

Permitting Decisions

Variation / Partial Surrender

We have decided to grant the variation and accept the partial surrender for Thames Cane Sugar Refinery operated by T&L Sugars Limited.

The variation number is EPR/MP3530HZ/V005.

This variation incorporates changes applied for by the operator in variation reference EPR/MP3530HZ/V004 in addition to an Environment Agency initiated variation to the permit (EPR/MP3530HZ/V005) which involves the statutory review of the permits in the Food, Drink & Milk industry sector.

Changes introduced by this variation made by the operator

- The relocation of the small waste storage area from the north side of the raw sugar shed, to the west side of the raw sugar shed.
- Addition of the following emission points: A76, A77, A78, A79, A80, A81 and A82.
- Partial surrender of land from the permit boundary. The parcel of land is to the west of the site.
- Removal of 4 x 19MWth Biomass Boilers from the permit which were never commissioned
- Removal of the 500 hour restriction on WHB Auxiliary forced draft (FD) firing.
- Removal of emission points S1, S4 and S6.

Changes introduced by this variation notice/statutory review

This consolidated permit has been issued following a full review against the best available techniques (BAT) conclusions for the Food, Drink and Milk Industries published on 4th December 2019 in the official journal of the European Union.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision-making process.

Part 1 (EPR/MP3530HZ/V004)

- Highlights [key issues](#) in the determination.
- Summarises the decision making process in the [decision considerations](#) section to show how the main relevant factors have been taken into account.

Part 2 (EPR/MP3530HZ/V005)

- Explains why we have also made an Environment Agency initiated variation.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and the variation notice.

Part 1

Key Issues

Changes applied for in V004

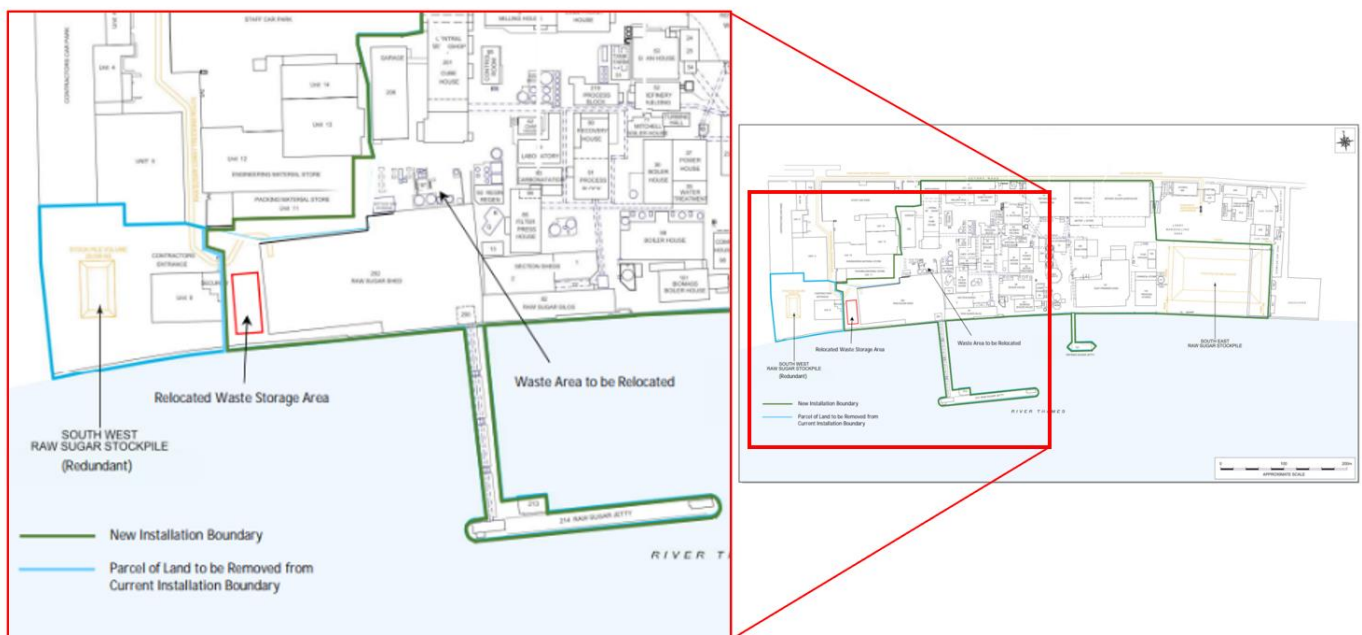
The operator originally applied to remove the gas oil pipeline to the Aalborg Boilers as part of V004 however, this aspect of the variation was withdrawn by the operator. This decision was made by the operator due to energy supply insecurity they wish to retain the gas oil pipeline in order to utilise liquid fuel options in the boilers should there be a failure in gas supply to the site.

Partial Surrender

The operator applied to remove a parcel of land to the west of the site that was brought into the installation boundary in variation V003, for the purpose of the land was solely to store raw cane sugar as a stockpile (south west raw sugar stockpile – 25,000 te). A non-hazardous food raw material, no hazardous material was stored in this area. Figure 1 shows the area of land to be surrendered outlined in blue. The land was utilised for this purpose for fourteen months. There is also a small building being removed from the boundary (Unit 8), which housed site security. The land area and building are no longer required. The operator wishes to remove this land from the permit to allow the site to lease this land to a third party.

The installation is subject to a Site Protection and Monitoring Programme (SPMP). The design of the SPMP was specified in the document; “Design of a Site Protection and Monitoring Programme for Tate & Lyle Silvertown Requiring Reference Data to be Collected – May 2006”. During the variation which introduced the land being surrendered (V003) it was determined soil and groundwater sampling was not required given the low environmental risk to land and groundwater from the activities taking place. Considering the information provided we have accepted the operators justification not undertake any additional soil or groundwater monitoring in relation to surrendering this land.

Figure 1 – Depicts the changes proposed



Relocation of Waste Storage Area

The operator has proposed the relocation of a small waste storage area from its current location adjacent to the northern wall of the raw sugar shed to the new proposed location an area to the west of the raw sugar shed. This location is within the existing site boundary, however a small extension of the installation boundary has been requested, in order to include the road to the north of the raw sugar shed. This will incorporate vehicle movements carrying waste such a drums between the production area and the newly re-located waste store. See figure 1 which depicts the relocation of the waste storage area (outlined in red).

Additional emission points

The following emission points have been identified by the operator as previously being omitted from the permit, these have been added to the permit for completeness:

- A76 & A77 Dust collection vents.
- A78 & A79 Raw sugar jetty discharge buckets.
- Internal emission point A80 - bag filter Exhaust for the section shed dust collector.
- A81 & A82 Cartridge filter for icing sugar dust abatement.

Removal of the FD firing hour limit

The operator has requested the removal of the 500 hour limit on running the WHB in FD mode. The operator confirmed that operating in FD mode would not be a preferred/ chosen method but is utilized out of necessity.

It is believed the original limited has been included to ensure usage of the CCGT is maximised. The operator confirmed that operation of the LCP as a CCGT is the most economical way to run LCP393 and would that it would always be selected when the GT and WHB are available and operating conditions require this unit to run in CCGT i.e. there is sufficient demand from the refinery. They confirmed the site requires LCP393 (CCGT) plus one boiler from LCP392 to service the usual site steam and electrical demand, for 'normal' operation. If the GT is not available, then both LCP392 boilers will run, with one on baseload and the second ranging to meet peaks and troughs in demand, with the WHB off. However, should only one boiler from LCP392 be available, then that will be run with the WHB in FD mode.

To control FD firing, the operator has proposed that the following conditions must apply to enable this running mode to be selected:

- The GT is unavailable
- Only one Aalborg boiler is available

With the removal of the 500 hour limit there is a concern this could lead to an increase in combustion cases, however, as part of this combined variation V004 & V005 the operator has removed 4 x 19MWth Solid Biomass Boilers from the permit. The removal of these boilers will significantly reduce the potential pollutants from the site.

We are satisfied that the WHB FD mode is not a desired mode of operation for the operator and agree in principal that the conditions above set out when the WHB FD mode can be used and it should not be used unless these conditions are met. We are also satisfied the previously permitted biomass boilers would have had a greater emissions of pollutants in comparison to operating the WHB in FD mode for greater than 500 hours per year. However, we have included and improvement condition IC33 in order to ensure an appropriate operating techniques document is in place with regard to WHB FD firing to ensure this mode is still limited where possible.

Decision considerations

Confidential information

A claim for commercial or industrial confidentiality has not been made.

The decision was taken in accordance with our guidance on confidentiality.

Identifying confidential information

We have not identified information provided as part of the application that we consider to be confidential.

The decision was taken in accordance with our guidance on confidentiality.

The regulated facility

We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility', Appendix 2 of RGN2 'Defining the scope of the installation', and Appendix 1 of RGN 2 'Interpretation of Schedule 1'.

The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.

The site

The operator has provided a plan which we consider to be satisfactory.

Extent of the surrender application

The operator has provided a plan showing the extent of the site of the facility that is to be surrendered.

We consider this plan to be satisfactory.

This plan is included in the permit.

Pollution risk

We are satisfied that the necessary measures have been taken to avoid a pollution risk resulting from the operation of the regulated facility.

Satisfactory state

We are satisfied that the necessary measures have been taken to return the site of the regulated facility to a satisfactory state, having regard to the state of the site before the facility was put into operation.

Site condition report

The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports.

Nature conservation, landscape, heritage and protected species and habitat designations

We have not carried out a screening for designated sites as the proposed variation will not alter any emissions to the environment that are already permitted. These emissions form part of the “prevailing environmental conditions” that may contribute to the existing condition of the designated site(s). The existing permitted emissions constitute the lawful baseline in regulatory terms and the proposed variation would not change that baseline. Therefore, as the competent authority, the Environment Agency concludes that there is no potential for likelihood of damage to any nearby SSSI / likely significant effect on any nearby SAC/SPA/Ramsar sites / likely hindrance to achieving the site objectives of any MCZ. This fulfils the regulatory obligations under the following legislation:

- Section 281 of the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act (CRoW) 2000)
- Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended)
- Sections 125-126 of the Marine and Coastal Access Act 2009

We consider that the application will not affect any site of nature conservation, landscape and heritage, and/or protected species or habitats identified.

We have not consulted Natural England.

The decision was taken in accordance with our guidance.

Environmental risk

We have reviewed the operator's assessment of the environmental risk from the facility.

The operator's risk assessment is satisfactory.

General operating techniques

We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility.

The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.

Changes to the permit conditions due to an Environment Agency initiated variation

See Part 2 of this document which describes charges made through the Environment Agency initiated variation EPR/MP3530HZ/V005.

Management system

We are not aware of any reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.

The decision was taken in accordance with the guidance on operator competence and how to develop a management system for environmental permits.

Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit variation.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Part 2

Review of an Environmental Permit for an Installation subject to Chapter II of the Industrial Emissions Directive under the Environmental Permitting (England & Wales) Regulations 2016 (as amended)

Decision document recording our decision-making process following review of a permit

The Permit number is: EPR/MP3530HZ
The Operator is: T&L Sugars Limited
The Installation is: Thames Cane Sugar Refinery
This Variation Notice number is: EPR/MP3530HZ/V005

What this document is about

Article 21(3) of the Industrial Emissions Directive (IED) requires the Environment Agency to review conditions in permits that it has issued and to ensure that the permit delivers compliance with relevant standards, within four years of the publication by the European Commission of updated decisions on best available techniques (BAT) Conclusions.

We have reviewed the permit for this installation against the BAT Conclusions for the Food, Drink and Milk Industries published on 4th December 2019 in the Official Journal of the European Union. In this decision document, we set out the reasoning for the consolidated variation notice that we have issued.

It explains how we have reviewed and considered the techniques used by the Operator in the operation and control of the plant and activities of the installation. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position.

As well as considering the review of the operating techniques used by the Operator for the operation of the plant and activities of the installation, the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit issue. Where this has not already been done, it also modernises the entire permit to reflect the conditions contained in our current generic permit template.

The introduction of new template conditions makes the Permit consistent with our current general approach and with other permits issued to Installations in this sector. Although the wording of some conditions has changed, while others have been deleted because of the new regulatory approach, it does not reduce the level of environmental protection achieved by the Permit in any way. In this document, we therefore address only our determination of substantive issues relating to the new BAT Conclusions.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future.

How this document is structured

1. Our decision
2. How we reached our decision
3. The legal framework
4. Annex 1 – Review of operating techniques within the Installation against BAT Conclusions.
5. Annex 2 – Review and assessment of changes that are not part of the BAT Conclusions derived permit review
6. Annex 3 – Improvement Conditions
7. Annex 5 – Non Review Improvement Conditions

1 Our decision

We have decided to issue the Variation Notice to the Operator. This will allow the Operator to continue to operate the Installation, subject to the conditions in the Consolidated Variation Notice that updates the whole permit.

We consider that, in reaching our decision, we have taken into account all relevant considerations and legal requirements and that the varied permit will ensure that a high level of protection is provided for the environment and human health.

The Consolidated Variation Notice contains many conditions taken from our standard Environmental Permit template including the relevant annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the Notice, we have considered the techniques identified by the operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate. This document does, however, provide an explanation of our use of “tailor-made” or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Requesting information to demonstrate compliance with BAT Conclusion techniques

We issued a Notice under Regulation 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 (a Regulation 61 Notice) on 08/06/2022 requiring the Operator to provide information to demonstrate where the operation of their installation currently meets, or how it will subsequently meet, the revised standards described in the relevant BAT Conclusions document.

The Notice required that where the revised standards are not currently met, the operator should provide information that:

- describes the techniques that will be implemented before 4 December 2023, which will then ensure that operations meet the revised standards, or
- justifies why standards will not be met by 4 December 2023, and confirmation of the date when the operation of those processes will cease within the Installation or an explanation of why the revised BAT standards are not applicable to those processes, or
- justifies why an alternative technique will achieve the same level of environmental protection equivalent to the revised BAT standards described in the BAT Conclusions.

Where the Operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT-AEL) described in the BAT Conclusions Document, the Regulation 61 Notice required that the Operator make a formal request for derogation from compliance with that BAT-AEL (as provisioned by Article 15(4) of IED). In this circumstance, the Notice identified that any such request for derogation must be supported and justified by sufficient technical and commercial information that would enable us to determine acceptability of the derogation request.

The Regulation 61 Notice response from the Operator was received on 04/11/2022.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review but not that it necessarily contained all the information we would need to complete that determination.

The Operator made no claim for commercial confidentiality. We have not received any information in relation to the Regulation 61 Notice response that appears to be confidential in relation to any party.

2.2 Review of our own information in respect to the capability of the Installation to meet revised standards included in the BAT Conclusions document

Based on our records and previous experience in the regulation of the installation we consider that the Operator will be able to comply with the techniques and standards described in the BAT Conclusions other than for those techniques and requirements described in BAT Conclusion 6. In relation to this BAT Conclusion, we do not fully agree with the Operator in respect of their current stated capability as recorded in their response to the Regulation 61 Notice. We have therefore included Improvement Condition IC19 in the Consolidated Variation Notice to ensure that the requirements of the BAT Conclusions are delivered within 3 months of the variation being issued.

2.3 Requests for further information during determination

Although we were able to consider the Regulation 61 Notice response generally satisfactory at receipt, we did in fact need more information in order to complete our permit review assessment, and issued further information requests on 19/03/2024 and 23/04/2024. These were in relation to FDM BAT conclusions: 1, 6, 8, 9, 11, 12, 13 & 14; emissions to air, MCPs, RHS risk assessment, containment; LCP BAT: 2, 3, 6, 8, 13, 28, 31-35, 40, 43 & 45. A copy of each further information request was placed on our public register.

2.4 Other Considerations

We have addressed any other key issues for the sector as part of this review process.

The operator has upgraded the Dry Low Emission (DLE) core the operator has proposed modifications to the start-up loads/ shut down loads, these have been proposed by the operator as per the table below. However, the operator did not provide a technical report based on an approved commissioning plan. We have included IC32 to ensure that the Minimum Start-Up Loads (MSULs) and Minimum Shut-Down Loads (MSDLs) are demonstrated appropriately.

