

Environment Agency

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

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

The Permit number is: EPR/PP3235LP
The Operator is: EPR Thetford Limited
The Installation is: Thetford Power Station
This Variation Notice number is: EPR/PP3235LP/V007

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 of updated decisions on best available techniques (BAT) conclusions.

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. This review has been undertaken with reference to the decision made by the European Commission establishing best available techniques (BAT) conclusions ('BAT Conclusions') for large combustion plant as detailed in document reference IEDC-7-1. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position. It also provides a justification for the inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

The installation burns a mixture of waste and non-waste material where the main purpose is generation of energy and is therefore a co-incineration plant that is subject to IED chapter IV as well as the LCP BAT conclusions. We have therefore reviewed the permit in line with the timescales of the waste incineration BAT conclusions.

This document therefore explains how we will ensure that the installation complies with the BAT conclusions by 3rd December 2023. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position. It also provides a justification for the

inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

As well as ensuring that the Installation complies with the BAT conclusions the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit issued. 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 philosophy and with other permits issued to installations in this sector. Although the wording of some conditions has changed, while others have been removed 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 mainly our determination of substantive issues relating to the new BAT Conclusions.

Throughout this document we will use a number of expressions. These are as referred to in the glossary.

We try to explain our decision as accurately, comprehensively and plainly as possible. We would welcome any feedback as to how we might improve our decision documents in future. The use of technical terms and acronyms are inevitable in a document of this nature: we provide a glossary of acronyms near the front of the document, for ease of reference.

How this document is structured

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1 Glossary of acronyms used in this document

(Please note that this glossary is standard for our decision documents and therefore not all these acronyms are necessarily used in this document.)

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEEL	BAT Associated Energy Efficiency Level
BAT-AEPL	BAT Associated environmental performance level
BAT-AEL	BAT Associated Emission Level
BATc	BAT conclusion
BREF	Best available techniques reference document
CEM	Continuous emissions monitor
CHP	Combined heat and power
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
ELV	Emission limit value derived under BAT or an emission limit value set out in IED
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
LCP	Large combustion plant
NOx	Oxides of nitrogen (NO plus NO ₂ expressed as NO ₂)
PHE	Public Health England
SAC	Special Area of Conservation
SGN	Sector guidance note
TGN	Technical guidance note
TOC	Total Organic Carbon
WFD	Water Framework Directive (2000/60/EC)

2 Our decision

We have decided to issue the consolidated variation notice to the operator. This will allow it to continue to operate the Installation, subject to the conditions in the consolidated variation notice.

We consider that, in reaching that 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 consider that those conditions are appropriate.

3 How we reached our decision

3.1 Requesting information to demonstrate compliance with BAT Conclusions for incineration Plant

We issued a Notice under Regulation 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 (a Regulation 61 Notice) on 09/06/22 requiring the Operator to provide information to demonstrate how the operation of their installation currently meets, or will subsequently meet, the revised standards described in the incineration BAT Conclusions document. The Notice also required that where the revised standards are not currently met, the operator should provide information that:

- Describes the techniques that will be implemented before 3rd December 2023, which will then ensure that operations meet the revised standard, or
- Justifies why standards will not be met by 3rd 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 standard is not applicable to those processes, or
- Justifies why an alternative technique will achieve the same level of environmental protection equivalent to the revised standard 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 requested that the Operator make a formal request for derogation from compliance with that 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 08/12/22.

We have not received any information in relation to the Regulation 61 Notice response that appears to be confidential in relation to any party.

3.2 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 regulatory activities with the facility we have no reason to consider that the operator will not be able to comply with the conditions that we include in the permit.

4 The legal framework

The consolidated variation notice will be issued under Regulation 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 the consolidated variation notice 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.

5 The key issues

The key issues arising during this permit review are:

- Ensuring the Installation complies with the BAT conclusions.
- Setting emission limits (including BAT AELs) for emissions to air,
- The energy efficiency levels associated with the Best Available Techniques (BAT-AEELs)

5.1 Ensuring the Installation complies with the BAT conclusions

We have reviewed the operator's response to the regulation 61 notice and we are satisfied that the Installation will meet the requirements of the BAT conclusions by 3rd December 2023. Further detail on our assessment is in annex 1 of this decision document.

Based on our records and previous regulatory activities with the Installation we have no reason to consider that the operator will not be able to comply with the conditions that we have included in the permit.

5.2 Emissions to air and the emission limits applied to the plant

5.2.1 Summary

The consolidated permit includes new emission limits for emissions to air. These limits ensure that the installation will comply with the relevant BAT-AELs, as specified in the BAT conclusions, and the relevant limits from IED Annex VI.

A number of general principles were applied during the permit review, including those set out in the UK LCP BAT Conclusions Interpretation Document . These included:

- The upper value of the BAT-AELs ranges specified were used unless use of the tighter limit was justified.
- The principle of no backsliding where if existing limits in the permit were already tighter than the upper end of the BAT-AEL ranges, the existing permit limits were retained.

