated with BAT <sup>(3)</sup>	
		Typical	Monitoring
SO <sub>2</sub>	(mg/m <sup>3</sup> )	< 30 <sup>(2)</sup>	Continuous
HCl	(mg/m <sup>3</sup> )	< 10 <sup>(2)</sup>	Continuous
HF	(mg/m <sup>3</sup> )	n/a	
NO <sub>x</sub>	(mg/m <sup>3</sup> )	< 175 <sup>(2)</sup>	Continuous
CO	(mg/m <sup>3</sup> )	< 25 <sup>(2)</sup>	Continuous
VOCs	(mg/m <sup>3</sup> )	< 10 <sup>(2)</sup>	Periodic
Dust	(mg/m <sup>3</sup> )	< 10 <sup>(2)</sup>	Continuous
Dioxins and furans	(ng/m <sup>3</sup> )	< 0.1 <sup>(4)</sup>	Periodic
Heavy metals total (Cd, TI)	(mg/m <sup>3</sup> )	< 0.05 <sup>(5)</sup>	
Heavy metals (Hg)	(mg/m <sup>3</sup> )	< 0.05 <sup>(5)</sup>	
Heavy metals total (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V)	(mg/m <sup>3</sup> )	< 0.5 <sup>(5)</sup>	
NH <sub>3</sub>	(mg/m <sup>3</sup> )	< 10	
Residence time	> 850 °C	3.5 s	
Oxygen	(minimum after last injection)	9 %	Continuous
Pressure, Temperature, Water vapour; Volumetric flow			Continuous
Ash - (total carbon)		< 1 % <sup>(6)</sup>	Periodic
Ash – (total protein) (Aqueous extract) (mg/100g)		0.3 – 0.6	Periodic
<sup>(2)</sup> Releases control – “95 % percentile <u>hourly</u> average over 24 hours”. Measurements at 273 K (temp.), 101.3 kPa (pressure) and 11 % O <sub>2</sub> dry gas			
<sup>(3)</sup> Actual performance results operating a dry flue gas-cleaning system with bag filters and injected reagents			
<sup>(4)</sup> Values measured over a sample period of a minimum of 6 hours and a maximum of 8 hours expressed as toxic equivalent in accordance with Annex 1 of the Waste Incineration Directive			
<sup>(5)</sup> Values measured over a sample period of a minimum of 6 hours and a maximum of 8 hours			
<sup>(6)</sup> Total organic carbon			
Note: Protein analysis is not relevant to the dedicated incineration of poultry by-products			

**Table 5.2: Emission levels associated with the dedicated incineration of animal by-products in either bubbling fluidised bed, circulating fluidised bed or rotary kiln incinerators**