Mode	MSUL	MSDL	OF	Comment
OCGT GAS	67%	67%	GT MWe Rated Output	Based on <4.5MWe GT emissions
OCGT LIQUID	67%	67%	GT MWe Rated Output	Based on <4.5MWe GT emissions
CCGT GAS Turbine Exhaust Gas (TEG) ONLY	67%	67%	GT MWe Rated Output	Based on <4.5MWe GT emissions
CCGT LIQUID TEG ONLY	67%	67%	GT MWe Rated Output	Based on <4.5MWe GT emissions
WHRB FD MODE (GAS)	50%	50%	WHRB MWt Rated Output	Min fire 60% duty
CCGT GAS TEG + AUX (GAS)	17%	17%	WHRB MWt Rated Output	Max TEG Only Threshold
CCGT LIQUID TEG + AUX (GAS)	17%	17%	WHRB MWt Rated Output	Max TEG Only Threshold

3 The legal framework

The Consolidated Variation Notice will be issued under Regulations 18 and 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* as described by the IED;
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that, in issuing the Consolidated Variation Notice, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

Annex 1: decision checklist regarding relevant BAT Conclusions

BAT Conclusions for the Food, Drink and Milk Industries, were published by the European Commission on 4 December 2019.

There are 37 BAT Conclusions.

BAT 1 – 15 are General BAT Conclusions (Narrative BAT) applicable to all relevant Food, Drink and Milk Installations in scope.

BAT 16 – 37 are sector-specific BAT Conclusions, including Best Available Techniques Associated Emissions Levels (BAT-AELs) and Associated Environmental Performance Levels (BAT-AEPLs):

BAT 16 & 17	BAT Conclusions for Animal Feed
BAT 18 – 20	BAT Conclusions for Brewing
BAT 21 – 23	BAT Conclusions for Dairies
BAT 24	BAT Conclusions for Ethanol Production
BAT 25 & 26	BAT Conclusions for Fish and Shellfish Processing
BAT 27	BAT Conclusions for Fruit and Vegetable Processing
BAT 28	BAT Conclusions for Grain Milling
BAT 29	BAT Conclusions for Meat Processing
BAT 30 – 32	BAT Conclusions for Oilseed Processing and Vegetable Oil Refining
BAT 33	BAT Conclusions for Soft Drinks and Nectar/Fruit Juice Processed from Fruit and Vegetables
BAT 34	BAT Conclusions for Starch Production
BAT 35 – 37	BAT Conclusions for Sugar Manufacturing

In addition to the BAT Conclusions for the Food, Drink and Milk Industries; the following BAT Conclusions also apply (as “secondary” BREF BAT Conclusions) due to the site activities:

- Large Combustion Plant (LCP) BAT Conclusions, published 17 August 2017 (relevant to FDM sites operating LCP):

BAT 1 – 17 (General BAT Conclusions), BAT 28 – 30 and BAT 40 – 45.

The operator carries out lime slaking on site in however this is permitted under the Schedule 1 Activity: *Section 3.1B(c) Slaking lime for the purpose of making calcium hydroxide or calcium magnesium hydroxide.*

As this activity is a Part B activity the Cement & Lime BAT Conclusions, published 9 April 2013 are not applicable, therefore, they are not addressed further.

This annex provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation. This annex should be read in conjunction with the Consolidated Variation Notice.

The overall status of compliance with the BAT conclusion is indicated in the table as:

NA – Not Applicable

CC – Currently Compliant

FC – Compliant in the future (within 4 years of publication of BAT Conclusions)

NC – Not Compliant

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
GENERAL BAT CONCLUSIONS (BAT 1-15)			
1	<p>Environmental Management System - Improve overall environmental performance.</p> <p>Implement an EMS that incorporates all the features as described within BATc 1.</p>	CC	<p>The operator has provided information to support compliance with BATc 1. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 1.</p> <p>The operator has a EMS in place which incorporates the requirements of BATc1.</p>
2	<p>EMS Inventory of inputs & outputs. Increase resource efficiency and reduce emissions.</p> <p>Establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the features as detailed within the BATCs.</p>	CC	<p>The operator has provided information to support compliance with BATc 2. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 2.</p> <p>The operator has a EMS which incorporates the requirements of BATc2.</p> <p>The operator has confirmed their EMS establishes, maintains and regularly reviews inventory of water, energy and raw materials consumption as well as of waste water and waste gas streams.</p>
3	<p>Monitoring key process parameters at key locations for emissions to water.</p> <p>For relevant emissions to water as identified by the inventory of waste water streams (see BAT 2), BAT is to monitor key process parameters (e.g. continuous monitoring of waste water flow, pH and temperature) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).</p>	CC	<p>The operator has provided information to support compliance with BATc 3. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 3.</p> <p>The operator has identified all relevant emissions to water and monitors key process parameters at key locations.</p> <p>The site utilises raw water which is supplied to the site from the Thames Water mains, via two metered intake points.</p> <p>Effluent is produced from all the water systems and is discharged to trade sewer. The site has a number of</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			<p>discharge points under trade effluent consent granted by Thames Water. The consent requires the monitoring and reporting of discharges to the sewers to be made to Thames Water. The site has a laboratory that takes regular samples from the sewers and analyse them for sugar content, chloride, pH and temperature. Any exceedance is reported internally and investigated.</p> <p>The site also has a TOC analysers on the main discharge sewer from site so that spikes from sugar loss to sewer could be seen in real time and reacted to/investigated.</p> <p>The operator has an abstraction licence, to utilise Thames River Water for cooling and condensing purposes and then returns the water back to the River Thames in compliance with permit discharge conditions (discharge point W1). The temperature of the outflow is monitored continuously and an average reported for the day. The sugar content of river water returned is analysed on a daily basis by the site laboratory. The laboratory analysis also include a daily COD test.</p>
4	<p>Monitoring emissions to water to the required frequencies and standards. BAT is to monitor emissions to water with at least the frequency given [refer to BAT 4 table in BATc] and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>	NA	<p>We are satisfied that BATc 4 is not applicable to this Installation.</p> <p>The process effluent from all water systems on site is discharged to foul sewer under a trade effluent consent by Thames Water, no direct discharges of process effluent to surface water.</p> <p>The operator has an abstraction licence, to utilise Thames River Water for cooling and condensing purposes and then returns the water back to the River Thames in compliance with permit discharge conditions (discharge point W1). This is not classified as process water therefore we are satisfied BATc4 is not applicable.</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
5	<p>Monitoring channelled emissions to air to the required frequencies and standards.</p> <p>BAT is to monitor channelled emissions to air with at least the frequency given and in accordance with EN standards.</p>	NA	<p>We are satisfied that BATc 5 is not applicable to this Installation.</p> <p>Under BATc 5 there are requirements for Sugar Manufacturing. However, the specific processes which monitoring requirements are linked to are related to Sugar Beet processing which is mainly the drying of beet pulp. This installations manufactures sugar via processing of sugar cane therefore, there are no monitoring requirements. Therefore, BATc 5 is not applicable to this site.</p>
6	<p>Energy Efficiency</p> <p>In order to increase energy efficiency, BAT is to use an energy efficiency plan (BAT 6a) and an appropriate combination of the common techniques listed in technique 6b within the table in the BATc.</p>	FC	<p>The operator has provided information to support compliance with BATc 6. We have assessed the information provided and we are not satisfied that the operator has demonstrated compliance with BATc 6.</p> <p>The operator utilises an appropriate combination of common techniques as listed in BATc 6b such as:</p> <ul style="list-style-type: none"> - heat recovery with heat exchangers/ heat pumps - pre heating of boiler feed water - minimisation of boiler blowdown <p>The site is also Combine Heat and Power Quality Assurance (CHPQA) certified.</p> <p>The operator provided a copy of their Sustainability Plan which includes how the operator is improving sustainability on the site. The plan does refer to objectives for energy efficiency however, it does not provide sufficient detail on:</p> <ul style="list-style-type: none"> • defining and calculating the specific energy consumption of the activity (or activities) • setting key performance indicators on an annual basis (for example for the specific energy consumption)

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			<ul style="list-style-type: none"> planning periodic improvement targets and related actions <p>We have therefore included an improvement condition IC20 in the permit to achieve compliance. The operator is required to complete the improvement conditions and demonstrate compliance with the BAT Conclusions within 3 months of the variation being issued (see Annex 3).</p>
7	<p>Water and wastewater minimisation</p> <p>In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below.</p> <p>(a) water recycling and/or reuse (b) Optimisation of water flow (c) Optimisation of water nozzles and hoses (d) Segregation of water streams</p> <p>Techniques related to cleaning operations:</p> <p>(e) Dry cleaning (f) Pigging system for pipes (g) High-pressure cleaning (h) Optimisation of chemical dosing and water use in cleaning-in-place (CIP) (i) Low-pressure foam and/or gel cleaning (j) Optimised design and construction of equipment and process areas (k) Cleaning of equipment as soon as possible</p>	CC	<p>The operator has provided information to support compliance with BATc 7. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 7.</p> <p>The operator implements a combination of the following appropriate techniques to reduce water consumption and the volume of waste water discharged:</p> <p>(a) The operator provided information on how water is recycled and reused in various different ways on site. (b) The operator confirmed the flow of water within the refinery is carefully controlled so as to only add enough water to the raw sugar affination and crystallisation. This is to ensure that the sugar liquor is of the right consistency for crystallisation and that excess energy is not required to evaporate any excess water in the liquor. (e) The operator confirmed all ATEX rated areas within the refinery are dry-cleaned only. (f) Pigging systems are used at the refinery to transfer syrups for Specialty Liquids products. (h) Cleaning in Place (CIP) systems are used in liquid sugar areas only and uses water. (k) The site has a cleaning schedule to ensure effective cleaning of the process areas and equipment. Equipment are cleaned when the plant is not operational or during maintenance.</p>
8	<p>Prevent or reduce the use of harmful substances</p>	CC	<p>The operator has provided information to support compliance with BATc 8. We have assessed the</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<p>In order to prevent or reduce the use of harmful substances, e.g. in cleaning and disinfection, BAT is to use one or a combination of the techniques given below.</p> <ul style="list-style-type: none"> (a) Proper selection of cleaning chemicals and/or disinfectants (b) Reuse of cleaning chemicals in cleaning-in-place (CIP) (c) Dry cleaning (d) Optimised design and construction of equipment and process areas 		<p>information provided and we are satisfied that the operator has demonstrated compliance with BATc 8.</p> <p>The operator stated that they only uses food-safe chemicals. Any chemicals that could enter the drainage system are also biodegradable and assessed against Trade Effluent Discharge Consent.</p> <p>The operator confirmed they have appropriate assessment in place which reviews what chemicals are used for cleaning and disinfecting purposes on site.</p> <p>The operator also confirmed all ATEX rated areas within the refinery are dry-cleaned only.</p>
9	<p>Refrigerants</p> <p>In order to prevent emissions of ozone-depleting substances and of substances with a high global warming potential from cooling and freezing, BAT is to use refrigerants without ozone depletion potential and with a low global warming potential.</p>	NA	<p>We are satisfied that BATc 9 is not applicable to this Installation.</p> <p>No refrigerants are used in the sugar refining process.</p>
10	<p>Resource efficiency</p> <p>In order to increase resource efficiency, BAT is to use one or a combination of the techniques given below:</p> <ul style="list-style-type: none"> (a) Anaerobic digestion (b) Use of residues (c) Separation of residues (d) Recovery and reuse of residues from the pasteuriser (e) Phosphorus recovery as struvite (f) Use of waste water for land spreading 	CC	<p>The operator has provided information to support compliance with BATc 10. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 10.</p> <p>The operator implements a combination of the following appropriate techniques to increase resource efficiency:</p> <ul style="list-style-type: none"> a) Low brix sweetwater is sent offsite for anaerobic digestion. This reduces the volume of effluent to sewer. The low brix sweetwater is a good feed to the microbial activity required in the digesters. b) The refinery also diverts colour from effluent and creates a by-product colourant (T8000), which can be used in our products or sold as colourant. <p>The refinery produces calcium carbonate cake from its secondary filtration process. The cake can be used</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			as soil improvement or for brick making. The company has recently completed a project to reclassify the cake as a by-product.
11	<p>Waste water buffer storage In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water.</p>	FC	<p>The operator has provided information to support compliance with BATc 11. We have assessed the information provided and we are not satisfied that the operator has demonstrated compliance with BATc 11.</p> <p>The operator stated that the only water direct to river is non-contact cooling water - this is not a wastewater stream. However, BATc 11 is applicable to discharges to sewer, the operator confirmed they do not have buffer storage for the whole site. The Operator has confirmed that they have 4 small effluent tanks in the Utilities area but no means of storing effluent should the effluent require buffering prior to discharging to the sewer.</p> <p>The operator should have sufficient buffer storage capacity to minimize any uncontrolled emissions to water and/or sewer. The operator is required to complete a feasibility study on installing appropriate buffer storage to prevent the uncontrolled discharge of wastewater from site.</p> <p>We consider that the operator will be future compliant with BATc 11. Improvement condition IC28 has been included in the permit to achieve compliance (see Annex 3).</p>
12	<p>Emissions to water – treatment In order to reduce emissions to water, BAT is to use an appropriate combination of the techniques given below. Preliminary, primary and general treatment (a) Equalisation (b) Neutralisation (c) Physical separate (eg screens, sieves, primary settlement tanks etc) Aerobic and/or anaerobic treatment (secondary treatment) (d) Aerobic and/or anaerobic treatment (eg activated sludge, aerobic lagoon etc)</p>	CC	<p>The operator has provided information to support compliance with BATc 12. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 12.</p> <p>The operator carries out pH correction (neuralisation) at two locations on site where Sodium Hydroxide or Hydrochloric acid is dosed to pH correct prior to release into the refinery sewer system. These are not 'end of pipe' but address specific effluent flows that can produce</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement										
	(e) Nitrification and/or denitrification (f) Partial nitrification - anaerobic ammonium oxidation Phosphorus recovery and/or removal (g) Phosphorus recovery as struvite (h) Precipitation (i) Enhanced biological phosphorus removal Final solids removal (j) Coagulation and flocculation (k) Sedimentation (l) Filtration (eg sand filtration, microfiltration, ultrafiltration) (m) Flotation		<p>significant pH variations that may then cause consent issues at the point of discharge. Both pH correction facilities receive wastewater from batch processes, and some degree of self- neutralisation occurs to minimise chemical additions. The pH corrected wastewater flows into the refinery sewer systems and will mix with other flows prior to final discharge.</p> <p>Effluent is discharged to Trade Effluent (sewer) and is within consented limits given in the site Trade Effluent Consent.</p> <p>The only water direct to river is non-contact cooling water with thermal pick-up and does therefore not require treatment.</p>										
12	<p>Emissions to water – treatment BAT-associated emission levels (BAT-AELs) for direct emissions to a receiving water body</p> <table border="1" data-bbox="277 948 1088 1270"> <thead> <tr> <th data-bbox="277 948 627 1011">Parameter</th> <th data-bbox="627 948 1088 1011">BAT-AEL ⁽¹⁵⁾ ⁽¹⁶⁾ (daily average)</th> </tr> </thead> <tbody> <tr> <td data-bbox="277 1011 627 1075">Chemical oxygen demand (COD) ⁽¹⁷⁾ ⁽¹⁸⁾</td> <td data-bbox="627 1011 1088 1075">25-100 mg/l ⁽¹⁹⁾</td> </tr> <tr> <td data-bbox="277 1075 627 1139">Total suspended solids (TSS)</td> <td data-bbox="627 1075 1088 1139">4.50 mg/l ⁽²⁰⁾</td> </tr> <tr> <td data-bbox="277 1139 627 1203">Total nitrogen (TN)</td> <td data-bbox="627 1139 1088 1203">2-20 mg/l ⁽²¹⁾ ⁽²²⁾</td> </tr> <tr> <td data-bbox="277 1203 627 1267">Total phosphorus (TP)</td> <td data-bbox="627 1203 1088 1267">0,2-2 mg/l ⁽²³⁾</td> </tr> </tbody> </table>	Parameter	BAT-AEL ⁽¹⁵⁾ ⁽¹⁶⁾ (daily average)	Chemical oxygen demand (COD) ⁽¹⁷⁾ ⁽¹⁸⁾	25-100 mg/l ⁽¹⁹⁾	Total suspended solids (TSS)	4.50 mg/l ⁽²⁰⁾	Total nitrogen (TN)	2-20 mg/l ⁽²¹⁾ ⁽²²⁾	Total phosphorus (TP)	0,2-2 mg/l ⁽²³⁾	NA	<p>We are satisfied that BATE-AELs set out in BATc 12 are not applicable to this Installation.</p> <p>The process effluent from all water systems on site is discharged to foul sewer under a trade effluent consent by Thames Water, no direct discharges of process effluent to surface water.</p> <p>The operator has an abstraction licence, to utilise Thames River Water for cooling and condensing purposes and then returns the water back to the River Thames in compliance with permit discharge conditions (discharge point W1). This is not classified as process water therefore we are satisfied the BAT-AELs are not applicable.</p>
Parameter	BAT-AEL ⁽¹⁵⁾ ⁽¹⁶⁾ (daily average)												
Chemical oxygen demand (COD) ⁽¹⁷⁾ ⁽¹⁸⁾	25-100 mg/l ⁽¹⁹⁾												
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13	<p>Noise management plan In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to set up, implement and regularly review a noise management plan, as</p>	FC	<p>The site has had recent noise issues, the regulator officer has requested a Noise Management Plan (NMP) be produced for the site. This plan should be in line with BATc 13.</p>										