We have set the emissions limit values at the top end of the BAT-AEL range in line with section 4.35 of Defra's Industrial emissions Directive EPR Guidance on Part A installations which states: *Where the BAT AELs are expressed as a range, the ELV should be set on the basis of the top of the relevant BAT-AEL range – that is to say, at the highest associated emission level - unless the installation is demonstrably capable of compliance with a substantially lower*

ELV, based on the BAT proposed by the operator, or exceptional environmental considerations compel a tighter ELV.

We are satisfied that environmental considerations do not require tighter ELVs to be set, and the operator has not proposed any lower ELVs, and so we have set the ELVs at the top end of the BAT-AEL ranges.

We have set IC1 which requires the operator to assess options to reduce NO_x emissions below the top of the BAT AEL range.

5.2.2 ELV for air emissions

In line with our waste incineration BAT C interpretation document: The waste gas resulting from the incineration of Article 3(31)(b) waste or non-waste fuel is more than 10% so the ELVs are calculated according to the Annex VI mixing rule, substituting the Annex VI waste ELVs for those specified in the WI BATCs.

5.2.2.1 Mixing rule

The mixing rule requires the proportions of flue gas resulting from waste combustion and non waste combustion be known. The operator provided a spreadsheet where this was calculated based on the following fuel feed composition:

Poultry litter (waste):	78.1%
Horse bedding (waste):	10.8%
Biomass (non waste):	11.1%

Meat and bone meal was not included in the calculations but only makes up a small amount of the total (~2%).

5.2.2.2 ELVs set

a) Particulates, NO_x, HCl, SO₂, HF, mercury*

ELVs calculated using the mixing rule from IED annex VI with parameters as follows:
Cwaste - BAT-AEL from waste incineration BAT C
Cproc - LCP BAT-AELs from section 2 of the LCP BAT C

* There is no BAT-AEL for Hg in section 6 of the LCP BAT C.

Therefore the LCP BAT C states it should be set using the mixing rule based on the BAT-AEL from LCP section 2 and the incineration BAT-AELs from the incineration BAT C.

The fact that a total ELV is set in IED annex VI, rather than a Cproc, does not affect the calculation.

b) The following pollutants have specified BAT-AELs in section 6 of the LCP BAT C and can be applied directly

- TOC
- dioxins/furans
- TVOC (daily and yearly average)
- Cd, TI

- Other metals

The BAT-AELs for metals in section 6 are specified as the average of samples obtained during one year.

c) CO

The mixing rule cannot be used because there is no BAT-AEL set in section 2 of the LCP BAT C. The ELV from the current permit is still appropriate.

d) IED chapter IV

IED chapter IV sets 'total emission limits values' for metals and dioxins. Where BAT-AELs above are equivalent or lower the chapter IV limits do not need to be set. The exception to this is for cadmium & Thallium and 'other metals' (Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V) where the BAT-AEL specified in section 1b above is an annual average but chapter IV sets a periodic limit. Therefore the chapter IV limits of: Cd + TI : 0.05 mg/m³ at 6% oxygen, 0.033 mg/m³ at 11% oxygen applies as well as the BAT-AEL.

Other metals: 0.5 mg/m³ at 6% oxygen, 0.33 mg/m³ at 11% oxygen applies as well as the BAT-AEL.

Pollutant	Limit at 11% O ₂ (mg/m ³)	Limit at 6% O ₂ (mg/m ³)	Basis (section above)	Reference period
Particulates	5.7	8.6	Mixing rule (1a)	Daily average
NOx	176.3	264.5		
HCl	8.0	12		
SO ₂	48.1	72.2		
HF	1.0	1.5		
Hg	0.02	.03		Periodic
Cd + TI	0.003	0.0045	LCP BAT C section 6 (1b)	Periodic – average of samples taken over a year
Other metals (Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V)	0.2	0.2		
Dioxins & Furans	0.02 ng/m ³	0.03		
TVOC	6.660	10		
TVOC	3.330	5		

CO	80	120	Limit in current permit (1c)	Daily average
Cd + Tl	0.033	0.05	IED chapter IV, annex VI (1d)	Periodic
Other metals (Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V)	0.33	0.5		

Abnormal operation backstop limits were set in table S3.1 (a) of the permit. These are based on the IED chapter IV requirements. Although they do not explicitly apply to co-incinerators our view is that it is BAT for them to apply:

Pollutant	Limit (6% oxygen)	Reference period	Basis for limit
Particulate matter	225 mg/m ³	½-hr average	IED annex IV part 3, paragraph 2 sets the following – note they are listed in IED at 11% oxygen The total dust concentration in the emissions into the air of a waste incineration plant shall under no circumstances exceed 150 mg/Nm ³ expressed as a half-hourly average. The air emission limit values for TOC and CO set out in points 1.2 and 1.5(b) shall not be exceeded.
Total Organic Carbon (TOC)	30 mg/m ³	½-hr average	
Carbon monoxide	150 mg/m ³	½-hr average	

e) IED chapter IV – abnormal operation limits

IED chapter IV sets backstop limits for particulates, TOC and CO during abnormal operation for incineration plants. Our view is that it is BAT to set such limits for co-incineration plants to ensure that particulate emissions are controlled to ensure no significant impact and that TOC and CO are controlled to ensure that good combustion is maintained during abnormal operation.

