Environment Agency

Review of an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2010 (as amended)

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

The Permit number is: EPR/BX1675IT
The Operator is: Hydrocarbon Resources Limited
The Installation is: Barrow Gas Terminals
This Variation Notice number is: EPR/BX1675IT/V005

What this document is about

All Environmental permits which permit the operation of large combustion plant (LCP), as defined by articles 28 and 29 of the Industrial Emissions Directive(IED), need to be varied to implement the special provisions for LCP given in the IED, by the 1 January 2016 (Article 82(3)). The IED makes special provisions for LCP under Chapter III, introducing new Emission Limit Values (ELVs) applicable to LCP, referred to in Article 30(2) and set out in Annex V.

The IED provides a period of transition towards the new ELVs via Article 32, the Transitional National Plan (TNP). It also makes provision for plant that wish to be exempted from compliance with the new ELVs in Article 33, the Limited Life Derogation (LLD). Other derogations include limited operating hour regimes for sites using 500 hr or 1500 hr derogations. There are also options for exemption from emission limits based on operating hours.

The Operator has submitted responses to our notice requiring information, issued under regulation 60(1) of the Environmental Permitting Regulations (EPR), which has provided us with information on which compliance route they wish to follow for each LCP. The responses also include specific details relating to each LCP, necessary for accurate implementation the IED requirements. A copy of the regulation 60 notice and the Operator's response is available on the public register.

We have reviewed the permit for this installation, including all variations since the last permit consolidation, and referred to the Operator's responses to the regulation 60 notice requiring information. This is our decision document,

which explains the reasoning for the consolidated variation notice that we have issued.

It explains how we have reviewed and considered the compliance routes and, where relevant, the emissions limits proposed by the Operator for each LCP on the installation. This review has been undertaken with reference to the:

- Chapter III and annex V of the IED

- "IED BAT ESI Review Paper, 28 October 2014" produced by the Environment Agency (referred to as the "2014 Non-ESI BAT review paper" in this document)

- "Electricity Supply Industry – IED compliance protocol for Utility Boilers and Gas Turbines", published by the Joint Environmental Programme.

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 implementing the chapter III IED compliance 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. 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 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 chapter III review

How this document is structured

Glossary

1. Our decision
2. How we reached our decision
3. The legal framework
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GLOSSARY

Baseload	means: (i) as a mode of operation, operating for >4000hrs per annum; and (ii) as a load, the maximum load under ISO conditions that can be sustained continuously, i.e. maximum continuous rating
BAT	best available techniques
BREF	best avalable techniques reference document
CCGT	combined cycle gas turbine
Derogation	as set out in Article 15(4) of the IED
Emergency use	<500 operating hours per annum
ELV	emission limit value set out in either IED or LCPD
GT	gas turbine
IED	Industrial Emissions Directive 2010/75/EC
LCP	large combustion plant – combustion plant subject to Chapter III of IED
LCPD	Large Combustion Plant Directive 2001/80/EC
LLD	Limited Life Derogation
MCR	Maximum Continuous Rating
MSUL/MSDL	Minimum start up load/minimum shut-down load
OCGT	Open Cycle Gas Turbine
Part load operation	operation during a 24 hr period that includes loads between MSUL/MSDL and maximum continuous rating (MCR)
TNP	Transitional National Plan

1 Our decision

We have decided to issue the 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 that concern the operation of the non-LCP part of the installation 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 relating to the requirements of Chapter III of and Annex V to the IED

We issued a Notice under Regulation 60(1) of the Environmental Permitting (England and Wales) Regulations 2010 (a Regulation 60 Notice) on 31/10/14 requiring the Operator to provide information for each LCP they operate, including:

- The type of plant, size and configuration.
- The proposed compliance routes.
- Minimum start up and shut down loads.
- The proposed emission limits and how they accord with the 2014 BAT review paper.
- For gas turbines, proposed emission limits for each unit between the MSUL/MSDL and 70% load, with a justification.