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<p>part of the environmental management system (see BAT 1), that includes all of the following elements:</p> <ul style="list-style-type: none"> - a protocol containing actions and timelines; - a protocol for conducting noise emissions monitoring; - a protocol for response to identified noise events, eg complaints; - a noise reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures. 		<p>We consider that the operator will be future compliant with BATc 13. Improvement condition IC21 has been included in the permit to achieve compliance (see Annex 3).</p>
14	<p>Noise management</p> <p>In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below.</p> <ul style="list-style-type: none"> (a) Appropriate location of equipment and buildings (b) Operational measures (c) Low-noise equipment (d) Noise control equipment (e) Noise abatement 	CC	<p>The operator has provided information to support compliance with BATc 14. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 14.</p> <p>The operator implements a combination of appropriate techniques as set out in BAT to reduce noise emissions, these are a few examples of the techniques:</p> <p>Appropriate location of equipment and buildings. The operator ensures noise generating equipment, such as the agglomerator, is positioned such that any noise is emitted away from neighbouring receptors.</p> <p>Operational Measures. The majority of processes and activities are housed within buildings and/or enclosures which provide noise attenuation. Exhaust stacks are located at centre of the refinery, increasing the distance away from noise sensitive receptors.</p> <p>Noise Attenuation. The Refinery has a number of steam vents, which operate automatically whenever the pressure in the s system reaches a high setpoint. The Boiler Operators control such noise emissions by cascading the pressure down through reducing and let down valves to the 0.7 bar steam mains, and to relieve the pressure through the silenced valves, this reducing any potential noise impact.</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			<p>The site also has a non-conformity procedure. This procedure describes how the site manages its non-conformities, including noise complaints. Any noise complaints received directly or via the Environment Agency is investigated immediately and actions taken to eliminate or reduce the noise impact.</p>
15	<p>Odour Management</p> <p>In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:</p> <ul style="list-style-type: none"> - a protocol containing actions and timelines; - a protocol for conducting odour monitoring. - a protocol for response to identified odour incidents eg complaints; - an odour prevention and reduction programme designed to identify the source(s); to measure/estimate odour exposure: to characterise the contributions of the sources; and to implement prevention and/or reduction measures. 	NA	<p>We are satisfied that BATc 15 is not applicable to this Installation.</p> <p>BATc 15 is only applicable to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated. No odour complaints have been received at the Thames Refinery over the last 5 years and has not had any historic issues associated with odour so is not currently required to have an odour management plan.</p>
SUGAR MANUFACTURING SECTOR BAT CONCLUSIONS (BAT 35 – 37)			
35	<p>Energy efficiency</p> <p>In order to increase energy efficiency, BAT is to use an appropriate combination of the techniques specified in BAT 6 and of the techniques given below:</p>	CC	<p>The operator has provided information to support compliance with BATc 35. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 35.</p> <p>The techniques described in BAT 35 are focused mainly on the sugar beet industry. The Thames Refinery manufactures sugar from the processing of sugar cane. The only technique described in BATc35 is (d) recycling of hot gases.</p> <p>The site does recycle hot gases as the site uses heat exchanges in the boiler house.</p>

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																		
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(e) Low-temperature (pre)drying of beet pulp	Direct (pre)drying of beet pulp using drying gas, e.g. air or hot gas.																				
36	<p>In order to prevent or reduce channelled dust emissions to air from beet pulp drying, BAT is to use one or a combination of the techniques given below:</p> <table border="1" data-bbox="309 919 1193 1315"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>(a) Use of gaseous fuels</td> <td rowspan="3">See Section 14.2.</td> <td>May not be applicable due to the constraints associated with the availability of gaseous fuels.</td> </tr> <tr> <td>(b) Cyclone</td> <td rowspan="2">Generally applicable.</td> </tr> <tr> <td>(c) Wet scrubber</td> </tr> <tr> <td>(d) Indirect drying (steam drying) of beet pulp</td> <td>See BAT 35b.</td> <td>May not be applicable to existing plants due to the need for a complete reconstruction of the energy facilities.</td> </tr> <tr> <td>(e) Solar drying of beet pulp</td> <td>See BAT 35c.</td> <td>May not be applicable due to local climatic conditions and/or lack of space.</td> </tr> <tr> <td>(f) Low-temperature (pre)drying of beet pulp</td> <td>See BAT 35e.</td> <td>Generally applicable.</td> </tr> </tbody> </table> <p>The associated monitoring is given in BAT 5.</p>	Technique	Description	Applicability	(a) Use of gaseous fuels	See Section 14.2.	May not be applicable due to the constraints associated with the availability of gaseous fuels.	(b) Cyclone	Generally applicable.	(c) Wet scrubber	(d) Indirect drying (steam drying) of beet pulp	See BAT 35b.	May not be applicable to existing plants due to the need for a complete reconstruction of the energy facilities.	(e) Solar drying of beet pulp	See BAT 35c.	May not be applicable due to local climatic conditions and/or lack of space.	(f) Low-temperature (pre)drying of beet pulp	See BAT 35e.	Generally applicable.	NA	<p>We are satisfied that BATc 36 is not applicable to this Installation.</p> <p>The techniques described in BAT 36 are focused on the sugar beet industry. The Thames Refinery manufactures sugar from the processing of sugar cane.</p> <p>However, the site has wet scrubbers (rotoclones) and bag filters in use, where there are relevant channelled emissions to air which may contain particulates.</p>
Technique	Description	Applicability																			
(a) Use of gaseous fuels	See Section 14.2.	May not be applicable due to the constraints associated with the availability of gaseous fuels.																			
(b) Cyclone		Generally applicable.																			
(c) Wet scrubber																					
(d) Indirect drying (steam drying) of beet pulp	See BAT 35b.	May not be applicable to existing plants due to the need for a complete reconstruction of the energy facilities.																			
(e) Solar drying of beet pulp	See BAT 35c.	May not be applicable due to local climatic conditions and/or lack of space.																			
(f) Low-temperature (pre)drying of beet pulp	See BAT 35e.	Generally applicable.																			

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement						
36	BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from beet pulp drying in the case of high-temperature drying (above 500 °C).	NA	<p>We are satisfied that the BAT-AELs set out in BATc 36 are not applicable to this Installation.</p> <p>The BAT-AELs are only applicable to channelled dust emissions to air from beet pulp drying. The Thames Refinery manufactures sugar from the processing of sugar cane, and does not process beet sugar.</p>						
37	In order to reduce channelled SOX emissions to air from high-temperature beet pulp drying (above 500 °C), BAT is to use one or a combination of the techniques.	NA	<p>We are satisfied that BATc 37 is not applicable to this Installation.</p> <p>The techniques described in BAT 37 are focused on the beet sugar industry. The Thames Refinery manufactures sugar from the processing of sugar cane.</p>						
37	BAT-associated emission level (BAT-AEL) for channelled SOX emissions to air from beet pulp drying in the case of high-temperature drying (above 500 °C) when natural gas is not used.	NA	<p>We are satisfied that the BAT-AELs set out in BATc 37 are not applicable to this Installation.</p> <p>The BAT-AELs are only applicable to channelled dust emissions to air from beet pulp drying. The Thames Refinery manufactures sugar from the processing of sugar cane, and does not process beet sugar.</p>						
Sugar Manufacturing Environmental Performance Levels									
E P L	<p style="text-align: center;"><i>Table 28</i></p> <p style="text-align: center;">Indicative environmental performance level for specific energy consumption</p> <table border="1" data-bbox="309 1257 1167 1366"> <thead> <tr> <th>Specific process</th> <th>Unit</th> <th>Specific energy consumption (yearly average)</th> </tr> </thead> <tbody> <tr> <td>Sugar beet processing</td> <td>MWh/tonne of beets</td> <td>0,15-0,40 ⁽¹⁾</td> </tr> </tbody> </table> <p>⁽¹⁾ The upper end of the range may include the energy consumption of the lime kilns and dryers.</p>	Specific process	Unit	Specific energy consumption (yearly average)	Sugar beet processing	MWh/tonne of beets	0,15-0,40 ⁽¹⁾	NA	<p>We are satisfied that the environmental performance levels (EPL) for specific energy consumption is not applicable to this Installation.</p> <p>The BAT-EPL is only applicable to sugar beet processing. The Thames Refinery manufactures sugar from the processing of sugar cane only.</p>
Specific process	Unit	Specific energy consumption (yearly average)							
Sugar beet processing	MWh/tonne of beets	0,15-0,40 ⁽¹⁾							

BATC No.	Summary of BAT Conclusion requirement for Food, Drink and Milk Industries	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement						
EPL	<p>13.2. Water consumption and waste water discharge</p> <p>General techniques to reduce water consumption and the volume of waste water discharged are given in Section 1.4 of these BAT conclusions. The indicative environmental performance level is presented in the table below.</p> <p style="text-align: center;"><i>Table 29</i></p> <p style="text-align: center;">Indicative environmental performance level for specific waste water discharge</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Specific process</th> <th style="width: 33%;">Unit</th> <th style="width: 33%;">Specific waste water discharge (yearly average)</th> </tr> </thead> <tbody> <tr> <td>Sugar beet processing</td> <td>m³/tonne of beets</td> <td>0,5-1,0</td> </tr> </tbody> </table>	Specific process	Unit	Specific waste water discharge (yearly average)	Sugar beet processing	m ³ /tonne of beets	0,5-1,0	NA	<p>We are satisfied that the environmental performance levels (EPL) for specific waste water discharge is not applicable to this Installation.</p> <p>The BAT-EPL is only applicable to sugar beet processing The Thames Refinery manufactures sugar from the processing of sugar cane only.</p>
Specific process	Unit	Specific waste water discharge (yearly average)							
Sugar beet processing	m ³ /tonne of beets	0,5-1,0							

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
General			
1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the features listed in the BATc document.	CC	<p>The operator has provided information to support compliance with BATc 1. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 1.</p> <p>The operator has a EMS in place which incorporates the requirements of BATc1.</p>
2	BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each	FC	For LCP emission points A1, A2 and A3 we have retained flue gas monitoring for oxygen content, temperature, pressure and water vapour content in line with BAT2. Stack gas volume flow

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement												
	<p>modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>		<p>monitoring has been added in line with key monitoring requirements in BAT2.</p> <p>The operator is currently upgrading the LCP to dry low emissions technology therefore, we have included an improvement condition to ensure testing in line with LCP-BAT2 is complete after commission.</p> <p>We consider that the operator will be future compliant with LCP-BAT2. Improvement condition IC22 has been included in the permit to achieve compliance (see Annex 3).</p>												
3	<p>BAT is to monitor key process parameters relevant for emissions to air and water including those given below.</p> <table border="1" data-bbox="327 815 1249 1114"> <thead> <tr> <th>Stream</th> <th>Parameter(s)</th> <th>Monitoring</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Flue-gas</td> <td>Flow</td> <td>Periodic or continuous determination</td> </tr> <tr> <td>Oxygen content, temperature, and pressure</td> <td rowspan="2">Periodic or continuous measurement</td> </tr> <tr> <td>Water vapour content ⁽³⁾</td> </tr> <tr> <td>Wastewater from flue-gas treatment</td> <td>Flow, pH, and temperature</td> <td>Continuous measurement</td> </tr> </tbody> </table>	Stream	Parameter(s)	Monitoring	Flue-gas	Flow	Periodic or continuous determination	Oxygen content, temperature, and pressure	Periodic or continuous measurement	Water vapour content ⁽³⁾	Wastewater from flue-gas treatment	Flow, pH, and temperature	Continuous measurement	FC	<p>The operator monitors key flue-gas parameters listed in BAT3 with the exception of mass flow. There are monitored using MCERTs instruments to ISO14181.</p> <p>The operator has confirmed that mass flow has been done on a periodic basis during QAL2 and AST, however, the equipment installed is legacy equipment and does not meet current standards. The operator has proposed to fit MCERT flue gas flow measurement instruments to allow accurate continuous monitoring.</p> <p>We have included an improvement condition IC23 to ensure the operator is compliant with LCP-BAT3 (see Annex 3).</p>
Stream	Parameter(s)	Monitoring													
Flue-gas	Flow	Periodic or continuous determination													
	Oxygen content, temperature, and pressure	Periodic or continuous measurement													
	Water vapour content ⁽³⁾														
Wastewater from flue-gas treatment	Flow, pH, and temperature	Continuous measurement													
4	<p>BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>	CC	<p>The operator has provided information to support compliance with BATc 4. We have assessed the information provided and we are</p>												

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			<p>satisfied that the operator has demonstrated compliance with BATc 4.</p> <p>The recent replacement of the Thames Refinery CEMS, subsequent QAL2s, and ongoing QAL3 process means that the CEMS deployed at the site are modern and suitable and sufficient to meet BAT4.</p> <p>The operator has proposed that AST testing on gas oil will be undertaken when there is a prolonged spell of fuel oil firing (such as greater than 10 days) and where this can be arranged within the gas oil firing window of operation.</p> <p>The operator has four Continuous Emissions Monitors (CEMS) installed at Thames Refinery that will analyse for NOx and CO. These are installed on the flues from the Aalborg boilers 1 & 2, on the flue from the waste heat boiler for CCGT and FD operation, and on the bypass flue from the GT to capture open cycle running where the plant does not exhaust through the WHB.</p> <p>This means that continuous NOx and CO monitoring to EN 14181, as required by BAT4, are routinely undertaken when firing natural gas or gas oil.</p>
5	<p>BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>	NA	<p>We are satisfied that the requirements of the BATc5 are not applicable.</p> <p>The Operator does not undertake flue gas treatment, therefore there is no discharge to water.</p>