At this installation regular sootblowing is required to prevent the furnace inner surfaces rapidly fouling, which would lead to poor combustion conditions, increased pollutant emissions and additional shut down/start-up sequences. Because of the high number of soot blowers at Thetford the sootblowing system is usually in operation for more than 15 hours per day. While the system is in use the steam discharge disturbs the combustion process and flue gas flow which causes spikes in CO emissions. Those spikes are particularly apparent for approximately 40 minutes at the start of the soot blow sequence when the lower combustion chamber wall blowers disturb the grate cover and cause brief but very high emissions. The adverse effect on plant operation from delaying a soot blow sequence is such that sootblowing would be started if it was due during an Abnormal Operation period. Conversely, with sootblowing taking place for more than 60% of the time, it is possible that an AO period would be started during a soot blow event. Therefore we have set a CO limit of 300 mg/m³ at 6% oxygen that will apply during abnormal operation that reflects the emissions that sootblowing generates to avoid breaches that are wholly attributable to that activity.

5.3 Energy efficiency

The BAT conclusions specify an energy efficiency level associated with the best available techniques (BAT-AEEL). For electricity only plants The BAT AEEL is based on net electrical efficiency, for CHP plants the BAT AEL can be either net electrical efficiency or net total fuel utilisation.

The relevant BAT AEEL for this installation is net electrical efficiency.

The Applicant stated that net electrical efficiency is 26.47 %. This is below the range specified in the BAT conclusions and we have therefore set improvement condition IC2 that requires the operator to assess options to improve efficiency.

5.4 Emissions to water or sewer

The operator stated that there is an emission to water. The discharge consists of boiler blowdown, waste water from ion exchange, surface water and run-off from roofs. Pollutants that could be present are limited to water treatment backwash chemicals of hydrochloric acid and sodium hydroxide and boiler treatment chemicals. We are satisfied that the discharge is not significant and current permit controls are appropriate.

6 Other issues not directly related to BAT Conclusions

6.1 Forest woodchip storage, W4 and site plan

The operator stated : Though the EPR Thetford permit was amended in V002 to include a wood chip storage area, as shown in Schedule 7 of the draft permit, that wood chip storage area is not used to store wood chip and there is no intention to use it for that purpose.

The operator requested that W4 is removed from the permit and the installation boundary reduced to remove the storage area.

We have removed W4 and removed mention of forest woodchip storage from table S2.1, but the extent of an installation cannot be reduced by a variation – the operator will need to apply for a partial surrender.

Annex 1

Decision checklist regarding relevant BAT Conclusions

This annex provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation.

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

NA - Not Applicable

CC - Currently Compliant

FC - Compliant in the future (by 3rd December 2023)

NC - Not Compliant

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
General BAT Conclusions					
1	EMS	Improve overall performance	Implement and adhere to an EMS that incorporates key features identified	EPR Thetford is certified to ISO 14001:2015 until Sep 2024. The EMS meets the requirements of BAT 1 with the exception of: (iv) g, (vii), (viii), (ix), (xi), (xiii), (xiv) and the EMS will be updated by 03/12/23 to ensure that it meets BAT 1	FC
2	Efficiency	Determine net electrical efficiency and/or net total fuel utilisation and/or net mechanical efficiency	Carry out a performance test at full load.	The report for the plant's net electrical efficiency test during commissioning in the 1990s cannot be located. An alternative approach to the Ricardo calculation method that follows the UK's LCP BAT interpretation document though a 'desk top' review was agreed	NC Improvement condition IC1 set

