

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/BU5631IR

The Operator is: National Grid Gas Plc

The Installation is: Carnforth/Nether Kellet Gas Compressor Station

This Variation Notice number is: EPR/BU5631IR/V004

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 a response 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 response also includes 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 response 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 Non-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.

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
4. Key Issues

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 available 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
FGD	flue gas desulphurisation
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
Mid merit	1500-4000 operating hours per annum
MSUL/MSDL	Minimum start up load/minimum shut-down load
OCGT	Open Cycle Gas Turbine
Peaking	500-1500 operating hours per annum
Part load operation	operation during a 24 hr period that includes loads between MSUL/MSDL and maximum continuous rating (MCR)
SCR	selective catalytic reduction
SNCR	selective non catalytic reduction
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 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 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 26/03/15.

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 31/07/15.

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 60 Notice response that appears to be confidential in relation to any party.

The site plan is subject to National Security and is therefore not included in the permit. The operator is required to carry on the permitted activities within the site boundary.

2.2 Requests for Further Information during determination

Although we were able to consider the Regulation 60 Notice response generally satisfactory at receipt, we did in fact need more information in order to complete our permit review assessment, and issued an email requesting further information on 26/10/15 relating to improvement conditions and

thermal input of units D and E. A copy of the email and the Operator's response was placed on our public register.

2.3 Alternative compliance routes

In their Regulation 60 Notice response, the operator initially requested multiple compliance routes be considered for their LCP because at that point they had not decided which route they wanted to apply. The routes requested were:

LCP 236 and LCP 237: 500 hour emergency operation or LLD
LCP 235: ELV compliance

We were only able to issue the variation notice for single compliance routes per LCP (other than TNP which can apply by pollutant), and the operator confirmed which route(s) they wanted in the variation notice by email dated 10/12/15.

The Operator has chosen to operate the LCPs under the following compliance routes:

- LCP 236 (Unit A): Limited Life Derogation (LLD)
- LCP 237 (Unit B): < 500hr emergency operation
- LCP 235 (Unit C): Emission Limit Values

This is what is considered in this decision document.

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.	n/a
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.	n/a
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;	2.3.9 4.2.2d
37	Provisions for malfunction and breakdown of abatement equipment including notifying the EA.	n/a
38	Monitoring of air emissions in accordance with Ann V Pt 3	3.5, 3.6
40	Multi-fuel firing	n/a
41(a)	Determination of start-up and shut-down periods	2.3.9 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	3.1.2 Schedule 3, Table S3.1
Ann V Pt 1	For plants operating less than 500 hours per year, record the used operating hours	2.3.8 4.2.2d
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	n/a
AnnV Pt 3(2, 3, 5)	Monitoring derogations	3.5.1 Schedule 3, Table S3.1
AnnV Pt3(4)	Measurement of total mercury	n/a

IED Article Reference	IED requirement	Permit condition
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	3.5.1 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	3.5.1 Schedule 3, Table S3.1
AnnV Pt7	Refinery multi-fuel firing SO2 derogation	n/a

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.

In the Operator's response to the Reg 60 Notice they had not decided which compliance route to take. The Operator is not required to decide at this stage whether to take the TNP/LLD compliance route or an alternative. We therefore considered all the proposed compliance routes and drafted the associated permits until the Operator informed us of their final decision on 10/12/15.

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

- Unit A, LCP 219 is changed to LCP 236;
- Unit B, LCP 220 is changed to LCP 237; and
- Unit C, LCP 218 is changed to LCP 235.

LCP 236

LCP 236 consists of 1 x 66.3 MWth OCGT which vents at emission point A1. The unit burns natural gas only.

The operator has proposed to operate this LCP under the LLD compliance route.

LCP 237

LCP 237 consists of 1 x 63.7 MWth OCGT which vents at emission point A2. The unit burns natural gas only.

The operator has proposed to operate this LCP under the 500 hour compliance route.