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																							
6	<p>In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.</p> <table border="1" data-bbox="331 483 1245 1441"> <thead> <tr> <th data-bbox="331 483 383 523"></th> <th data-bbox="383 483 555 523">Technique</th> <th data-bbox="555 483 902 523">Description</th> <th data-bbox="902 483 1245 523">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 523 383 687">a.</td> <td data-bbox="383 523 555 687">Fuel blending and mixing</td> <td data-bbox="555 523 902 687">Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td> <td data-bbox="902 523 1245 687" rowspan="2">Generally applicable</td> </tr> <tr> <td data-bbox="331 687 383 823">b.</td> <td data-bbox="383 687 555 823">Maintenance of the combustion system</td> <td data-bbox="555 687 902 823">Regular planned maintenance according to suppliers' recommendations</td> </tr> <tr> <td data-bbox="331 823 383 1018">c.</td> <td data-bbox="383 823 555 1018">Advanced control system</td> <td data-bbox="555 823 902 1018">See description in Section 8.1</td> <td data-bbox="902 823 1245 1018">The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td> </tr> <tr> <td data-bbox="331 1018 383 1153">d.</td> <td data-bbox="383 1018 555 1153">Good design of the combustion equipment</td> <td data-bbox="555 1018 902 1153">Good design of furnace, combustion chambers, burners and associated devices</td> <td data-bbox="902 1018 1245 1153">Generally applicable to new combustion plants</td> </tr> <tr> <td data-bbox="331 1153 383 1441">e.</td> <td data-bbox="383 1153 555 1441">Fuel choice</td> <td data-bbox="555 1153 902 1441">Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used</td> <td data-bbox="902 1153 1245 1441">Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's</td> </tr> </tbody> </table>		Technique	Description	Applicability	a.	Fuel blending and mixing	Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type	Generally applicable	b.	Maintenance of the combustion system	Regular planned maintenance according to suppliers' recommendations	c.	Advanced control system	See description in Section 8.1	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system	d.	Good design of the combustion equipment	Good design of furnace, combustion chambers, burners and associated devices	Generally applicable to new combustion plants	e.	Fuel choice	Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used	Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's	CC	<p>The operator has provided information to support compliance with the BATc 6. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 6.</p> <p>The operator has addressed the techniques in BATc6 to determine which are appropriate to utilise to improve the general environmental performance of its combustion plant and to reduce emissions to air of CO:</p> <ol style="list-style-type: none"> There is little scope for fuel blending or mixing based on the available fuels at Thames – natural gas and gas oil. The burners/pokers are optimised to ensure atomisation/mixing with air at the point of combustion. There are numerous planned maintenance PM routines for the ongoing maintenance of the Thames LCP and these are documented within sites action plan, the computerised maintenance management system (CMMS) for the site. The boiler control systems are relatively basic, with combustion ratios that the instrumentation will follow, maintaining set-point pressure by varying fuel supply and controlling air flow to maintain the ratio, whilst erring on the side of lean combustion as the plant ramps up or down in line with site steam demand. In addition, the Aalborgs (LCP292) have an O₂ bias that ensures leaner combustion when operating in such a
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BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement				
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			<p>fuel balance in the case of combustion of industrial process fuels. For existing combustion plants, the type of fuel chosen may be limited by the configuration and the design of the plant</p>				
7	<p>In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_x emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_x ratio, homogeneous reagent distribution and optimum size of the reagent drops)</p>	NA	<p>We are satisfied that the requirements of the BATc7 are not applicable.</p> <p>As the site does not use selective catalytic/non-catalytic reduction for abatemet.</p>				
8	<p>In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.</p>	CC	<p>The operator has provided information to support compliance with the BATc 8. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 8.</p> <p>LCP 393 Asset: No.5 Gas Turbine Generator abatement system includes – Wet Low Emission (WLE) technology and DLE to reduce thermal NO_x generation.</p>				

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			<p>Steam is introduced to the turbine via a spray ring with 8 inlets spaced radially leading to the combustion chamber spray nozzles. The steam presence in the combustion zone will reduce/ dilute the combustion temperature which in turn reduces the formation of NOx compounds.</p> <p>The turbine is run at fixed load (at maximum combustion temperature) with the fuel to steam ratio balanced to achieve an optimum combustion temperature that will reduce NOx formation without eliciting incomplete combustion (and subsequent high CO formation).</p> <p>The GT has been upgraded via a Dry Low Emissions (DLE) core, the operator confirmed this was installed as of 31/03/2024. This will benefit operation by removing the need for steam supply and therefore also abating emissions when the GT is run in open cycle.</p> <p>LCP 393 Asset: No.3 WHRB does not have abatement as the GT emissions are abated, and with optimised combustion process generates CO and NOx within BAT AELs without further abatement.</p> <p>LCP392 No.1 and No.2 Aalborg Boilers do not have abatement as the optimised combustion process generates CO and NOx within BAT AELs without further abatement.</p>
9	In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1):	CC	The operator has provided information to support compliance with the BATc 9. We have assessed the information provided and we are

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement				
	<p>(i) Initial full characterisation of the fuel used including at least the parameters listed below and in accordance with EN standards. ISO, national or other international standards may be used provided they ensure the provision of data of an equivalent scientific quality;</p> <p>(ii) Regular testing of the fuel quality to check that it is consistent with the initial characterisation and according to the plant design specifications. The frequency of testing and the parameters chosen from the table below are based on the variability of the fuel and an assessment of the relevance of pollutant releases (e.g. concentration in fuel, flue-gas treatment employed);</p> <p>(iii) Subsequent adjustment of the plant settings as and when needed and practicable (e.g. integration of the fuel characterisation and control in the advanced control system (see description in Section 8.1)).</p> <p>Description Initial characterisation and regular testing of the fuel can be performed by the operator and/or the fuel supplier. If performed by the supplier, the full results are provided to the operator in the form of a product (fuel) supplier specification and/or guarantee.</p> <table border="1" data-bbox="322 882 1254 1050"> <thead> <tr> <th data-bbox="322 882 622 954">Fuel(s)</th> <th data-bbox="622 882 1254 954">Substances/Parameters subject to characterisation</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 954 622 1050">Natural gas</td> <td data-bbox="622 954 1254 1050"> <ul style="list-style-type: none"> — LHV — CH₄, C₂H₆, C₃, C₄₊, CO₂, N₂, Wobbe index </td> </tr> </tbody> </table>	Fuel(s)	Substances/Parameters subject to characterisation	Natural gas	<ul style="list-style-type: none"> — LHV — CH₄, C₂H₆, C₃, C₄₊, CO₂, N₂, Wobbe index 		<p>satisfied that the operator has demonstrated compliance with the BATc 9.</p> <p>The boilers and gas turbine use mainly natural gas but are also permitted to use diesel (gasoil). The boilers and gas turbine have specific fuel quality that needs to be adhered to for optimum Performance.</p> <p>Natural gas is supplied to site through National Grid gas network, and nothing can be done to alter supply, although quality is monitored. The natural gas is sampled monthly and analysed by a UKAS accredited lab to BS EN ISO 17025 standard. The report provides the components of the gas, the NCV and GCV, nitrogen and superior Wobbe index. This is an important part of the sites UK ETS protocols.</p> <p>The diesel is characterised by the Supplier, using BS EN 590 standard. The characterisation includes ash content, carbon residue and sulphur content. The operator has confirmed the supplier gasoil testing does not currently cover N content but they have confirmed this will be requested in future.</p> <p>The operator has also confirmed the process will also be started to test the stored gasoil on a low frequency but routine basis, to assess fuel quality and potential degradation within storage, should this occur. This testing will be used to cover all.</p>
Fuel(s)	Substances/Parameters subject to characterisation						
Natural gas	<ul style="list-style-type: none"> — LHV — CH₄, C₂H₆, C₃, C₄₊, CO₂, N₂, Wobbe index 						
10	In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1),	CC	The operator has provided information to support compliance with the BATc 10. We have assessed the information provided and we are				

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<p>commensurate with the relevance of potential pollutant releases, that includes the following elements:</p> <ul style="list-style-type: none"> — appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and shutdown loads for stable generation in gas turbines), — set-up and implementation of a specific preventive maintenance plan for these relevant systems, — review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary, — periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary. 		<p>satisfied that the operator has demonstrated compliance with the BATc 10.</p> <p>The operator has confirmed the plant does operate in OTNOC due to:</p> <ul style="list-style-type: none"> - Routine weekly LCP start-up (SU) and shut-down (SD) - Steam demand/usage fluctuation due to upset from the process - Mechanical issues - Instrumentation issues - Testing <p>The Thames Refinery normally operates the refining process 5 days a week. The boilers are under OTNOC mainly during start-up, at the beginning of the week (Sunday evening/Monday morning), and shut-down for the weekend (Friday evening/Saturday morning).</p> <p>The operator has a LCP SU/SD procedure to ensure that these processes are undertaken in a way that minimises OTNOC due to SU/SD. The operator has confirmed and periods of OTNOC will be logged within the site EMS nonconformity procedure so that these can be tracked, investigated, and corrective actions applied as required.</p>
11	<p>BAT is to appropriately monitor emissions to air and/or to water during OTNOC.</p> <p>Description</p> <p>The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.</p>	CC	<p>The operator has provided information to support compliance with the BATc 11. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 11.</p> <p>Emissions to air are monitored on a continuous basis with the sites installed CEMS on the LCP</p>

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement														
			will continue measurement during OTNOC unless the emissions go out of the range of these instruments. OTNOC at Thames is primarily from SU/SD and emissions for this period are recoded by the CEMS. The operator has confirmed an Envirosoft report of pertinent CEM data is required to routinely provide SU/SD data and other OTNOC emission data.														
12	<p>In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated $\geq 1\,500$ h/yr, BAT is to use an appropriate combination of the techniques given below.</p> <table border="1" data-bbox="322 663 1254 1430"> <thead> <tr> <th data-bbox="322 663 367 703"></th> <th data-bbox="367 663 562 703">Technique</th> <th data-bbox="562 663 911 703">Description</th> <th data-bbox="911 663 1254 703">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 703 367 954">a.</td> <td data-bbox="367 703 562 954">Combustion optimisation</td> <td data-bbox="562 703 911 954">See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues</td> <td data-bbox="911 703 1254 954" rowspan="3">Generally applicable</td> </tr> <tr> <td data-bbox="322 954 367 1289">b.</td> <td data-bbox="367 954 562 1289">Optimisation of the working medium conditions</td> <td data-bbox="562 954 911 1289">Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO_x emissions or the characteristics of energy demanded</td> </tr> <tr> <td data-bbox="322 1289 367 1430">c.</td> <td data-bbox="367 1289 562 1430">Optimisation of the steam cycle</td> <td data-bbox="562 1289 911 1430">Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the</td> </tr> </tbody> </table>		Technique	Description	Applicability	a.	Combustion optimisation	See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues	Generally applicable	b.	Optimisation of the working medium conditions	Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO _x emissions or the characteristics of energy demanded	c.	Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the	CC	<p>The operator has provided information to support compliance with the BATc 12. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 12.</p> <p>The Operator employs the following techniques:</p> <ul style="list-style-type: none"> • monitoring of emissions and plant status coupled with alarms and operator response procedures ensure that combustion is optimised within the control systems installed. • Thames operate a backpressure type steam turbine at the lowest exhaust pressure set point manageable by the equipment (in terms of blading stress) and the lowest pressure manageable by steam distribution network. • A boiler overhaul plan reinstatement has started to minimise losses due to drain valves and non-operational steam traps. • A project has been initiated to investigate VFDs of boiler FD fans and potentially the boiler feed-water pumps. • Hot well feed water temperatures have been boosted using reclaimed heat from process unit's in-lieu of direct steam injection.
	Technique	Description	Applicability														
a.	Combustion optimisation	See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues	Generally applicable														
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		condenser cooling water, within the design conditions			<ul style="list-style-type: none"> Investigation ongoing to improve locking in energy during shutdown periods to reduce energy required for LCP restart. Feed-water is pre-heated using recovered heat from the process, and feed water is approx. 78 degrees Celsius prior to de-aeration. Recovered heat is in the form of low-grade vapour from evaporated process streams. The LCP includes co-gen with the exhaust from the gas turbine routed via the fired waste heat boiler, so that this heat is used to generate steam. This is an integral part of the Thames LCP and is the basis of the site CHP plant.
d.	Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)			
e.	Preheating of combustion air	Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion	Generally applicable within the constraints related to the need to control NO _x emissions		
f.	Fuel preheating	Preheating of fuel using recovered heat	Generally applicable within the constraints associated with the boiler design and the need to control NO _x emissions		
g.	Advanced control system	See description in Section 8.2. Computerised control of the main combustion parameters enables the combustion efficiency to be improved	Generally applicable to new units. The applicability to old units may be constrained by the need to retrofit the combustion system and/or control command system		
h.	Feed-water preheating using recovered heat	Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler	Only applicable to steam circuits and not to hot boilers. Applicability to existing units may be limited due to constraints associated with the plant configuration and the amount of recoverable heat		

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	i.	Heat recovery by cogeneration (CHP)	Recovery of heat (mainly from the steam system) for producing hot water/steam to be used in industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: <ul style="list-style-type: none"> — flue-gas — grate cooling — circulating fluidised bed 	Applicable within the constraints associated with the local heat and power demand. The applicability may be limited in the case of gas compressors with an unpredictable operational heat profile		
	j.	CHP readiness	See description in Section 8.2.	Only applicable to new units where there is a realistic potential for the future use of heat in the vicinity of the unit		
	k.	Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat		
	l.	Heat accumulation	Heat accumulation storage in CHP mode	Only applicable to CHP plants. The applicability may be limited in the case of low heat load demand		
	m.	Wet stack	See description in Section 8.2.	Generally applicable to new and existing units fitted with wet FGD		

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	n.	Cooling tower discharge	The release of emissions to air through a cooling tower and not via a dedicated stack	Only applicable to units fitted with wet FGD where reheating of the flue-gas is necessary before release, and where the unit cooling system is a cooling tower	
	o.	Fuel pre-drying	The reduction of fuel moisture content before combustion to improve combustion conditions	Applicable to the combustion of biomass and/or peat within the constraints associated with spontaneous combustion risks (e.g. the moisture content of peat is kept above 40 % throughout the delivery chain). The retrofit of existing plants may be restricted by the extra calorific value that can be obtained from the drying operation and by the limited retrofit possibilities offered by some boiler designs or plant configurations	
	p.	Minimisation of heat losses	Minimising residual heat losses, e.g. those that occur via the slag or those that can be reduced by insulating radiating sources	Only applicable to solid-fuel-fired combustion units and to gasification/IGCC units	
	q.	Advanced materials	Use of advanced materials proven to be capable of withstanding high operating temperatures and pressures and thus to achieve	Only applicable to new plants	

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			increased steam/combustion process efficiencies		
	r.	Steam turbine upgrades	This includes techniques such as increasing the temperature and pressure of medium-pressure steam, addition of a low-pressure turbine, and modifications to the geometry of the turbine rotor blades	The applicability may be restricted by demand, steam conditions and/or limited plant lifetime	
	s.	Supercritical and ultra-supercritical steam conditions	Use of a steam circuit, including steam reheating systems, in which steam can reach pressures above 220,6 bar and temperatures above 374 °C in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions	Only applicable to new units of $\geq 600 \text{ MW}_{\text{th}}$ operated $> 4\,000 \text{ h/yr.}$ Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries. Not applicable to gas turbines and engines generating steam in CHP mode. For units combusting biomass, the applicability may be constrained by high-temperature corrosion in the case of certain biomasses	
13	In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques given below.			CC	The operator has provided information to support compliance with the BATc 13. We have assessed the information provided and we are
Technique	Description	Applicability			

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	a.	Water recycling	Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant	Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present		<p>satisfied that the operator has demonstrated compliance with the BATc 13.</p> <p>Dry bottom ash handling is not applicable as the site does not use solid fuels.</p> <p>The operator has stated that opportunities across the site will be considered for the collection of surface water run-off, and this may include the LCP area. However, the operator has confirmed the residual aqueous streams from the LCP are negligible and where these do exist in the form of blowdown they are too poor quality for re-use. The level of wastewater from the LCP is negligible in comparison to the sites overall water use. We are satisfied the operator cannot implement water recycling in the LCP aspect of the site but that they are implementing BAT in the FDM processing in relation to water and wastewater minimisation.</p>
14	b.	Dry bottom ash handling	Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.	Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants	CC	<p>The operator has provided information to support compliance with the BATc 14. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 14.</p> <p>Boiler blowdown is the primary wastewater generated by the LCP. Water is not used in any LCP abatement. Surface water run-off from the LCP area is routed to the site trade effluent drainage system. Cooling water is not used in the LCP process, with cooling duties around the site is required for the sugar refining process.</p>

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement						
			There are minimal wastewater streams from the LCP, boiler blowdown is the primary wastewater generated by the LCP which is sent to sewer via a trade effluent consent.						
15	In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given, and to use secondary techniques as close as possible to the source in order to avoid dilution.	NA	We are satisfied that the requirements of the BATc15 are not applicable. The site does not carry out any flue-gas treatment						
16	In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking: (a) waste prevention, e.g. maximise the proportion of residues which arise as by-products; (b) waste preparation for reuse, e.g. according to the specific requested quality criteria; (c) waste recycling; (d) other waste recovery (e.g. energy recovery), by implementing an appropriate combination of techniques.	NA	We are satisfied that the requirements of the BATc16 are not applicable. The site does not carry out any flue-gas treatment						
17	<p>In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.</p> <table border="1" data-bbox="322 1102 1254 1436"> <thead> <tr> <th data-bbox="322 1102 555 1142">Technique</th> <th data-bbox="555 1102 945 1142">Description</th> <th data-bbox="945 1102 1254 1142">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1142 555 1436">a. Operational measures</td> <td data-bbox="555 1142 945 1436"> These include: — improved inspection and maintenance of equipment — closing of doors and windows of enclosed areas, if possible — equipment operated by experienced staff </td> <td data-bbox="945 1142 1254 1436">Generally applicable</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Operational measures	These include: — improved inspection and maintenance of equipment — closing of doors and windows of enclosed areas, if possible — equipment operated by experienced staff	Generally applicable	CC	<p>The operator has provided information to support compliance with the BATc 17. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 17.</p> <p>The operator implements the following operational techniques to reduce noise emissions:</p> <ul style="list-style-type: none"> - Planned, routine inspection and maintenance of equipment
Technique	Description	Applicability							
a. Operational measures	These include: — improved inspection and maintenance of equipment — closing of doors and windows of enclosed areas, if possible — equipment operated by experienced staff	Generally applicable							