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>for use by the EA. That document and supporting calculations are included with this submission.</p> <p>A net electrical efficiency value was calculated by dividing the electrical energy exported to the grid as measured by the National Grid meters by the sum of the energy available from all waste, biomass and fuel oil in a calendar year.</p> <p>The BAT target range is 28% to 38%. The calculated net electrical efficiency value in the calendar year of 2021 was 26.47%. Further energy efficiency projects are planned.</p> <p>No derogation required as this is not a BAT AEL but we have set an IC for improvements to be assessed.</p>	
3	Monitoring of process parameters	Monitor key process parameters for emissions to air and water specified in the corresponding table.	Monitoring of specified process parameters.	<p>Flue Gas: O₂ - Currently monitored - Continuous MCERTS/QAL1 Oxitec 500 as part of Gasmeter CX4000 system Water vapour - Currently monitored - Continuous MCERTS/QAL1 Gasmeter CX4000 FTIR Flow - Currently monitored -</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				Continuous non-MCERTS cross duct pitot and Periodic bi-annually by MCERTS test laboratory Temperature - Currently monitored - Periodic bi-annually by MCERTS test laboratory Pressure - Currently monitored - Periodic bi-annually by MCERTS test laboratory Waste water from FGC Not applicable. No wet FGC techniques are used	
4	Monitoring of emissions to air	Monitor emissions to air with at least the frequency in the corresponding table and in accordance with the EN standards.	Monitor emissions to air with at least the frequency in the corresponding table and in accordance with the EN standards.	NH₃ - Currently monitored - Continuous MCERTS Gaset CX4000. BS EN 14181 calibration required if SCR/SNCR introduced NO_x - Currently monitored - Continuous MCERTS Gaset CX4000 to BS EN 14181 N₂O - N/A fluidised bed not used. Currently monitored - Continuous MCERTS Gaset CX4000. BS EN 14181 calibration required if SCR/SNCR introduced CO - Currently monitored - Continuous MCERTS Gaset CX4000 to BS EN 14181	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>SO₂ - Currently monitored - Continuous MCERTS Gaset CX4000 to BS EN 14181</p> <p>SO₃ - N/A SCR not used</p> <p>HCL - Currently monitored - Continuous MCERTS Gaset CX4000 to BS EN 14181</p> <p>HF - Currently monitored - Periodic 6 monthly by MCERTS/UKAS test laboratory. Continuous not required by virtue of low historic results 0.4 mg/Nm³ or less since 2011</p>	
5	Monitoring of emissions to water from flue-gas treatment	Monitor emissions to water with at least the frequency in the corresponding table and in accordance with the EN standards.	Monitor emissions to water with at least the frequency in the corresponding table and in accordance with the EN standards.	N/A No wet FGC methods are used so there are no emissions to monitor	NA
6	Environmental performance	Improve general environmental performance	A variety of techniques	<p>Techniques:</p> <p>a. Fuel blending and mixing: The qualifying biomass fuel component is wood chip, which is consistently and continuously mixed with waste fuels during fuels reception so that all solid fuel held in the fuel hall is a near homogenous mix of biomass and waste.</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>b. Maintenance of the combustion system: The Maintenance of the combustion system has developed over time & in line with plant operation & knowledge. The combustion system comprises of the following components: Fuel feed - Buffer Hopper Feed Screws and Grate Distribution air Boiler grate Combustion air fans</p> <p>The Equipment defects are managed via the sites CMMS.</p> <p>Buffer hopper Fuel feed screws: All feed screws are inspected for condition in our 6-to-8-week cleaning outages. Any required immediate maintenance is carried out with in the cleaning outage. Annual maintenance of motors / gearbox's & screw reflighting is carried out in our annual maintenance outage each August.</p>	
7	Reduce emissions of ammonia to air	Reduction of ammonia emissions where SCR or SNCR is used.	BAT is to optimise the design and/or operation and to meet associated AELs.	Operator stated compliant by 03/12/23. Also stated that compliance with the ammonia BAT AEL cannot be assured	FC Improvement condition set for system to be

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				at the time of this document's submission. It is anticipated that an SNCR system will be installed and the degree of need for ammonia controls cannot yet be confirmed.	optimised. The permit requires the ELV has to be complied with from 03/12/23
8	Prevent or reduce emissions to air	Prevent or reduce emissions to air during normal operating conditions.	Ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	<p>Techniques for acid gases HCl & SO₂: Duct sorbent injection</p> <p>Appropriate design: Storage silo hold three weeks supply on Bicarb for abatement. Bicarb is delivered to site on a rolling two-week basis. The delivery system consists of two rotary valves, two blowers & four injection points before the eight Bag filter cells, each cell contains 450 bag filters. One delivery system is used as the duty system & the other is available as stand by.</p> <p>Operation: The HCl & SO₂ Abatement system is managed by the DCS. The Panel operator controls this by giving the DCS target set-points which are compared to transferred CEM corrected values & the system will increase or reduce the amount of Bicarb being delivered to control HCl & SO₂ emissions.</p> <p>Maintenance: Annual & Routine</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				Maintenance of the Bicarb abatement system is managed via the sites CMMS	
9	Environmental performance and reduce emissions to air	Inclusion of a number of elements in the quality assurance/quality control programmes for all the fuels used, as part of the EMS.	Techniques (i), (ii) and (iii).	<p>i. Full characterisation of fuel: EPRL SHE Procedure ENV_P04 New Biomass Fuel Approval Protocol includes steps to: Identify the source of the waste Verify the waste composition (MSDS required) Complete COSHH assessment Review chemical composition Assess compatibility with other waste fuels Assess handling characteristics Establish Calorific Value Get agreement for use by the relevant Competent Authority (EA/SEPA)</p> <p>ii. Testing of fuel quality: EPRL SHE System Procedure ENV_P06 Waste Management is a controlled document within the EMS and sets on site acceptance methods. local site procedures (F&A-0002 Calorific tests) & (F&A-0021 Fuel sample for Knights analysis) manage fuel sampling.</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>iii. Adjustment of plant settings: All adjustments are made & controlled via the sites DCS system which controls all aspects of the plant's core processes. Fuel feed to the boiler is controlled by the speed of the fuel feed screws & distribution air pressure to ensure an even covering of fuel across the boiler grate. Combustion air flows are controlled via DCS to achieve complete combustion & control Emissions</p>	
10	Reduce emissions to air and/or water	Prevent or reduce emissions to air during other than normal operating conditions (OTNOC).	A variety of techniques.	Development of a management plan to fully meet WI OTNOC / AO requirements is awaiting confirmation of requirements by the UK's Competent Authorities. When those requirements are known a Management System Procedure will be produced that defines the techniques that are to be used. As an interim measure, procedures to react to and report AO events have been drafted and included in routine operating procedure templates and reporting templates.	FC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
11	Monitoring of emissions to air and/or to water	Monitoring of emissions to air and/or to water during OTNOC.	Appropriately monitor emissions to air and/or to water during OTNOC.	Defining the in-house methods to meet WI OTNOC / AO is awaiting confirmation of requirements by the UK's Competent Authorities. When those requirements are known a Management System Procedure will be produced that directs site teams to carry out the necessary actions.	FC
12	Energy efficiency	Increase the energy efficiency for units operated ≥ 1500 h/yr	A variety of techniques	<p>Techniques:</p> <p>a. Combustion optimisation - Complete combustion is achieved by control of Primary & secondary air flow's and control of fuel distribution on the boiler grate, via the DCS</p> <p>b. Optimisation of the working medium conditions - Steam in the pressure system is operated at the highest design temperature & pressure 450DegC & 65Bar, while maintaining low enough furnace temperatures to control emissions of NOx.</p> <p>c. Optimisation of the steam cycle - Turbine back pressure & efficiency is controlled by Air cooled condensers with air flow controlled via ten vertical mounted two speed fans to achieve the designed Turbine back pressure of 0.080Bar absolute.</p>	CC Compliant with measures set out in BAT C but gross EEE is below the BAT AEEL – see BAT 2 above