The Regulation 60 Notice response from the Operator was received on 31/03/15.

We considered that the response did not contain sufficient information for us to commence determination of the permit review. We therefore issued a further information request to the Operator. Suitable further information was provided by the Operator on 23/09/15, 06/10/15 and 26/11/15.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review

The Operator made no claim for commercial confidentiality. We have not received any information in relation to the Regulation 60 Notice response that appears to be confidential in relation to any party. However, the site is covered by a national security note which covers the site plan and part of the process description.

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.

Meeting the requirements of the IED

The table below shows how each requirement of the IED has been addressed by the permit conditions.

IED Article Reference	IED requirement	Permit condition
30(6)	If there is an interruption in the supply of gas, an alternative fuel may be used and the permit emission limits deferred for a period of up to 10 days, except where there is an overriding need to maintain energy supplies. The EA shall be notified immediately.	Not applicable
32(4)	For installations that have applied to derogate from the IED Annex V emission limits by means of the transitional national plan, the monitoring and reporting requirements set by UK Government shall be complied with.	Not applicable
33(1)b	For installations that have applied to derogate from the IED Annex V emission limits by means of the Limited Life Derogation, the operator shall submit annually a record of the number of operating hours since 1 January 2016;	2.3.8 4.2.2d
37	Provisions for malfunction and breakdown of abatement equipment including notifying the EA.	Not applicable
38	Monitoring of air emissions in accordance with Ann V Pt 3	3.5, 3.6
40	Multi-fuel firing	Not applicable
41(a)	Determination of start-up and shut-down periods	2.3.5 Schedule 1 Table S1.4
Ann V Pt 1(1)	All emission limit values shall be calculated at a temperature of 273,15 K, a pressure of 101,3 kPa and after correction for the water vapour content of the waste gases and at a standardised O2 content of 6 % for solid fuels, 3 % for combustion plants, other than gas turbines and gas engines using liquid and gaseous fuels and 15 % for gas turbines and gas engines.	Schedule 6, Interpretation
Ann V Pt 1	Emission limit values	3.1.1 Schedule 3, Table S3.1
Ann V Pt 1	For plants operating less than 500 hours per year, record the used operating hours	Not applicable
Ann V Pt 1(6(1))	Definition of natural gas	Schedule 6, Interpretation
Ann V Pt 2	Emission limit values	3.1.2 Schedule 3, Table S3.1
AnnV Pt 3(1)	Continuous monitoring for >100MWth for specified substances	Not applicable
AnnV Pt 3(2, 3, 5)	Monitoring derogations	3.5.1 Schedule 3, Table S3.1

IED Article Reference	IED requirement	Permit condition
AnnV Pt3(4)	Measurement of total mercury	Not applicable
AnnV Pt3(6)	EA informed of significant changes in fuel type or in mode of operation so can check Pt3 (1-4) still apply	2.3.1 Schedule 1, Table S1.2
AnnV Pt3(7)	Monitoring requirements	3.1.1, 3.1.2 Schedule 3, Table S3.1
AnnV Part 3(8,9,10)	Monitoring methods	3.5, 3.6
AnnV Pt 4	Monthly, daily, 95%ile hourly emission limit value compliance	Not applicable
AnnV Pt7	Refinery multi-fuel firing SO2 derogation	Not applicable

4. Key Issues

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

Where relevant and appropriate, we have incorporated the techniques described by the Operator in their Regulation 60 Notice response as specific operating techniques required by the permit, through their inclusion in Table S1.2 of the Consolidated Variation Notice.

The variation notice uses updated LCP numbers in accordance with the most recent DEFRA LCP reference numbers. The LCP references have changed as follows:

- **LCP196** is changed to **LCP177 (A18) ;**
- **LCP197** is changed to **LCP178 (A28) ; and**
- **LCP198** is changed to **LCP179 (A29).**

LCP177, 178 and 179

LCP 177 consists of 1 x 78MWth gas turbine with mechanical drive which vents via its own dedicated windshield at emission point A18 above the waste heat recovery unit (WHRU) as required for site energy services. There is also a bypass stack on this unit. LCP unit 178 consists of 1 x 76MWth gas turbine with mechanical drive which vents via its own dedicated windshield at emission points A28. LCP unit 179 consists of 1 x 76MWth gas turbine with mechanical drive which vents via its own dedicated windshield at emission points A29 The units all burn natural gas .