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		<ul style="list-style-type: none"> — avoidance of noisy activities at night, if possible — provisions for noise control during maintenance activities 			<ul style="list-style-type: none"> - Closing of doors and windows of enclosed areas - Equipment operated by experienced staff in a way to prevent issues that may generate additional noise - Avoidance of noisy activities at night, wherever possible through work planning - Provisions for noise control during maintenance activities - Planned maintenance of critical equipment to ensure continued good operation - Switching off equipment when not in use or not needed - Identifying and reporting leaks (e.g compressed air, steam), or other process indicators that may result in equipment failure etc. - Requesting maintenance on equipment where wear and tear could result in increased noise generation, such as bearings. <p>For onsite steam distribution systems, good operation and maintenance of the system is important, and includes:</p> <ul style="list-style-type: none"> - Controls to ensure that the system is balanced to avoid pressure swings that may result in steam venting or process trips, which then may - Ensuring that steam traps operate correctly; - Insulation is installed and maintained; - Leaks are detected and dealt with systematically; - Planned maintenance is carried; and - Optimising the distribution systems to eliminate unused lines.
	b. Low-noise equipment	This potentially includes compressors, pumps and disks	Generally applicable when the equipment is new or replaced		
	c. Noise attenuation	Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings	Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space		
	d. Noise-control equipment	This includes: <ul style="list-style-type: none"> — noise-reducers — equipment insulation — enclosure of noisy equipment — soundproofing of buildings 	The applicability may be restricted by lack of space		
	e. Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens	Generally applicable to new plant		

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																		
			<p>The site also has Noise Attenuation in place including steam vents, which operate automatically whenever the pressure in the system reaches a high setpoint.</p> <p>The operator ensures equipment is appropriate located to minimise noise emissions.</p> <p>The operator also has a non-conformity procedure in place which describes how the site manages its non-conformities, including noise complaints. Any noise complaints received directly or via the Environment Agency is investigated immediately and actions taken to eliminate or reduce the noise impact</p>																		
Combustion of solid biomass and/ or peat																					
24 – 27	BAT conclusions applicable to LCP which combust solid biomass and/ or peat.	NA	BAT24 – 27 are not applicable to the site.																		
Combustion of liquid fuels																					
Table 13	<p>BAT-associated energy efficiency levels (BAT-AEELs) for HFO and/or gas oil combustion in boilers</p> <table border="1" data-bbox="327 1214 1249 1401"> <thead> <tr> <th data-bbox="327 1214 524 1326" rowspan="3">Type of combustion unit</th> <th colspan="4" data-bbox="524 1214 1249 1257">BAT-AEELs ⁽⁹⁹⁾ ⁽¹⁰⁰⁾</th> </tr> <tr> <th colspan="2" data-bbox="524 1257 875 1326">Net electrical efficiency (%)</th> <th colspan="2" data-bbox="875 1257 1249 1326">Net total fuel utilisation (%) ⁽¹⁰¹⁾</th> </tr> <tr> <th data-bbox="524 1326 703 1401">New unit</th> <th data-bbox="703 1326 875 1401">Existing unit</th> <th data-bbox="875 1326 1068 1401">New unit</th> <th data-bbox="1068 1326 1249 1401">Existing unit</th> </tr> </thead> <tbody> <tr> <td data-bbox="327 1401 524 1406"></td> <td data-bbox="524 1401 703 1406"></td> <td data-bbox="703 1401 875 1406"></td> <td data-bbox="875 1401 1068 1406"></td> <td data-bbox="1068 1401 1249 1406"></td> </tr> </tbody> </table>	Type of combustion unit	BAT-AEELs ⁽⁹⁹⁾ ⁽¹⁰⁰⁾				Net electrical efficiency (%)		Net total fuel utilisation (%) ⁽¹⁰¹⁾		New unit	Existing unit	New unit	Existing unit						NA	The BAT-AEELs in table 13 are not applicable as the boiler LCP392's are limited to fire on gas oil for <1500 hours per year, therefore, in accordance with note 99 of the BATc the BAT-AEELs are not applicable.
Type of combustion unit	BAT-AEELs ⁽⁹⁹⁾ ⁽¹⁰⁰⁾																				
	Net electrical efficiency (%)		Net total fuel utilisation (%) ⁽¹⁰¹⁾																		
	New unit	Existing unit	New unit	Existing unit																	

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant					Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	HFO- and/or gas-oil-fired boiler	> 36,4	35,6–37,4	80–96	80–96		
28	In order to prevent or reduce NO _x emissions to air while limiting CO emissions to air from the combustion of HFO and/or gas oil in boilers, BAT is to use one or a combination of the techniques given below.					CC	<p>The Aalborg Boilers can be fired on gas oil as the burners were modified in 2016 when the low NO_x upgrade was done for gas firing.</p> <p>The operator has stated that techniques a-h cannot be applied to this older equipment. However, the operator only operates the Aalborg Boilers with gas oil as fuel during periods of gas supply interruption, they are limited to fire on gas oil to <1500 hours per year. Therefore technique i. fuel choice is considered to be compliant.</p> <p>The yearly average NO_x BAT-AELs do not apply to existing plant which operate on gas oil for <1500 hours per year.</p> <p>We have included the daily mean NO_x ELV for LCP392 Aalborg Boilers (emission point A1) when fuelled on gas oil as 145mg/m³ in line with the BAT-AELs. The higher end of the limit has been included in accordance with note 106 of the BATc as the boilers where in operation before 7th January 2014.</p> <p>We have maintained the same CO limits as previously permitted as the yearly average indicative limits in BAT28 are only applicable to boilers which operate >1500 hours per year on gas oil.</p>
Technique		Description	Applicability				
a.	Air staging	See descriptions in Section 8.3	Generally applicable				
b.	Fuel staging						
c.	Flue-gas recirculation						
d.	Low-NO _x burners (LNB)						
e.	Water/steam addition		Applicable within the constraints of water availability				
f.	Selective non-catalytic reduction (SNCR)		Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads. The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads				
g.	Selective catalytic reduction (SCR)	See descriptions in Section 8.3	Not applicable to combustion plants operated < 500 h/yr. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr. Not generally applicable to combustion plants of < 100 MW _{th}				
h.	Advanced control system		Generally applicable to new combustion plants. The applicability to old combustion plants may be constrained by the need to				

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																															
	<table border="1" data-bbox="322 293 1254 497"> <tr> <td data-bbox="322 293 367 497"></td> <td data-bbox="367 293 546 497"></td> <td data-bbox="546 293 743 497"></td> <td data-bbox="743 293 1254 363">retrofit the combustion system and/or control command system</td> </tr> <tr> <td data-bbox="322 363 367 497">i.</td> <td data-bbox="367 363 546 497">Fuel choice</td> <td data-bbox="546 363 743 497"></td> <td data-bbox="743 363 1254 497">Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td> </tr> </table> <p data-bbox="349 501 1227 558">BAT-associated emission levels (BAT-AELs) for NO_x emissions to air from the combustion of HFO and/or gas oil in boilers</p> <table border="1" data-bbox="322 561 1254 858"> <thead> <tr> <th data-bbox="322 561 582 746" rowspan="3">Combustion plant total rated thermal input (MW_{th})</th> <th colspan="4" data-bbox="582 561 1254 603">BAT-AELs (mg/Nm³)</th> </tr> <tr> <th colspan="2" data-bbox="582 603 878 673">Yearly average</th> <th colspan="2" data-bbox="878 603 1254 673">Daily average or average over the sampling period</th> </tr> <tr> <th data-bbox="582 673 703 746">New plant</th> <th data-bbox="703 673 878 746">Existing plant ⁽¹⁰²⁾</th> <th data-bbox="878 673 1052 746">New plant</th> <th data-bbox="1052 673 1254 746">Existing plant ⁽¹⁰³⁾</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 746 582 785">< 100</td> <td data-bbox="582 746 703 785">75–200</td> <td data-bbox="703 746 878 785">150–270</td> <td data-bbox="878 746 1052 785">100–215</td> <td data-bbox="1052 746 1254 785">210–330 ⁽¹⁰⁴⁾</td> </tr> <tr> <td data-bbox="322 785 582 858">≥ 100</td> <td data-bbox="582 785 703 858">45–75</td> <td data-bbox="703 785 878 858">45–100 ⁽¹⁰⁵⁾</td> <td data-bbox="878 785 1052 858">85–100</td> <td data-bbox="1052 785 1254 858">85–110 ⁽¹⁰⁶⁾ ⁽¹⁰⁷⁾</td> </tr> </tbody> </table> <p data-bbox="322 861 1187 890">As an indication, the yearly average CO emission levels will generally be:</p> <ul data-bbox="322 893 1187 1034" style="list-style-type: none"> — 10-30 mg/Nm³ for existing combustion plants of < 100 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of <100 MW_{th}, — 10–20mg/Nm³ for existing combustion plants of ≥ 100 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of ≥ 100 MW_{th}. 				retrofit the combustion system and/or control command system	i.	Fuel choice		Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State	Combustion plant total rated thermal input (MW _{th})	BAT-AELs (mg/Nm ³)				Yearly average		Daily average or average over the sampling period		New plant	Existing plant ⁽¹⁰²⁾	New plant	Existing plant ⁽¹⁰³⁾	< 100	75–200	150–270	100–215	210–330 ⁽¹⁰⁴⁾	≥ 100	45–75	45–100 ⁽¹⁰⁵⁾	85–100	85–110 ⁽¹⁰⁶⁾ ⁽¹⁰⁷⁾		
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29	<p data-bbox="322 1053 1254 1145">In order to prevent or reduce SO_x, HCl and HF emissions to air from the combustion of HFO and/or gas oil in boilers, BAT is to use one or a combination of the techniques given below.</p> <table border="1" data-bbox="322 1149 1254 1404"> <thead> <tr> <th data-bbox="322 1149 582 1187">Technique</th> <th data-bbox="582 1149 797 1187">Description</th> <th data-bbox="797 1149 1254 1187">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1187 367 1257">a.</td> <td data-bbox="367 1187 582 1257">Duct sorbent injection (DSI)</td> <td data-bbox="582 1187 797 1257" rowspan="3">Generally applicable</td> </tr> <tr> <td data-bbox="322 1257 367 1327">b.</td> <td data-bbox="367 1257 582 1327">Spray dry absorber (SDA)</td> </tr> <tr> <td data-bbox="322 1327 367 1404">c.</td> <td data-bbox="367 1327 582 1404">Flue-gas condenser</td> </tr> </tbody> </table>	Technique	Description	Applicability	a.	Duct sorbent injection (DSI)	Generally applicable	b.	Spray dry absorber (SDA)	c.	Flue-gas condenser	CC	<p data-bbox="1438 1053 2007 1145">The Aalborg Boilers can be fired on gas oil as the burners were modified in 2016 when the low NO_x upgrade was done for gas firing.</p> <p data-bbox="1438 1181 2007 1331">The operator uses the technique i. fuel choice, as natural gas is the primary fuel choice with gas oil being used only during periods of gas oil interruption. The operator also utilises ultra low sulphur gas oil.</p> <p data-bbox="1438 1366 2007 1452">The yearly average SO₂ BAT-AELs do not apply to existing plant which operate on gas oil for <1500 hours per year.</p>																					
Technique	Description	Applicability																																
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BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	d. Wet flue-gas desulphurisation (wet FGD)		There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW _{th} . Not applicable to combustion plants operated < 500 h/yr. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr		We have included the daily mean SO ₂ ELV for LCP392 Aalborg Boilers (emission point A1) when fuelled on gas oil as 200mg/m ³ in line with the BAT-AELs.
	e. Seawater FGD		There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW _{th} . Not applicable to combustion plants operated < 500 h/yr. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr		
	f. Fuel choice		Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State		
BAT-associated emission levels (BAT-AELs) for SO₂ emissions to air from the combustion of HFO and/or gas oil in boilers					
Combustion plant total rated thermal input (MW_{th})		BAT-AELs for SO₂ (mg/Nm³)			
		Yearly average		Daily average or average over the sampling period	
		New plant	Existing plant ⁽¹⁰⁸⁾	New plant	Existing plant ⁽¹⁰⁹⁾
< 300		50–175	50–175	150–200	150–200 ⁽¹¹⁰⁾
≥ 300		35–50	50–110	50–120	150–165 ⁽¹¹¹⁾ ⁽¹¹²⁾