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>d. Minimisation of energy consumption - A full review of site Energy efficiency is carried out by the sites management team on an annual basis.</p> <p>e. Preheating of combustion air - Both Primary & Secondary combustion airs are pre heated by passing the combustion air through flue gas to air heat exchangers. P1 & P2 Primary air heaters & S1 & S2 Secondary air heaters.</p> <p>f. Fuel preheating - Not in plant design</p> <p>g. Advanced control system - An advanced control system, known as a Distributed Control System (DCS) is used to control combustion parameters. It monitors process conditions and adjusts plant equipment to maintain the operational conditions that are selected by operators within the control room. The DCS also receives data from the plant's CEM system to enable operators to set process parameters that deliver compliance with ELVs.</p> <p>h. Feed-water preheating using recovered heat - Boiler feed water preheating is optimised by use of a flow gas to water heat exchanger (Economiser) increasing feed water temperature by 100DegC. LP steam is</p>	

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>also bleed off the Turbine to the Deaerator/Feed water tank & LP1 & LP2 using the LP steam to preheat Condensate/Feedwater.</p> <p>i. Heat recovery by cogeneration (CHP) - Not in plant design j. CHP readiness - Not in plant design k. Flue gas condenser - Not in plant design l. Heat accumulation - Not in plant design m. Wet stack - Not in plant design n. Cooling tower discharge - Not in plant design</p> <p>o. Fuel pre-drying - Only by mixing on receipt and evaporation while in storage p. Minimisation of heat loss - All components of the steam / water cycle are lagged & clad & are routinely inspected on an ongoing basis. Section of the Boiler water wall tube lagging & cladding are routinely replaced during our annual maintenance outage. q. Advanced materials - Sections of Furnace water wall tube have been replaced with Inconel spiral wound boiler tube panels, to both aid in heat transfer & to reduce tube wear and 1% chrome boiler tube has been trialled in the Generation bank tube bundle, to</p>	

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>again help with heat transfer & reduce tube wear therefore reducing tube leaks.</p> <p>r. Steam turbine upgrades - Steam turbine is maintained to OEM design specification & there are currently no available upgrades.</p> <p>s. Supercritical and ultra-supercritical steam conditions - The plant was not designed to run at these pressures.</p>	
13	Reduce water usage and the volume of contaminated waste water discharged	Reduce water usage and the volume of contaminated waste water discharged	Use of one or both of the techniques specified in the associated table.	<p>Techniques:</p> <p>a. Water recycling - Not used</p> <p>b. Dry bottom ash handling - A dry bottom ash system is controlled via the sites DCS. Hot bottom ash drops from the Furnace rotary grate into a series of mechanical screw conveyors & a bucket elevator, conveying the hot bottom ash into ash trailers, allowing the ash to cool down and then be moved from site.</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
14	Prevent contaminated of uncontaminated waste water and to reduce emissions to water	Prevent contaminated of uncontaminated waste water and to reduce emissions to water	Segregate waste water streams and to treat them separately, depending on the pollutant content.	<p>All sites wastewater systems are segregated & laid out as separate systems.</p> <p>Sewage system including the use of a Klargester before being discharged. With a discharge limit of 10m³ over a 24hr period.</p> <p>Rain water run off is segregated into the surface water drain system incorporating Penstocks & Interceptors before being discharged to the river.</p> <p>Trade effluent produced in the demineralized water plant is held in tanks treated by the operations staff via the DCS to be within limits of the sites permit before being discharged to the river. With a discharge limit of 60m³ over a 24hr period. The system is fully interlocked so that only water within the permit limits can be discharged.</p>	CC
15	Reduce emissions to water	Reduce emissions to water from flue-gas treatment	A variety of techniques	N/A No wet FGC methods are used so there are no emissions to reduce	NA