Compliance Route:
The Operator has proposed to operate LCP 177 under the LLD compliance route and LCP's 178 and 179 under the ELV compliance route.

Net Rated Thermal Input:

LCP 177:

The Operator has stated that the Net Thermal Input is 78 MWth. They have justified this figure by providing details of the manufacturers performance testing carried out by Rolls Wood Group on 31 October 2012. The tests were carried out in accordance with CTS 5017/2 Production Equipment Test Schedule.

This justification is accepted by the Environment Agency.

LCP 178 & 179:

The Operator has stated that the Net Thermal Input of each unit is 76 MWth. They have justified this figure by providing details of the manufacturers performance testing carried out by COGSYS on 5 October 2014 and 8 October 2014.The tests were carried out in accordance with DNVGL2014 Performance Test Method Statement (COG-2207-MS).

This justification is accepted by the Environment Agency.

Minimum start up load and Minimum shut-down load:

The Operator has defined the “minimum start up load” and “minimum shut-down load” for the LCP’s in their response to question 6 of the Regulation 60 Notice, in terms of the output load (12MW); and this output load as a percentage of the rated output of the combustion plant (42% for LCP177 and 40% for LCP 178 and 179).

The output load and percentage of the rated output is based on the rated power output from each unit.

We agree with all of these definitions and have set these thresholds in table S1.4 of the permit accordingly. Standard permit condition 2.3.5 has been set to define the period.

Emission limits:

For ELV plant:

The BAT ESI paper stated a number of principles , one of these being “no backsliding” so if the IED derived ELVs are laxer than the ELVs in the existing permit then the latter will be used.

The IED Annex V ELVs for oxides of nitrogen and carbon monoxide apply to OCGTs, CCGTs and mechanical drive gas turbines when the load is >70%. This has been interpreted as 70% of the rated output load. The rated output load used here is the same as that used for calculating the percentage load when specifying the end of start-up and beginning of shut-down.

The NOx ELV’s proposed are consistent with the approach given in the IED BAT ESI review paper which states that ELV’s will not be tighter than the Annex V values unless an existing ELV is already tighter.

The no backsliding principle detailed in the IED ESI BAT review paper means that the current hourly limits cannot be relaxed. As a result the operator proposed that in the case of A28 and A29 the current hourly ELV of 75mg/m^3

is retained This approach is consistent with the approach given in the IED BAT ESI Review paper 28/10/14 and reproduced below;

I. If the tighter current ELV is specified for an Annex V averaging period (hourly, 24 hourly or monthly), then it will remain as it is.

II. If the tighter current ELV is specified for an averaging period that is not in Annex V, then it will be derived for the closest averaging period that is in Annex V, based on site performance and using the ratios between averaging periods in Annex V as a guide.

III. Where a shorter term elv is tighter than Annex V, the longer term limit will usually be set at the same level, taking into account the fact that the shorter-term elv may be defined as a 95%ile, and the longer term elv as a more stringent 100%ile for compliance.

A28 and A29 ELV route- NOx

NOx	Existing mg/m3	Load	Annex V mg/m3	New Permit limit mg/m3
NOx	125	5-12MW (below MSUL/MSDL)		
NOx	100	12-22MW		
NOx	75	22-30MW		
NOx		>70%	75	75
NOx		<70%	-	100

A28 and A29 ELV route- CO

	Existing mg/m3	Load	Annex V mg/m3	New Permit limit mg/m3
CO	100	Non specified		
CO		>70%	100	100
CO		<70%	-	100

The Operator has proposed limits in line with annex V of the IED and the 2014 BAT review paper. Consequently we have accepted the proposed limits and incorporated them into table 3.1 of the permit.