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																															
30	<p>In order to reduce dust and particulate-bound metal emissions to air from the combustion of HFO and/or gas oil in boilers, BAT is to use one or a combination of the techniques given below.</p> <table border="1" data-bbox="322 384 1254 1318"> <thead> <tr> <th data-bbox="322 384 360 424"></th> <th data-bbox="360 384 595 424">Technique</th> <th data-bbox="595 384 862 424">Description</th> <th data-bbox="862 384 1254 424">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 424 360 496">a.</td> <td data-bbox="360 424 595 496">Electrostatic precipitator (ESP)</td> <td data-bbox="595 424 862 496">See description in Section 8.5</td> <td data-bbox="862 424 1254 496" rowspan="2">Generally applicable</td> </tr> <tr> <td data-bbox="322 496 360 536">b.</td> <td data-bbox="360 496 595 536">Bag filter</td> <td data-bbox="595 496 862 536"></td> </tr> <tr> <td data-bbox="322 536 360 730">c.</td> <td data-bbox="360 536 595 730">Multicyclones</td> <td data-bbox="595 536 862 730">See description in Section 8.5. Multicyclones can be used in combination with other dedusting techniques</td> <td data-bbox="862 536 1254 730"></td> </tr> <tr> <td data-bbox="322 730 360 925">d.</td> <td data-bbox="360 730 595 925">Dry or semi-dry FGD system</td> <td data-bbox="595 730 862 925">See descriptions in Section 8.5. The technique is mainly used for SO_x, HCl and/or HF control</td> <td data-bbox="862 730 1254 925"></td> </tr> <tr> <td data-bbox="322 925 360 1120">e.</td> <td data-bbox="360 925 595 1120">Wet flue-gas desulphurisation (wet FGD)</td> <td data-bbox="595 925 862 1120">See description in Section 8.5. The technique is mainly used for SO_x, HCl and/or HF control</td> <td data-bbox="862 925 1254 1120">See applicability in BAT 29</td> </tr> <tr> <td data-bbox="322 1120 360 1318">f.</td> <td data-bbox="360 1120 595 1318">Fuel choice</td> <td data-bbox="595 1120 862 1318">See description in Section 8.5</td> <td data-bbox="862 1120 1254 1318">Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td> </tr> </tbody> </table> <p data-bbox="344 1353 1232 1410">BAT-associated emission levels (BAT-AELs) for dust emissions to air from the combustion of HFO and/or gas oil in boilers</p> <table border="1" data-bbox="322 1410 1254 1452"> <thead> <tr> <th data-bbox="322 1410 544 1452"></th> <th data-bbox="544 1410 1254 1452">BAT-AELs for dust (mg/Nm³)</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1452 544 1458"></td> <td data-bbox="544 1452 1254 1458"></td> </tr> </tbody> </table>		Technique	Description	Applicability	a.	Electrostatic precipitator (ESP)	See description in Section 8.5	Generally applicable	b.	Bag filter		c.	Multicyclones	See description in Section 8.5. Multicyclones can be used in combination with other dedusting techniques		d.	Dry or semi-dry FGD system	See descriptions in Section 8.5. The technique is mainly used for SO _x , HCl and/or HF control		e.	Wet flue-gas desulphurisation (wet FGD)	See description in Section 8.5. The technique is mainly used for SO _x , HCl and/or HF control	See applicability in BAT 29	f.	Fuel choice	See description in Section 8.5	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State		BAT-AELs for dust (mg/Nm ³)			CC	<p>The site employs the following techniques:</p> <p>f) The site uses natural gas as the main fuel and gas oil as a back-up.</p> <p>The sites fuel supplier characterises the gas oil using BS EN 590 standard and these characteristics include ash content, carbon residue and sulphur content. The site itself does not carry out separate analysis for the components in its flue-gas and gas oil is only used as a back up fuel limited to <1500 hours per year.</p> <p>The yearly average dust BAT-AELs do not apply to existing plant which operate on gas oil for <1500 hours per year.</p> <p>We have included the daily mean dust ELV for LCP392 Aalborg Boilers (emission point A1) when fuelled on gas oil as 25mg/m³ in line with the BAT-AELs. In accordance with note 115 of the BATc the upper limit was included as the plant was operated before 7th January 2014.</p>
	Technique	Description	Applicability																															
a.	Electrostatic precipitator (ESP)	See description in Section 8.5	Generally applicable																															
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BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																			
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31	<p>In order to increase the energy efficiency of HFO and/or gas oil combustion in reciprocating engines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a. Combined cycle</td> <td>See description in Section 8.2</td> <td>Generally applicable to new units operated ≥ 1 500 h/yr. Applicable to existing units within the constraints associated with the steam cycle design and the space availability. Not applicable to existing units operated < 1 500 h/yr</td> </tr> </tbody> </table> <p>BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of HFO and/or gas oil in reciprocating engines</p> <table border="1"> <thead> <tr> <th rowspan="3">Type of combustion unit</th> <th colspan="2">BAT-AEELs ⁽¹¹⁹⁾</th> </tr> <tr> <th colspan="2">Net electrical efficiency (%) ⁽¹²⁰⁾</th> </tr> <tr> <th>New unit</th> <th>Existing unit</th> </tr> </thead> <tbody> <tr> <td>HFO- and/or gas-oil-fired reciprocating engine — single cycle</td> <td>41,5–44,5 ⁽¹²¹⁾</td> <td>38,3–44,5 ⁽¹²¹⁾</td> </tr> <tr> <td>HFO- and/or gas-oil-fired reciprocating engine — combined cycle</td> <td>> 48 ⁽¹²²⁾</td> <td>No BAT-AEEL</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Combined cycle	See description in Section 8.2	Generally applicable to new units operated ≥ 1 500 h/yr. Applicable to existing units within the constraints associated with the steam cycle design and the space availability. Not applicable to existing units operated < 1 500 h/yr	Type of combustion unit	BAT-AEELs ⁽¹¹⁹⁾		Net electrical efficiency (%) ⁽¹²⁰⁾		New unit	Existing unit	HFO- and/or gas-oil-fired reciprocating engine — single cycle	41,5–44,5 ⁽¹²¹⁾	38,3–44,5 ⁽¹²¹⁾	HFO- and/or gas-oil-fired reciprocating engine — combined cycle	> 48 ⁽¹²²⁾	No BAT-AEEL	<p>NA NO AEEL</p>	<p>The BAT31 is not applicable as the operator does not operate gas oil fired engines which are classified as LCP.</p>
Technique	Description	Applicability																				
a. Combined cycle	See description in Section 8.2	Generally applicable to new units operated ≥ 1 500 h/yr. Applicable to existing units within the constraints associated with the steam cycle design and the space availability. Not applicable to existing units operated < 1 500 h/yr																				
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HFO- and/or gas-oil-fired reciprocating engine — single cycle	41,5–44,5 ⁽¹²¹⁾	38,3–44,5 ⁽¹²¹⁾																				
HFO- and/or gas-oil-fired reciprocating engine — combined cycle	> 48 ⁽¹²²⁾	No BAT-AEEL																				
32	<p>In order to prevent or reduce NO_x emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> </tbody> </table>	Technique	Description	Applicability	<p>NA</p>	<p>The BAT32 is not applicable as the operator does not operate gas oil fired engines which are classified as LCP.</p>																
Technique	Description	Applicability																				

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement												
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	Technique	Description	Applicability														
a.	Combustion optimisation		Generally applicable														
b.	Oxidation catalysts	See descriptions in Section 8.3	Not applicable to combustion plants operated < 500 h/yr. The applicability may be limited by the sulphur content of the fuel														

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34	<p data-bbox="322 745 1254 834">In order to prevent or reduce SO_x, HCl and HF emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.</p> <table border="1" data-bbox="322 841 1254 1463"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 882 607 1042">a. Fuel choice</td> <td data-bbox="607 882 815 1042">See descriptions in Section 8.4</td> <td data-bbox="815 882 1254 1042">Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td> </tr> <tr> <td data-bbox="322 1042 607 1201">b. Duct sorbent injection (DSI)</td> <td data-bbox="607 1042 815 1201"></td> <td data-bbox="815 1042 1254 1201">There may be technical restrictions in the case of existing combustion plants Not applicable to combustion plants operated < 500 h/yr</td> </tr> <tr> <td data-bbox="322 1201 607 1463">c. Wet flue-gas desulphurisation (wet FGD)</td> <td data-bbox="607 1201 815 1463"></td> <td data-bbox="815 1201 1254 1463">There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW_{th}. Not applicable to combustion plants operated < 500 h/yr. There may be technical and economic restrictions for retrofitting</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Fuel choice	See descriptions in Section 8.4	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State	b. Duct sorbent injection (DSI)		There may be technical restrictions in the case of existing combustion plants Not applicable to combustion plants operated < 500 h/yr	c. Wet flue-gas desulphurisation (wet FGD)		There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW _{th} . Not applicable to combustion plants operated < 500 h/yr. There may be technical and economic restrictions for retrofitting	NA	The BAT34 is not applicable as the operator does not operate gas oil fired engines which are classified as LCP.						
Technique	Description	Applicability																			
a. Fuel choice	See descriptions in Section 8.4	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State																			
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BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																												
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35	<p>In order to prevent or reduce dust and particulate-bound metal emissions from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.</p> <table border="1"> <thead> <tr> <th data-bbox="322 826 562 866">Technique</th> <th data-bbox="562 826 779 866">Description</th> <th data-bbox="779 826 1254 866">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 866 360 1034">a.</td> <td data-bbox="360 866 562 1034">Fuel choice</td> <td data-bbox="779 866 1254 1034">Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td> </tr> <tr> <td data-bbox="322 1034 360 1137">b.</td> <td data-bbox="360 1034 562 1137">Electrostatic precipitator (ESP)</td> <td data-bbox="779 1034 1254 1137">Not applicable to combustion plants operated < 500 h/yr</td> </tr> <tr> <td data-bbox="322 1137 360 1177">c.</td> <td data-bbox="360 1137 562 1177">Bag filter</td> <td data-bbox="779 1137 1254 1177"></td> </tr> </tbody> </table> <p>BAT-associated emission levels (BAT-AELs) for dust emissions to air from the combustion of HFO and/or gas oil in reciprocating engines</p> <table border="1"> <tr> <td data-bbox="322 1273 562 1393" rowspan="3" style="text-align: center;">Combustion plant total rated thermal input (MW_{th})</td> <td colspan="4" data-bbox="562 1273 1254 1313" style="text-align: center;">BAT-AELs for dust (mg/Nm³)</td> </tr> <tr> <td colspan="2" data-bbox="562 1313 887 1385" style="text-align: center;">Yearly average</td> <td colspan="2" data-bbox="887 1313 1254 1385" style="text-align: center;">Daily average or average over the sampling period</td> </tr> <tr> <td data-bbox="562 1385 719 1457" style="text-align: center;">New plant</td> <td data-bbox="719 1385 887 1457" style="text-align: center;">Existing plant ⁽¹³⁰⁾</td> <td data-bbox="887 1385 1032 1457" style="text-align: center;">New plant</td> <td data-bbox="1032 1385 1254 1457" style="text-align: center;">Existing plant ⁽¹³¹⁾</td> </tr> </table>	Technique	Description	Applicability	a.	Fuel choice	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State	b.	Electrostatic precipitator (ESP)	Not applicable to combustion plants operated < 500 h/yr	c.	Bag filter		Combustion plant total rated thermal input (MW_{th})	BAT-AELs for dust (mg/Nm³)				Yearly average		Daily average or average over the sampling period		New plant	Existing plant ⁽¹³⁰⁾	New plant	Existing plant ⁽¹³¹⁾	NA	The BAT35 is not applicable as the operator does not operate gas oil fired engines which are classified as LCP.			
Technique	Description	Applicability																													
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	≥ 50	5–10	5–35	10–20	10–45												
36	In order to increase the energy efficiency of gas oil combustion in gas turbines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.					NA	The operator operates a gas turbine 50-600 MWth. The unit does not operate > 1,500 hours/year on gas oil.										
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<p align="center">BAT-associated energy efficiency levels (BAT-AEELs) for gas-oil-fired gas turbines</p> <table border="1"> <thead> <tr> <th rowspan="3">Type of combustion unit</th> <th colspan="2">BAT-AEELs ⁽¹³²⁾</th> </tr> <tr> <th colspan="2">Net electrical efficiency (%) ⁽¹³³⁾</th> </tr> <tr> <th>New unit</th> <th>Existing unit</th> </tr> </thead> <tbody> <tr> <td>Gas-oil-fired open-cycle gas turbine</td> <td>> 33</td> <td>25–35,7</td> </tr> <tr> <td>Gas-oil-fired combined cycle gas turbine</td> <td>> 40</td> <td>33–44</td> </tr> </tbody> </table>					Type of combustion unit	BAT-AEELs ⁽¹³²⁾		Net electrical efficiency (%) ⁽¹³³⁾		New unit	Existing unit	Gas-oil-fired open-cycle gas turbine	> 33	25–35,7	Gas-oil-fired combined cycle gas turbine	> 40	33–44
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37	In order to prevent or reduce NO _x emissions to air from the combustion of gas oil in gas turbines, BAT is to use one or a combination of the techniques given below.					CC	<p>The Thames Refinery SGT200 gas turbine (LCP393) can be fired on either natural gas or gas oil, and BAT37 therefore apply for when it is fired on gas oil.</p> <p>The Thames Refinery SGT200 gas turbine is currently fitted with wet low NO_x abatement in the form of steam injection BAT37, technique a. This can only be used when the steam raising plant has been fired for long enough to generate sufficient steam, so the GT will start up without stem injection. Greater and more efficient NO_x</p>										
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		reduction (SCR)		There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr. Retrofitting existing combustion plants may be constrained by the availability of sufficient space		<p>abatement can be attained through the use of dry low emissions technology.</p> <p>The change to the dry low emission (DLE) core will eliminate the requirement for steam injection (Wet low emissions), and as such there should be a slight efficiency gain with this modification. This meets BAT37 technique b and as such the SGT200 will meet BAT for NO_x abatement.</p>						
38	In order to prevent or reduce CO emissions to air from the combustion of gas oil in gas turbines, BAT is to use one or a combination of the techniques given below.			<p>CC</p> <p>The Thames Refinery SGT200 gas turbine (LCP393) can be fired on either natural gas or gas oil, and BAT 38 therefore apply for when it is fired on gas oil.</p> <p>CO emissions are managed through the optimisation of combustion and the monitoring of this through the operation of the CEMS.</p>								
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Technique	Description	Applicability										
a.	Combustion optimisation	See description in Section 8.3										
b.	Oxidation catalysts	Not applicable to combustion plants operated < 500 h/yr. Retrofitting existing combustion plants may be constrained by the availability of sufficient space										
<p>As an indication, the emission level for NO_x emissions to air from the combustion of gas oil in dual fuel gas turbines for emergency use operated < 500 h/yr will generally be 145–250 mg/Nm³ as a daily average or average over the sampling period.</p>												
39	In order to prevent or reduce SO _x and dust emissions to air from the combustion of gas oil in gas turbines, BAT is to use the technique given below.			<p>CC</p> <p>The Thames Refinery SGT200 gas turbine (LCP393) can be fired on either natural gas or gas oil, and BAT39 therefore apply for when it is fired on gas oil.</p> <p>SO_x and dust emissions are minimised by the low consumption of gas oil as natural gas is the fuel of choice for the facility. Only ultra-low sulphur gas oil is used at Thames.</p>								
<table border="1"> <thead> <tr> <th data-bbox="322 1230 385 1278">Technique</th> <th data-bbox="385 1230 564 1278">Description</th> <th data-bbox="564 1230 781 1278">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1278 385 1437">a.</td> <td data-bbox="385 1278 564 1437">Fuel choice</td> <td data-bbox="564 1278 781 1437">See description in Section 8.4</td> </tr> </tbody> </table>	Technique	Description	Applicability			a.	Fuel choice	See description in Section 8.4	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State			
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a.	Fuel choice	See description in Section 8.4										

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																		
	<p align="center">BAT-associated emission levels for SO₂ and dust emissions to air from the combustion of gas oil in gas turbines, including dual fuel gas turbines</p> <table border="1" data-bbox="322 384 1254 730"> <thead> <tr> <th rowspan="3">Type of combustion plant</th> <th colspan="4">BAT-AELs (mg/Nm³)</th> </tr> <tr> <th colspan="2">SO₂</th> <th colspan="2">Dust</th> </tr> <tr> <th>Yearly average ⁽¹³⁴⁾</th> <th>Daily average or average over the sampling period ⁽¹³⁵⁾</th> <th>Yearly average ⁽¹³⁴⁾</th> <th>Daily average or average over the sampling period ⁽¹³⁵⁾</th> </tr> </thead> <tbody> <tr> <td>New and existing plants</td> <td>35–60</td> <td>50–66</td> <td>2–5</td> <td>2–10</td> </tr> </tbody> </table>	Type of combustion plant	BAT-AELs (mg/Nm ³)				SO ₂		Dust		Yearly average ⁽¹³⁴⁾	Daily average or average over the sampling period ⁽¹³⁵⁾	Yearly average ⁽¹³⁴⁾	Daily average or average over the sampling period ⁽¹³⁵⁾	New and existing plants	35–60	50–66	2–5	2–10		<p><u>Sulphur Dioxide BAT-AELs</u> The yearly average SO₂ BAT-AEL is not applicable for LCP393 (emission point A2 and A3) when fuelled on gas oil as the plant operates <1500 hours/year.</p> <p>We have included the daily mean SO₂ ELV for LCP393 (emission point A2 and A3) when fuelled on gas oil as 66mg/m³ in line with the BAT-AELs.</p> <p><u>Dust BAT-AELs</u> The yearly average dust BAT-AEL is not applicable for LCP393 (emission point A2 and A3) when fuelled on gas oil as the plant operates <1500 hours/year.</p> <p>We have included the daily mean dust ELV for LCP393 (emission point A2 and A3) when fuelled on gas oil as 10mg/m³ in line with the BAT-AELs.</p>
Type of combustion plant	BAT-AELs (mg/Nm ³)																				
	SO ₂		Dust																		
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Combustion of gaseous fuels																					
40	<p>In order to increase the energy efficiency of natural gas combustion, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.</p> <table border="1" data-bbox="322 1098 1254 1423"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a. Combined cycle</td> <td>See description in Section 8.2</td> <td>Generally applicable to new gas turbines and engines except when operated < 1 500 h/yr. Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability. Not applicable to existing gas turbines and engines operated < 1 500 h/yr.</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Combined cycle	See description in Section 8.2	Generally applicable to new gas turbines and engines except when operated < 1 500 h/yr. Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability. Not applicable to existing gas turbines and engines operated < 1 500 h/yr.	FC	<p>The Thames Refinery LCP is already configured as a CHP/CCGT, and as such this meets the primary requirement of BAT40. The CHP is certified under the CHPQA scheme, and is deemed a 'good quality' CHP scheme, subject to annual returns, and audit as required by CHPQA. The change to the dry low emission (DLE) core in the SGT200 that the operator confirmed has been installed as of 31/03/2024 eliminates the requirement for steam injection (Wet low emissions), and as such there will be a slight efficiency gain overall.</p>												
Technique	Description	Applicability																			
a. Combined cycle	See description in Section 8.2	Generally applicable to new gas turbines and engines except when operated < 1 500 h/yr. Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability. Not applicable to existing gas turbines and engines operated < 1 500 h/yr.																			