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
16	Reduce waste sent for disposal	To reduce the quantity of waste sent for disposal	A variety of techniques	<p>Waste minimisation is achieved through use of by-product (ashes) as fertiliser from the energy recovery activities (co-incineration of biomass waste with qualifying biomass)</p> <p>Techniques:</p> <p>a. Generation of gypsum by product - Not applicable, residues are used to produce an alternative by-product (fertiliser)</p> <p>b. Recycling or recovery of residues in the construction sector - Not applicable, residues are used to produce fertiliser</p> <p>c. Energy recovery by using waste in the fuel mix - Energy recovery is carried out with all wastes fired contributing to steam generation fed to a turbine / alternator set and electrical export to the grid</p> <p>d. Preparation of spent catalyst for re-use - Not used</p>	CC
17	Reduce noise emissions	To reduce noise emissions	A variety of techniques	<p>Group Procedure Env_P21 'Vibration and Noise Control Measures' in the EMS requires all the listed techniques to be considered if corrective actions are required or</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>new equipment is introduced.</p> <p>Techniques:</p> <p>a. Operational measures - Proactive and reactive plant maintenance is controlled to minimise shutdown and start-up sequences. Doors to the plant buildings are routinely closed when not in use. Fuel deliveries are limited from 06:00 to 20:00 to restrict vehicle noise.</p> <p>b. Low noise equipment - Only applicable during changes to plant equipment</p> <p>c. Noise attenuation - An embankment was raised around the perimeter of the site when the plant was first constructed</p> <p>d. Noise-control equipment - The turbine and alternator set are housed in an acoustic enclosure. Major items of plant equipment, such as combustion fans, are installed within buildings or enclosures.</p> <p>Baffles are installed within the stack and start-up steam hogger.</p> <p>e. Appropriate location of equipment and buildings - The plant is in a location remote from highly populated areas.</p>	

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
Combustion of solid fuels (solid biomass and/or peat)					
AEELs	Energy efficiency	BAT-associated energy efficiency levels (BAT-AEELs)	BAT AEEL as Net Electrical Efficiency from Table 8: Existing unit - 28 to 38%	The calculated net electrical efficiency value in the calendar year of 2021 was 26.47%, but that includes periods operating at less than full load. The following improvement actions have been carried out or planned since 2021: <ul style="list-style-type: none"> Improved turbine lagging - Completed Aug 2022 Regular inspection and cleaning of the ACC. 	NC Improvement condition IC2 set
24	Prevent or reduce emissions of NOx	Prevent or reduce emissions of NOx emissions to air while limiting CO and N ₂ O emissions to air from the combustion of solid biomass and/or peat.	A variety of techniques and associated AELs	Calculated ELVs based on mixing rule formula agreed with Environment Agency. ELVs at 6 vol% O ₂ Ref. mg/Nm ³ NOx: 264.5 CO: 120 The new NOx ELV will effectively be 14% lower than the current ELV, the new CO ELV is effectively unchanged. Improvements will be necessary for the new NOx and CO ELVs to both be met. Techniques used: a. Combustion optimisation - Solid fuel feed rate and distribution on the grate, and supply of Primary and	FC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>Secondary air, are controlled by the Advanced Control System, based on operator selected set points, to achieve optimised solid fuel combustion</p> <p>b. Low NOx burners - N/A for solid fuel</p> <p>c. Air staging - Hot Primary air is fed to the solid fuel through apertures in the grate bars, flow rate is controlled via the DCS to optimise fuel air mix. Secondary air is fed into the furnace above the grate and below the nose to complete combustion of the solid fuel</p> <p>d. Fuel staging - There is a single level of solid fuel injection but fuel delivery is optimised horizontally across the grate by varying the delivery rate from 6 pairs of independently controlled feed screws and the distribution air flow rate. Fuel distribution on the grate can be further optimised by independently varying the speed at which the two grate halves rotate</p> <p>e. Flue gas recirculation - Not used, not included in original plant design</p> <p>f. SNCR - The viability of introduction of an SNCR system is the subject of an ongoing project. It is anticipated that an SNCR system will be installed.</p> <p>g. SCR - Introduction of SCR has been</p>	