ELV's for <70% load:

"Low Load" Gas Turbine Emission Limits set when the load varies between MSUL/MSDL and base load during the daily reference period:
IED Annex V ELVs for GTs apply when the load is >70%.

A daily limit of 100 mg/m^3 was proposed for NOx emissions at loads below 70% based on the existing ELV at loads of this type. We have accepted this proposed limit. There is no additional limit for CO.

For LLD Plant -A18 LLD Route-NOx

NOx	Existing mg/m3	Load	Annex V mg/m3	New Permit limit mg/m3
NOx	125	Non specified		
NOx		>70%	75	125
NOx		<70%	-	200

A18 LLD Route-CO

CO	Existing mg/m3	Load	Annex V mg/m3	New Permit limit mg/m3
CO	200	Non specified		
CO		>70%	Not applicable	200
CO		<70%	Not applicable	300

Under the limited life derogation (LLD) ELV's for NOx are set to reflect current performance and so existing limits are set.

LLD plant are not required to meet the Annex V CO limits and so they will remain as they are in the permit .

ELV's for <70% load:

"Low Load" Gas Turbine Emission Limits set when the load varies between MSUL/MSDL and base load during the daily reference period:
IED Annex V ELVs for GTs apply when the load is >70%.

A daily limit of 200 mg/m^3 was proposed for NOx emissions at loads below 70% based on the existing ELV at loads of this type. There was a diagram for emissions at variable loads for 2015 which highlighted that NOx concentrations are elevated to a level below 200 mg/m^3 at low loads. We have accepted this proposed limit though the operator has not provided air dispersion modelling data demonstrating that these emissions will not cause significant pollution. We have therefore required the Operator to carry out an assessment of the environmental risk by means of an improvement condition and submit the information to us.
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A daily limit of 500 mg/m^3 was proposed for CO emissions at loads below 70% based on the existing ELV at loads of this type. There was a diagram for the Operator's emissions at variable loads for 2015 which highlights that CO concentrations are elevated to a level below 300 mg/m^3 at low loads. Following further discussion the latter limit was accepted. (We only require further assessment of the environmental risk for CO when the emission levels are above 440mg/m^3.)

Sulphur dioxide emissions from natural gas firing of gas turbines will be reported as six monthly concentrations on the basis of the fuel sulphur content without continuous or periodic monitoring since only trace quantities of sulphur are present in UK natural gas. For dust in gas turbines we have not required any reporting as the dust emissions will always be reported as zero. This is because natural gas is an ash-free fuel and high efficiency combustion in the gas turbine does not generate additional particulate matter. The fuel gas is always filtered and, in the case of gas turbines, the inlet air is also filtered resulting in a lower dust concentration in the flue than in the surrounding air.

Energy efficiency:

The installation does not have CHP. In line with the DEFRA Part A guidance, to report on the scope for further improvement, a condition has been included for the operator to carry out a 4-yearly efficiency review.

Monitoring & standards:

Standards for assessment of the monitoring location and for measurement of oxygen, water vapour, temperature and pressure have been added to the permit template for clarity.

A row has been included in table S3.1 which requires the operator to confirm compliance with BS EN 15259 in respect of monitoring location and stack gas velocity profile in the event there is a significant operational change (such as a change of fuel type) to the LCP.

Resource efficiency metrics:

A more comprehensive suite of reporting metrics has been added to the permit template for ESI plant. In table S4.2 "Resource Efficiency Metrics" have been added requiring the reporting of various resource parameters, as this is an Electrical Supply Industry (ESI) power plant. These metrics are being used for all ESI plant.

Additional IED Chapter II requirements:

Condition 3.1.4 relating to protection of soil, groundwater and groundwater monitoring, has been added in compliance with IED requirements. Conditions 4.3.1 and 4.3.2 relating to notifications have been amended in compliance with IED requirements.