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																																																															
	<p data-bbox="745 300 1249 451">Not applicable to mechanical drive gas turbines operated in discontinuous mode with extended load variations and frequent start-ups and shutdowns. Not applicable to boilers</p> <p data-bbox="320 459 1256 515">BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of natural gas</p> <table border="1" data-bbox="320 520 1256 1318"> <thead> <tr> <th rowspan="3">Type of combustion unit</th> <th colspan="5">BAT-AEELs ⁽¹³⁶⁾ ⁽¹³⁷⁾</th> </tr> <tr> <th colspan="2">Net electrical efficiency (%)</th> <th rowspan="2">Net total fuel utilisation (%) ⁽¹³⁸⁾ ⁽¹³⁹⁾</th> <th colspan="2">Net mechanical energy efficiency (%) ⁽¹³⁹⁾ ⁽¹⁴⁰⁾</th> </tr> <tr> <th>New unit</th> <th>Existing unit</th> <th>New unit</th> <th>Existing unit</th> </tr> </thead> <tbody> <tr> <td>Gas engine</td> <td>39,5–44 ⁽¹⁴¹⁾</td> <td>35–44 ⁽¹⁴¹⁾</td> <td>56–85 ⁽¹⁴¹⁾</td> <td colspan="2">No BAT-AEEL.</td> </tr> <tr> <td>Gas-fired boiler</td> <td>39–42,5</td> <td>38–40</td> <td>78–95</td> <td colspan="2">No BAT-AEEL.</td> </tr> <tr> <td>Open cycle gas turbine, ≥ 50 MW_{th}</td> <td>36–41,5</td> <td>33–41,5</td> <td>No BAT-AEEL</td> <td>36,5–41</td> <td>33,5–41</td> </tr> <tr> <th colspan="6">Combined cycle gas turbine (CCGT)</th> </tr> <tr> <td>CCGT, 50–600 MW_{th}</td> <td>53–58,5</td> <td>46–54</td> <td>No BAT-AEEL</td> <td colspan="2">No BAT-AEEL</td> </tr> <tr> <td>CCGT, ≥ 600 MW_{th}</td> <td>57–60,5</td> <td>50–60</td> <td>No BAT-AEEL</td> <td colspan="2">No BAT-AEEL</td> </tr> <tr> <td>CHP CCGT, 50–600 MW_{th}</td> <td>53–58,5</td> <td>46–54</td> <td>65–95</td> <td colspan="2">No BAT-AEEL</td> </tr> <tr> <td>CHP CCGT, ≥ 600 MW_{th}</td> <td>57–60,5</td> <td>50–60</td> <td>65–95</td> <td colspan="2">No BAT-AEEL</td> </tr> </tbody> </table>	Type of combustion unit	BAT-AEELs ⁽¹³⁶⁾ ⁽¹³⁷⁾					Net electrical efficiency (%)		Net total fuel utilisation (%) ⁽¹³⁸⁾ ⁽¹³⁹⁾	Net mechanical energy efficiency (%) ⁽¹³⁹⁾ ⁽¹⁴⁰⁾		New unit	Existing unit	New unit	Existing unit	Gas engine	39,5–44 ⁽¹⁴¹⁾	35–44 ⁽¹⁴¹⁾	56–85 ⁽¹⁴¹⁾	No BAT-AEEL.		Gas-fired boiler	39–42,5	38–40	78–95	No BAT-AEEL.		Open cycle gas turbine, ≥ 50 MW _{th}	36–41,5	33–41,5	No BAT-AEEL	36,5–41	33,5–41	Combined cycle gas turbine (CCGT)						CCGT, 50–600 MW _{th}	53–58,5	46–54	No BAT-AEEL	No BAT-AEEL		CCGT, ≥ 600 MW _{th}	57–60,5	50–60	No BAT-AEEL	No BAT-AEEL		CHP CCGT, 50–600 MW _{th}	53–58,5	46–54	65–95	No BAT-AEEL		CHP CCGT, ≥ 600 MW _{th}	57–60,5	50–60	65–95	No BAT-AEEL			<p data-bbox="1435 300 2011 507">However, the operator has not provided calculations of the energy efficiency levels therefore we cannot confirm compliance with the plants BAT-AEELs for the combustion of natural gas. We have included an improvement conditions IC22 & IC24 to ensure compliance with the relevant BAT-AEELS (see Annex 3).</p>
Type of combustion unit	BAT-AEELs ⁽¹³⁶⁾ ⁽¹³⁷⁾																																																																	
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41	<p data-bbox="320 1350 1256 1433">In order to prevent or reduce NO_x emissions to air from the combustion of natural gas in boilers, BAT is to use one or a combination of the techniques given below.</p>	FC	<p data-bbox="1435 1342 1933 1425">The operator has not provided sufficient information to confirm compliance against techniques described in LCP-BAT41.</p>																																																															

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	Technique	Description	Applicability		We have therefore, included and improvement condition IC26 to ensure compliance with LCP-BAT41 (See Annex 3).
a.	Air and/or fuel staging	See descriptions in Section 8.3. Air staging is often associated with low-NO _x burners	Generally applicable		
b.	Flue-gas recirculation	See description in Section 8.3			
c.	Low-NO _x burners (LNB)				
d.	Advanced control system	See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system		
e.	Reduction of the combustion air temperature	See description in Section 8.3	Generally applicable within the constraints associated with the process needs		
f.	Selective non-catalytic reduction (SNCR)		Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads. The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads		

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement														
	g.	Selective catalytic reduction (SCR)		<p>Not applicable to combustion plants operated < 500 h/yr.</p> <p>Not generally applicable to combustion plants of < 100 MW_{th}.</p> <p>There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</p>															
42	<p>In order to prevent or reduce NO_x emissions to air from the combustion of natural gas in gas turbines, BAT is to use one or a combination of the techniques given below.</p>			CC	<p>The operators gas turbine is currently fitted with:</p> <p>b. The gas turbine has been fitted with dry low core the operator has confirmed this has been installed as of 31/03/2024.</p>														
<table border="1"> <thead> <tr> <th data-bbox="322 836 367 874"></th> <th data-bbox="367 836 564 874">Technique</th> <th data-bbox="564 836 938 874">Description</th> <th data-bbox="938 836 1258 874">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 874 367 1114">a.</td> <td data-bbox="367 874 564 1114">Advanced control system</td> <td data-bbox="564 874 938 1114">See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr</td> <td data-bbox="938 874 1258 1114">The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td> </tr> <tr> <td data-bbox="322 1114 367 1232">b.</td> <td data-bbox="367 1114 564 1232">Water/steam addition</td> <td data-bbox="564 1114 938 1232" rowspan="2">See description in Section 8.3</td> <td data-bbox="938 1114 1258 1232">The applicability may be limited due to water availability</td> </tr> <tr> <td data-bbox="322 1232 367 1406">c.</td> <td data-bbox="367 1232 564 1406">Dry low-NO_x burners (DLN)</td> <td data-bbox="938 1232 1258 1406">The applicability may be limited in the case of turbines where a retrofit package is not available or when water/steam</td> </tr> </tbody> </table>						Technique	Description	Applicability	a.	Advanced control system	See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system	b.	Water/steam addition	See description in Section 8.3	The applicability may be limited due to water availability	c.	Dry low-NO _x burners (DLN)	The applicability may be limited in the case of turbines where a retrofit package is not available or when water/steam
	Technique	Description	Applicability																
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BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
				addition systems are installed	
	d.	Low-load design concept	Adaptation of the process control and related equipment to maintain good combustion efficiency when the demand in energy varies, e.g. by improving the inlet airflow control capability or by splitting the combustion process into decoupled combustion stages	The applicability may be limited by the gas turbine design	
	e.	Low-NO _x burners (LNB)	See description in Section 8.3	Generally applicable to supplementary firing for heat recovery steam generators (HRSGs) in the case of combined-cycle gas turbine (CCGT) combustion plants	
	f.	Selective catalytic reduction (SCR)		<p>Not applicable in the case of combustion plants operated < 500 h/yr.</p> <p>Not generally applicable to existing combustion plants of < 100 MW_{th}.</p> <p>Retrofitting existing combustion plants may be constrained by the availability of sufficient space.</p> <p>There may be technical and economic restrictions for retrofitting existing</p>	

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																																																						
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43	In order to prevent or reduce NO _x emissions to air from the combustion of natural gas in engines, BAT is to use one or a combination of the techniques given.	NA	The BAT43 is not applicable as the operator does not operate natural gas fired engines which are classified as LCP.																																																						
44	<p>In order to prevent or reduce CO emissions to air from the combustion of natural gas, BAT is to ensure optimised combustion and/or to use oxidation catalysts.</p> <p style="text-align: center;">Table 24 BAT-associated emission levels (BAT-AELs) for NO_x emissions to air from the combustion of natural gas in gas turbines</p> <table border="1"> <thead> <tr> <th rowspan="2">Type of combustion plant</th> <th rowspan="2">Combustion plant total rated thermal input (MW_{th})</th> <th colspan="2">BAT-AELs (mg/Nm³) ⁽¹⁴⁶⁾ ⁽¹⁴¹⁾</th> </tr> <tr> <th>Yearly average ⁽¹⁴²⁾ ⁽¹⁴³⁾</th> <th>Daily average or average over the sampling period</th> </tr> </thead> <tbody> <tr> <td colspan="4">Open-cycle gas turbines (OCGTs) ⁽¹⁴⁴⁾ ⁽¹⁴⁵⁾</td> </tr> <tr> <td>New OCGT</td> <td>≥ 50</td> <td>15 –35</td> <td>25 –50</td> </tr> <tr> <td>Existing OCGT (excluding turbines for mechanical drive applications) – All but plants operated < 500 h/yr</td> <td>≥ 50</td> <td>15 –50</td> <td>25 –55 ⁽¹⁴⁶⁾</td> </tr> <tr> <td colspan="4">Combined-cycle gas turbines (CCGTs) ⁽¹⁴⁴⁾ ⁽¹⁴⁷⁾</td> </tr> <tr> <td>New CCGT</td> <td>≥ 50</td> <td>10 –30</td> <td>15 –40</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of < 75 %</td> <td>≥ 600</td> <td>10 –40</td> <td>18 –50</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of ≥ 75 %</td> <td>≥ 600</td> <td>10 –50</td> <td>18 –55 ⁽¹⁴⁸⁾</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of < 75 %</td> <td>50 –600</td> <td>10 –45</td> <td>35 –55</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of ≥ 75 %</td> <td>50 –600</td> <td>25 –50 ⁽¹⁴⁹⁾</td> <td>35 –55 ⁽¹⁵⁰⁾</td> </tr> <tr> <td colspan="4">Open- and combined-cycle gas turbines</td> </tr> <tr> <td>Gas turbine put into operation no later than 27 November 2003, or existing gas turbine for emergency use and operated < 500 h/yr</td> <td>≥ 50</td> <td>No BAT-AEL</td> <td>60 –140 ⁽¹⁵¹⁾ ⁽¹⁵²⁾</td> </tr> <tr> <td>Existing gas turbine for mechanical drive applications – All but plants operated < 500 h/yr</td> <td>≥ 50</td> <td>15 –50 ⁽¹⁵³⁾</td> <td>25 –55 ⁽¹⁵⁴⁾</td> </tr> </tbody> </table>	Type of combustion plant	Combustion plant total rated thermal input (MW _{th})	BAT-AELs (mg/Nm ³) ⁽¹⁴⁶⁾ ⁽¹⁴¹⁾		Yearly average ⁽¹⁴²⁾ ⁽¹⁴³⁾	Daily average or average over the sampling period	Open-cycle gas turbines (OCGTs) ⁽¹⁴⁴⁾ ⁽¹⁴⁵⁾				New OCGT	≥ 50	15 –35	25 –50	Existing OCGT (excluding turbines for mechanical drive applications) – All but plants operated < 500 h/yr	≥ 50	15 –50	25 –55 ⁽¹⁴⁶⁾	Combined-cycle gas turbines (CCGTs) ⁽¹⁴⁴⁾ ⁽¹⁴⁷⁾				New CCGT	≥ 50	10 –30	15 –40	Existing CCGT with a net total fuel utilisation of < 75 %	≥ 600	10 –40	18 –50	Existing CCGT with a net total fuel utilisation of ≥ 75 %	≥ 600	10 –50	18 –55 ⁽¹⁴⁸⁾	Existing CCGT with a net total fuel utilisation of < 75 %	50 –600	10 –45	35 –55	Existing CCGT with a net total fuel utilisation of ≥ 75 %	50 –600	25 –50 ⁽¹⁴⁹⁾	35 –55 ⁽¹⁵⁰⁾	Open- and combined-cycle gas turbines				Gas turbine put into operation no later than 27 November 2003, or existing gas turbine for emergency use and operated < 500 h/yr	≥ 50	No BAT-AEL	60 –140 ⁽¹⁵¹⁾ ⁽¹⁵²⁾	Existing gas turbine for mechanical drive applications – All but plants operated < 500 h/yr	≥ 50	15 –50 ⁽¹⁵³⁾	25 –55 ⁽¹⁵⁴⁾	CC	<p>LCP393 can operate as a CCGT, however, the BAT-AELs for NO_x when the gas turbine is fuelled with natural gas as set out in table 24 are dependent on the net total fuel utilisation therefore we have linked this to the IC24 and IC25 in table S3.1 of the permit for emission point A2.</p> <p>When the plant is operating as an OCGT the plant discharges via A3, when fuelled on natural gas we have included the ELVs for NO_x as follows in line with BAT:</p> <ul style="list-style-type: none"> - Yearly average – 50 mg/m³ - Daily average – 55 mg/m³ <p>The operator control CO levels by ensuring the combustion process is optimised using document Boiler Operation Mode Procedure: TM/06- 10.1.1/B0.</p> <p>We have included the following NO_x ELV for LCP392 Aalborg Boilers (A1) when fuelled on natural gas as follows in line with BAT:</p> <ul style="list-style-type: none"> - Yearly average – 100 mg/m³ - Daily average – 110mg/m³ <p>We have included the yearly average CO ELV for LCP392 Aalborg Boilers as 40mg/m³ in line with the indicative levels as set out in BAT44.</p>
Type of combustion plant	Combustion plant total rated thermal input (MW _{th})			BAT-AELs (mg/Nm ³) ⁽¹⁴⁶⁾ ⁽¹⁴¹⁾																																																					
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Existing gas turbine for mechanical drive applications – All but plants operated < 500 h/yr	≥ 50	15 –50 ⁽¹⁵³⁾	25 –55 ⁽¹⁵⁴⁾																																																						

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement		
	<p>As an indication, the yearly average CO emission levels for each type of existing combustion plant operated $\geq 1\,500$ h/yr and for each type of new combustion plant will generally be as follows:</p> <ul style="list-style-type: none"> —New OCGT of ≥ 50 MWth: $< 5\text{--}40$ mg/Nm³. For plants with a net electrical efficiency (EE) greater than 39 %, a correction factor may be applied to the higher end of this range, corresponding to [higher end] x EE/39, where EE is the net electrical energy efficiency or net mechanical energy efficiency of the plant determined at ISO baseload conditions. —Existing OCGT of ≥ 50 MWth (excluding turbines for mechanical drive applications): $< 5\text{--}40$ mg/Nm³. The higher end of this range will generally be 80 mg/Nm³ in the case of existing plants that cannot be fitted with dry techniques for NOX reduction, or 50 mg/Nm³ for plants that operate at low load. —New CCGT of ≥ 50 MWth: $< 5\text{--}30$ mg/Nm³. For plants with a net electrical efficiency (EE) greater than 55 %, a correction factor may be applied to the higher end of the range, corresponding to [higher end] x EE/55, where EE is the net electrical energy efficiency of the plant determined at ISO baseload conditions. —Existing CCGT of ≥ 50 MWth: $< 5\text{--}30$ mg/Nm³. The higher end of this range will generally be 50 mg/Nm³ for plants that operate at low load. —Existing gas turbines of ≥ 50 MWth for mechanical drive applications: $< 5\text{--}40$ mg/Nm³. The higher end of the range will generally be 50 mg/Nm³ when plants operate at low load. <p>In the case of a gas turbine equipped with DLN burners, these indicative levels correspond to when the DLN operation is effective.</p> <p>BAT-associated emission levels (BAT-AELs) for NOX emissions to air from the combustion of natural gas in boilers and engines</p> <table border="1" data-bbox="322 1315 1245 1374"> <tr> <td data-bbox="322 1315 501 1374"></td> <td data-bbox="501 1315 1245 1374" style="text-align: center;">BAT-AELs (mg/Nm³)</td> </tr> </table>		BAT-AELs (mg/Nm³)		
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BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	Type of combustion plant	Yearly average ₍₁₅₅₎		Daily average or average over the sampling period		
		New plant	Existing plant ₍₁₅₆₎	New plant	Existing plant ₍₁₅₇₎	
	Boiler	10 –60	50 –100	30 –85	85 –110	
	Engine ₍₁₅₈₎	20 –75	20 –100	55 –85	55 –110 ₍₁₅₉₎	
	<p>As an indication, the yearly average CO emission levels will generally be:</p> <p>< 5–40 mg/Nm³ for existing boilers operated ≥ 1 500 h/yr;</p> <p>< 5–15 mg/Nm³ for new boilers;</p> <p>30–100 mg/Nm³ for existing engines operated ≥ 1 500 h/yr and for new engines.</p>					
45	In order to reduce non-methane volatile organic compounds (NMVOC) and methane (CH ₄) emissions to air from the combustion of natural gas in spark-ignited lean-burn gas engines, BAT is to ensure optimised combustion and/or to use oxidation catalysts.				NA	Not applicable to the site as spark ignition gas engines are not utilised onsite.