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				considered and discounted in favour of SNCR.	
25	Prevent or reduce emissions of SO _x , HCl and HF	Prevent or reduce emissions of SO _x , HCl and HF emissions to air from the combustion of solid biomass and/or peat.	A variety of techniques and associated AELs	<p>Calculated ELVs based on mixing rule formula agreed with Environment Agency ELVs at 6 vol% O₂ Ref mg/Nm³</p> <p>SO₂: 72.2 HCl 12.0 HF: 1.5</p> <p>Techniques:</p> <p>a. Boiler sorbent injection - N/A, control of HCl and SO₂ effective without this technique</p> <p>b. Duct sorbent injection - Sodium bicarbonate is injected into the flue gas before the bag filters. The abatement cake builds up on the bags to react with HCl and SO₂ to meet the current ELVs. Increased dosing of sodium bicarbonate planned to meet the new ELVs.</p> <p>c. Spray dry absorber - N/A, control of HCl and SO₂ effective without this technique</p> <p>d. CFB Dry scrubber - N/A, control of HCl and SO₂ effective without this technique</p> <p>e. Wet scrubbing - N/A, control of HCl</p>	FC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>and SO2 effective without this technique</p> <p>f. Flue gas condenser - N/A, control of HCl and SO2 effective without this technique</p> <p>g. Wet FGD - N/A, control of HCl and SO2 effective without this technique</p> <p>h. Fuel choice - All fuels fired are biomass with low content of relevant chemicals</p> <p>HF emissions have historically been <ELV, previous test results since 2011 <0.6 mg/Nm³</p>	
26	Reduce dust and particulate-bound metal emissions	Reduce emissions of dust and particulate-bound metal emissions to air from the combustion of solid biomass and/or peat.	A variety of techniques and associated AELs	<p>Calculated ELV based on mixing rule formula agreed with Environment Agency ELVs at 6 vol% O2 Ref mg/Nm3 Dust: 8.6</p> <p>Planned and reactive maintenance of the bag filters will continue to meet the reduced Dust ELV Techniques used:</p> <p>a. Electrostatic Precipitator - N/A, control of Dust effective without this technique</p> <p>b. Bag filter - 8 bag filter cells are incorporated in the flue gas path.</p>	FC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>c. Dry or semi-dry FGD - N/A, control of Dust effective without this technique</p> <p>d. Wet FGD - N/A, control of Dust effective without this technique</p> <p>e. Fuel choice - In use fuel mix produces low Dust and Metals results, Dust typically <50% of ELV and Metals <40% of ELV</p>	
27	Prevent or reduce emissions of mercury	Prevent or reduce emissions of mercury emissions to air from the combustion of solid biomass and/or peat.	A variety of techniques and associated AELs	<p>Calculated ELV based on mixing rule formula agreed with Environment Agency ELVs at 6 vol% O2 Ref mg/Nm3</p> <p>Hg: 0.03 Periodic 6 monthly</p> <p>Techniques:</p> <p>a. Carbon sorbent - N/A, control of Hg effective without this technique</p> <p>b. Halogenated additives in fuels or injected - N/A, control of Hg effective without this technique</p> <p>c. Fuel choice - This techniques is the prime method for control of Hg. All fuels used are biomass with low Hg content, consequently no other control measures are necessary.</p> <p>d. Electrostatic Precipitator - N/A,</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>control of Hg effective without this technique</p> <p>e. Bag filter - Bag filters are in use and might contribute to Hg control, but effect is limited without use of activated carbon injection.</p> <p>f. Dry or semi-dry FGD - N/A, control of Hg effective without this technique</p> <p>g. Wet FGD - N/A, control of Hg effective without this technique</p> <p>Hg emissions have historically been <ELV, previous test results since 2011 <0.015 mg/Nm3</p>	
BAT Conclusions for co-incineration (BAT 60 - 71)					
60	Improvement of the general environmental performance	General rules for waste selection, acceptance, mixing, drying and pre-treatment. BAT 60 (a) is to set formal waste acceptance procedures	BAT is to use technique BAT 60 (a) and a combination of the techniques given in BAT 6 and/or the other techniques below.	<p>See answers given for BAT 6</p> <p>BAT 60 techniques:</p> <p>a. Waste pre-acceptance and acceptance:</p> <p>Pre-acceptance - EPRL SHE Procedure ENV_P04 New Biomass Fuel Approval Protocol includes steps to:</p> <p>Identify the source of the waste</p> <p>Verify the waste composition (MSDS)</p>	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				<p>required) Complete COSHH assessment Review chemical composition Assess compatibility with other waste fuels Assess handling characteristics Establish Calorific Value Get agreement for use by the relevant Competent Authority (EA) Acceptance - Regular fuel receipts are pre-arranged through contracted suppliers and types are restricted to those specified in the Permit. Representative fuel samples are sent to UKAS accredited laboratory for analysis of chemical content, CV, ash and moisture. The fuel reception bays separate oversize content, which are chipped and re-fed to avoid waste to landfill.</p>	
61	Adjustment of ELVs to reflect waste component of fuel	Emissions from combustion of waste are not to exceed those set by the WI BAT	BAT is to take appropriate measures to ensure that the emissions of polluting substances in the part of the flue-gases resulting from waste co-	<p>At the time of the issue of the Regulation 61 Notice the EA issued a document showing which ELVs were to be calculated using the IED Mixing Rule formula, those that were set by LCP BATCs and the ELV for CO. They were divided into three groups: Mixing Rule: Particulates, NOx, HCl, SO2, HF, Mercury</p>	FC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
			incineration are not higher than those resulting from the application of BAT conclusions for the incineration of waste.	<p>Set by LCP Section 6: TOCs, PCDD/F, Cd/Tl, Other metals</p> <p>CO: No LCP BAT AEL to be used in the Mixing Rule so an ELV could not be calculated</p> <p>For the species to be calculated a spreadsheet was designed that applied the requirements of the IED Mixing Rule formula as shown in the Defra worked example. The calculations in the spreadsheet were accepted by the EA and the derived ELVs are shown.</p> <p>See key issues section</p>	
62	Maintain a good quality of gypsum, ashes and slags as well as other residues so that they can be recycled (<i>or used</i>)	Control of slags and ashes during waste co-incineration so that they do not differ from normal residues	BAT is to maintain a good quality of gypsum, ashes and slags as well as other residues, in line with the requirements set for their recycling when the plant is not co-incinerating waste, by using one or a combination of the	BAT 62 is not relevant to site, it assumes that firing of waste is an intermittent activity during which residue quality is to be maintained. Firing of waste and biomass mix is the routine situation, other than start-up and shutdown, and ensuring quality of residues (used for fertiliser production rather than gypsum) is optimised for that operating condition. All ashes produced by site from firing of solid fuels are processed off-site to produce fertiliser.	NA