Annex 2: Review and assessment of changes that are not part of the BAT Conclusions derived permit review

Updating permit during permit review consolidation

- Activity name
- Introductory note (updated)
- Site plan
- Table S1.1 overhaul
 - Activity Reference (AR) renumbering
 - Updated listed activities
 - Addition of production capacity
 - Directly associated activities (DAAs) standardisation

We have updated permit conditions to those in the current generic permit template as a part of permit consolidation. The conditions will provide the same level of protection as those in the previous permit.

Capacity Threshold

The Environment Agency is looking to draw a “line in the sand” for permitted production capacity; a common understanding between the Operator and regulator for the emissions associated with a (maximum) level of production, whereby the maximum emissions have been demonstrated as causing no significant environmental impact.

We have included a permitted production level (capacity) within table S1.1 of the permit for the section 6.8 listed activity and we need to be confident that the level of emissions associated with this production level have been demonstrated to be acceptable.

The Operator stated they did not completed a H1 assessment at the time of permitting. We have included an improvement condition within the permit (IC19), this will ensure the operator conducts ambient air monitoring in relation to the dust around the site. We are taking this pragmatic approach as the site has a significant number of emissions of particulates to air thus it would not be feasible or representative to use the H1 tool to look at this parameter.

Emissions to Air

We asked the operator to list all emission points to air from the installation in the Regulation 61 notice. And to provide a site plan indicating the locations of all air emission points.

The operator has provided an up to date air emission plan.

Addition of emission points A76, A77, A78 and A80 – these were omitted from the previous variation (V003) in error. Details are as follows:

- A76 & A77 Dust collection vents.
- A78 & A79 Raw sugar jetty discharge buckets.
- Internal emission point A80 - bag filter Exhaust for the section shed dust collector (included for completeness).
- A81 & A82 Cartridge filter for icing sugar dust abatement.

Removal of emission point A57 in the permit as this was associated with the biomass boilers which have been removed from the site, these plant were never operational on the site. Emission points associated with the biomass boilers have also been removed these include A58 – A64.

The operator confirmed they have retain the flue associated with A57 in the stack and will now discharge the emissions of LCP393 up both flues within this stack and this will now be just classified as A2.

We have included an emission limit of 20mg/m³ for particulate emissions from the lime plant.

Implementing the requirements of the Medium Combustion Plant Directive

Existing small combustion plant (<1MW)

For the existing combustion plant with a rated thermal input less than 1 MW we will not be including any emission limit values or monitoring requirements within the permit, unless any site specific conditions require us to do this.

Medium Combustion Plant (1MW-50MW)

The Operator requested that the 4 x 19MWth Solid Biomass Boilers be removed from the permit. The operator and the regulatory officer confirmed that these were never operational therefore we have removed this from the permit.

We have reviewed the information provided and we consider that the operator has no Medium Combustion Plants on site.

Existing large combustion plant (>50MW)

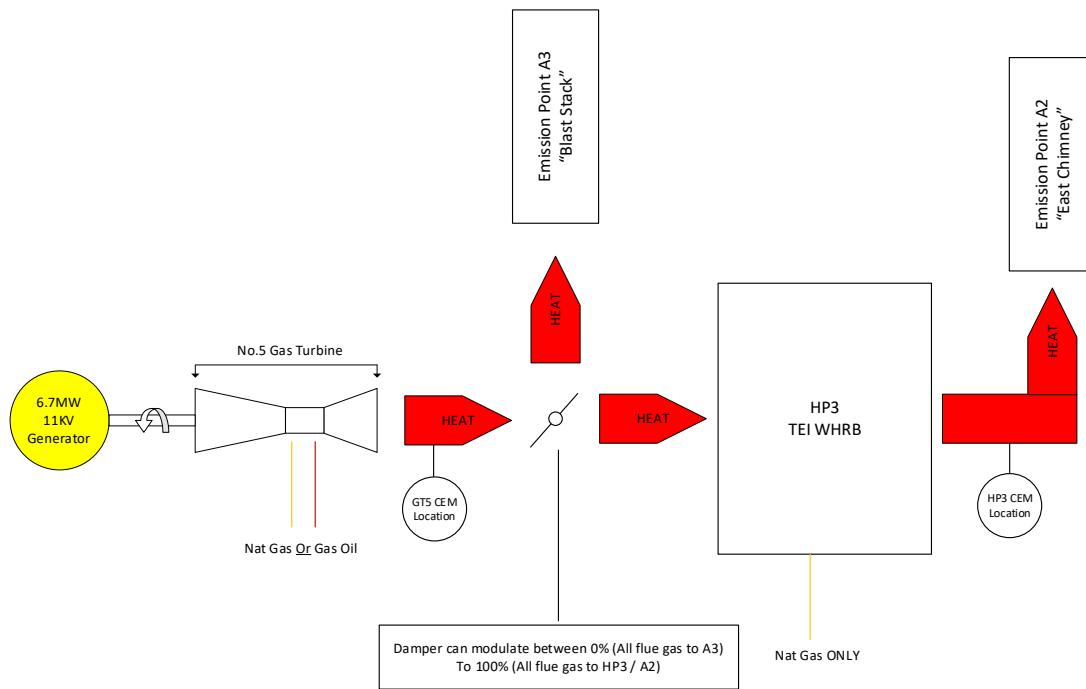
The site operates Large Combustion Plant – LCP392 and LCP393.

A full BAT assessment against the LCP BAT conclusions has been undertaken as detailed in Annex 1.

“TEG only” mode

The operator noted that an operation of the plant which is not represented in the permit which they call Turbine Exhaust Gas (TEG) only mode. The operator provided the following schematic and confirmed TEG only mode occurs when the Gas Turbine is fired (using natural gas or gas oil) but the WHRB is not fired on natural gas, which we categorise as OCGT however, the operator confirmed that in this scenario the damper open which allows the gas exhaust heat to be exchanged through the WHRB. This scenario although classified as OCGT is more efficient as heat is being recovered and used to raise steam in the WHRB.

The operator confirmed in a call on 10/12/2024 that this has been carried out since the plant has been in operation. The operator has been reporting this under ‘CP393 GT on gas exhausting through unfired WHB or Bypass’. This has not previously been represented in the permit.



In the permit a new mode of operation has been included in the permit, to capture all modes of operation accurately, this mode is classified as Turbine Exhaust Gas (TEG). We are satisfied the ELVs should not be affected by running in this mode and that the limits for the OCGT are appropriate however, we want to ensure this is captured in the permit.

We have also included an improvement condition IC23 to ensure we have a good understanding of the flow split between A2 and A3, when operating in this mode.

Emissions to Water and implementing the requirements of the Water Framework Directive

We asked the Operator to provide information on all emissions to water at the installation in the Regulation 61 Notice as follows;

- Identify any effluents which discharge directly to surface or groundwater;
- Provide an assessment of volume and quality, including results of any monitoring data available;
- and for any discharges to water / soakaway whether a recent assessment of the feasibility of connection to sewer has been carried out.

The operator has previously provided assessments for all emissions to water at the installation. The operator declares there has been no change to activities and subsequent effluents generated at the installation since this risk assessment was taken. Consequently, we agree that the original risk assessments remain valid at this time.

The site has a direct discharge to the River Thames of cooling water, this is not classified as process effluent. However, there is an existing limit in the permit for Sucrose which is limited at 1 tonne/day. The operator clarified on a call dated 15/11/2024 that this is a result of foam produced during boiling which can enter the

cooling water. Whilst the operator confirmed this does not occur regularly, we have been notified that this has occurred multiple times this year (2024).

It is understood these occurrences are not standard practise and is not of benefit to the operator as there is a loss of product, however, we believe further investigation into this loss of sugar should be investigated to ensure the operator is minimising these occurrences. In addition, we require an assessment to be complete to ensure this limit is still appropriate in terms of the effect on water quality.

We have included a series of improvement conditions IC34a, IC34b, and IC34c.

IC34a has been included to ensure in the short term a robust operating techniques document demonstrates the controls in place currently to minimise discharges of sucrose, and clarifications of when these discharges occur.

IC34b has been included to ensure an environmental risk assessment is undertaken to demonstrate whether the releases of sucrose to the water course is having a detrimental impact on the receiving water body. This improvement condition is linked to the limit in Table S3.2 in the permit and should the assessment determine a new limit should be set this should be reviewed and agreed with the Environment Agency.

IC34c has been included depending on the outcome of IC35 should the operator be required to take action to improve the controls in order to reduce the amount of sucrose. The improvement condition required the operator to provide a plan to the agency for agreement.

Sewer Emissions

The operator confirmed emission point S6 has been removed as it is no longer used at the site. This emission point was previously from surface water run-off from 100,000 tonne raw sugar stockpile area.

The operator confirmed S1 and S4 are also no longer in use these have been removed from the permit.

- S1 is part of a property that the operator leases out and they no longer have responsibility for, so we are removing this from the permit.
- S4 has is now blocked up and all flow goes through S3 (operator calls this C sewer)

Soil & groundwater risk assessment (baseline report)

The IED requires that the operator of any IED installation using, producing or releasing “relevant hazardous substances” (RHS) shall, having regarded the possibility that they might cause pollution of soil and groundwater, submit a “baseline report” with its permit application. The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the regulated facility and at cessation of activities. It must enable a quantified comparison to be made between the baseline and the state of the site at surrender.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, taking into account both the baseline conditions and the site’s current or approved future use. To do this, the Operator has to submit a surrender application to us, which

we will not grant unless and until we are satisfied that these requirements have been met.

The Operator submitted a site condition report during the original application received on 30/03/2005. The site condition report included a report on the baseline conditions as required by Article 22. We reviewed that report and considered that it adequately described the condition of the soil and groundwater at that time.

The Operator confirmed the site condition report and baseline report is relevant and up to date. We have reviewed the information and we consider that it adequately describes the current condition of the soil and groundwater. Consequently, we are satisfied that the baseline conditions have not changed.

Hazardous Substances

Hazardous substances are those defined in Article 3 of Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures.

The operator has not provided an appropriate risk assessment on the hazardous substances stored and used at the installation.

The operator is required to submit a risk assessment for the relevant hazardous substances for review to the Environment Agency via improvement condition (IC30).

Climate Change Adaptation

The operator has considered if the site is at risk of impacts from adverse weather (flooding, unavailability of land for land spreading, prolonged dry weather / drought) .

The operator has identified the installation as likely to be or has been affected by unavailability of land for land spreading of waste and prolonged dry weather/ drought, which we consider to be a severe weather event.

We do not consider the operator to have submitted a suitable climate change adaptation plan for the installation. We have included an improvement condition into the permit (IC27) to request a climate change adaptation plan is submitted by the operator for approval from the Environment Agency.

Containment

We asked the Operator via the Regulation 61 Notice to provide details of the each above ground tanks which contain potentially polluting liquids at the site, including tanks associated with the effluent treatment process where applicable.

The Operator did not provide a response to the Regulation 61 Notice with respect to the existing tanks and their containment measures on site and stated that given the age of the plant, it is not currently possible for their above-ground effluent storage and treatment tanks to have secondary or tertiary containment capacity.

We have set improvement conditions in the permit to address the deficiencies in the existing tanks and containment measures on site (IC29). See Improvement conditions in Annex 3 of this decision document.

Annex 3: Improvement Conditions

Based on the information in the Operator's Regulation 61 Notice response and our own records of the capability and performance of the installation at this site, we consider that we need to set improvement conditions so that the outcome of the techniques detailed in the BAT Conclusions are achieved by the installation. These improvement conditions are set out below - justifications for them is provided at the relevant section of the decision document (Annex 1 or Annex 2).

We also consider that we need to set improvement conditions relating to changes in the permit not arising from the review of compliance with BAT conclusions. The justifications for these are provided in Annex 4 of this decision document.

Previous improvement conditions marked as complete in the previous permit.

Superseded Improvement Conditions – Removed from permit as marked as “complete” or superseded.	
Reference	Improvement Condition
IC13	The operator shall provide a report in writing to the Environment Agency for acceptance which provides the net rated thermal input for LCP392 and LCP393. The net rated thermal input is the ‘as built’ value unless the plant has been modified significantly resulting in an improvement of the plant efficiency or output that increases the rated thermal input (which typically requires a performance test to demonstrate that guaranteed improvements have been realised). The Operator shall then also include a report in writing to the Environment Agency for acceptance. The report shall define and provide a written justification of the “minimum start up load” and “minimum shut-down load”, for LCP392 as required by the Implementing Decision 2012/249/EU
IC14	The Operator shall submit a report in writing to the Environment Agency for acceptance. The report shall define and provide a written justification of the “minimum start up load” and “minimum shut-down load”, for the biomass plant within the LCP393 as required by the Implementing Decision 2012/249/EU
IC17	The Operator shall submit a report in writing to the Environment Agency for acceptance. The report shall define and provide an assessment of the emission from the OCGT emission point A3. The operator shall propose new limits for NOx and CO.
IC18	The operator shall submit a report in writing to the Environment Agency detailing the monitoring methods used to determine effluent heat and temperature for release point W1. The monitoring methods shall be agreed in writing with the Agency.

The following improvement conditions have added to the permit as a result of the variation.

Improvement programme requirements	
Reference	Reason for inclusion
IC19	To ensure ambient dust monitoring is carried out at the site.

IC20	To ensure compliance with FDM BATc6 – Energy Efficiency.
IC21	To ensure compliance with FDM BATc13 – Noise Management Plan.
IC22	To ensure compliance with LCP BAT 2 – net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification.
IC23	To ensure compliance with LCP BAT 3 – appropriate monitoring, and to ensure an understanding of the flow between A2 and A3 during TEG mode.
IC24	To ensure compliance with LCP BAT 40 – net electrical efficiency, net total fuel utilisation, and net mechanical energy efficiency BAT-AEELs for LCP392 and LCP393.
IC25	To ensure the limit for yearly NOx is set in line with LCP-BAT44, table 24.
IC26	To ensure compliance with LCP BAT 41 – to prevent or reduce NOx emissions to air from the combustion of natural gas in boilers.
IC27	To ensure an appropriate climate change adaptation plan is in place as part of the EMS.
IC28	To ensure the operator conducts a feasibility study in relation to FDM BATc11 – waste water buffer storage.
IC29	To ensure the operator reviews containment onsite appropriately.
IC30	To ensure the operator completes an appropriate three stage assessment for relevant hazardous substances.
IC31	To ensure the operator provides a report to define when dry low NOx operation is effective.
IC34a	To ensure in the short term a robust operating techniques document demonstrates the controls in place currently to minimise discharges of sucrose, and clarifications of when these discharges occur
IC34b	To ensure an environmental risk assessment is either reviewed or is complete to demonstrate if the release of sucrose at the current limit could have an impact on the receiving water body. This improvement condition is linked to the limit in table S3.2 in the permit and should the assessment determine a new limit should be set this should be reviewed and agreed with the Environment Agency.
IC34c	Depending on the outcome of IC34b should the operator be required to take action to improve the controls in order to reduce the amount of sucrose. The improvement condition required the operator to provide a plan to the agency for agreement.

Annex 4: Non Review Improvement Conditions

Improvement programme requirements	
Reference	Reason for inclusion
IC32	To ensure the operator define the minimum start-up and shut-down loads.
IC33	To ensure an appropriate operating techniques document is in place with regard to when WHB FD firing will occur (under what circumstances).