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
			techniques given in BAT 60		
63	Increase the energy efficiency of the co-incineration of waste	Deliver increases in energy efficiency through a combination of techniques shown for BAT 12. (BAT 19 is not applicable)	BAT is to use an appropriate combination of the techniques given in BAT 12	See answers given for BAT 12 for techniques	CC
64	To prevent or reduce NOX emissions to air while limiting CO and N2O emissions	-	N/A	Not applicable - relates to firing of coal and/or lignite	NA
65	To prevent or reduce NOX emissions to air while limiting CO and N2O emissions from the co-incineration of waste with biomass and/or peat	Control of NOx without adversely impacting CO and N ₂ O emissions	BAT is to use one or a combination of the techniques given in BAT 24.	See answers given for BAT 24 for techniques Plan is to introduce SNCR NOx abatement	FC
66	To prevent or reduce SOX, HCl and HF emissions to air	-		Not applicable - relates to firing of coal and/or lignite	NA
67	In order to prevent or reduce SOX, HCl and HF emissions to air from the co-incineration of waste with biomass and/or peat	Control of acid gases	BAT is to use one or a combination of the techniques given in BAT 25.	See answers given for BAT 25 for techniques	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
68	To reduce dust and particulate-bound metal emissions to air	-		Not applicable - relates to firing of coal and/or lignite	NA
69	To reduce dust and particulate-bound metal emissions to air from the co-incineration of waste with biomass and/or peat	Control of particulates and metals emissions	BAT is to use one or a combination of the techniques given in BAT 26.	See answers given for BAT 26 for techniques	CC
70	In order to reduce mercury emissions to air from the co-incineration of waste with biomass	Control of mercury emissions through a combination of techniques shown for BAT 27 (BAT 23 is non-applicable)	BAT is to use one or a combination of the techniques given in BAT 27.	See answers given for BAT 27 techniques	CC
71	To reduce emissions of volatile organic compounds and polychlorinated dibenzodioxins and -furans to air from the co-incineration of waste with biomass,	Control of VOCs, PCDD, PCDF emissions	BAT is to use a combination of the techniques given in BAT 6 and 26, and use of BAT 71 techniques	See answers given for BAT 6 techniques See answers given for BAT 26 techniques BAT 71 techniques: Activated carbon injection - Not used Rapid quenching using wet scrubber/flue gas condenser - Not used, but flue gas temperature controlled by boiler design to achieve rapid cooling of the flue-gas through combustion air/flue gas heat exchangers from temperatures above 400 °C to below 250 °C before dust abatement to prevent the de novo	CC

BAT No.	Topic	Brief Description	BAT	Operator response	Complies with BAT? (NA, CC, FC, NC)
				synthesis of PCDD/F. SCR - Not used	

7 Review and assessment of derogation requests made by the operator in relation to BAT Conclusions which include an associated emission level (AEL) value

The IED enables a competent authority to allow derogations from BAT AELs stated in BAT Conclusions under specific circumstances as detailed under Article 15(4):

By way of derogation from paragraph 3, and without prejudice to Article 18, the competent authority may, in specific cases, set less strict emission limit values. Such a derogation may apply only where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to:

(a) the geographical location or the local environmental conditions of the installation concerned; or

(b) the technical characteristics of the installation concerned.

As part of their Regulation 61 Note response, the operator has not requested a derogation from compliance with any AEL values.

8 Summary checklist

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
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.
Operating techniques	
General operating techniques	We have reviewed the techniques used by the operator where they are relevant to the BAT Conclusions and compared these with the relevant guidance notes. The permit conditions ensure compliance with the relevant BREF, BAT Conclusions. The ELVs deliver compliance with the BAT-AELs.
Permit conditions	
Updating permit conditions during consolidation	We have updated permit conditions to those in the current generic permit template as part of permit consolidation. The conditions will provide at least the same level of protection as those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit.
Changes to the permit conditions due to an Environment Agency initiated variation	We have varied the permit as stated in the variation notice.
Improvement programme	Based on the information on the application, we consider that we need to impose an improvement programme.
Emission limits	We have decided that emission limits should be set for the parameters listed in the permit. These are described in the relevant BAT Conclusions in section of this document. It is considered that the ELVs/equivalent parameters or technical measures described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment is secured.

Aspect considered	Decision
Monitoring	<p>We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.</p> <p>These are described in the relevant BAT Conclusions in section of this document.</p>
Operator competence	
Management system	<p>There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.</p>
Growth Duty	
<p>Section 108 Deregulation Act 2015 – Growth duty</p>	<p>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.</p> <p>Paragraph 1.3 of the guidance says:</p> <p>“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.”</p> <p>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.</p> <p>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.</p>