LCP 235

LCP 235 consists of 1 x 71.9 MWth OCGT which vents at emission point A3. The unit burns natural gas only.

The operator has proposed to operate this LCP under the ELV compliance route.

Retaining of bespoke conditions:

We have retained conditions 2.3.4 and 2.3.5 from the original permit relating to the simultaneous operation of the turbine units (referred to in the conditions as Cab A to Cab E).

We have also retained condition 2.3.6 relating to the annual Network Review. This is a condition of the permits for all National Grid Gas compressor stations.

Net Rated Thermal Input:

The Applicant has justified the Net Rated Thermal Inputs stated above in their response to the request for further information.

These tests were based on the maximum flow of fuel (gas) into the turbine multiplied by the net calorific value (ncv) of the fuel, carried out at the maximum fuel flow. Fuel flow rates and the ncv were subject to testing to ISO standard. As these tests are repeatable and provide an absolute measure of the thermal input to the plant, we accept these figures.

As the plant is a mechanical drive gas turbine, no electricity is produced so precluding using electrical output to determine when the plant is in Start-up/Shut-down. In place of this the operator has proposed using three measured operational criteria in place of electrical output and has provided evidence of the trigger values for each of these criteria. We accept these criteria in place of an electrical output

The historic discontinuous emissions monitoring tests for the unit have been reviewed and the highest Net Thermal Input recorded where the exhaust temperature is near maximum exhaust cone temperature (ECT) limit for that unit and the fuel flow is near maximum limit for that unit.

The fuel flow is calculated to ISO 6976:1995 and is externally validated by UKAS accredited external body.

The discontinuous testing is completed to a UKAS accredited method to the requirements of MCERTS by a UKAS accredited testing laboratory.

The test for LCPs 236 and 237 took place on 04/03/2014. The test for LCP 235 took place on 05/03/2014.

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 in their response to question 6 of the Reg 60 and RFI notice, in terms of three criteria that suit the technical characteristics of the plant, which can be met at the end of start-up or start of shut-down.

We agree with this definition and have set these thresholds in the Permit in table S1.5 accordingly.

Standard permit condition 2.3.10 has been set to define the period of start up and shut down, referring to the thresholds in this table.

Emission limits:

The emission limits that were previously permitted are shown in table 1 below with the Annex V limits in table 2 and the new permitted limits in table 3. Note that in the previous permit the limits exclude start up, shut down and operation at loads <55% of MCR and this has been retained for this variation.

Table 1: Previous permitted limits from EPR/BU5631IR/V002

Emission point	Parameter	Previous emission limit	Reference period
A1 and A2	Oxides of Nitrogen (NO and NO ₂ expressed as NO ₂)	380 mg/m ³	Daily average
		380 mg/m ³	95% of validated hourly averages within a calendar year
	Carbon Monoxide (CO)	350 mg/m ³	Daily average
		350 mg/m ³	95% of validated hourly averages within a calendar year
A3	Oxides of Nitrogen (NO and NO ₂ expressed as NO ₂)	75 mg/m ³	Daily average
		150 mg/m ³	95% of validated hourly averages within a calendar year
	Carbon Monoxide (CO)	100 mg/m ³	Daily average
		100 mg/m ³	95% of validated hourly averages within a calendar year

Table 2: Annex V limits

Parameter	Annex V limits
Oxides of Nitrogen (NO and NO ₂ expressed as NO ₂)	75 mg/m ³
Carbon Monoxide (CO)	100 mg/m ³

Table 3: new permitted limits for NOx and CO

Emission point (compliance route)	Parameter	Limit	Reference Period	Monitoring frequency	Monitoring standard or method
A1, Unit A LCP 236 (LLD)	Oxides of Nitrogen (NO and NO ₂ expressed as NO ₂)	345 mg/m ³	Monthly mean of validated hourly averages	Continuous	Predictive Emissions Monitoring (PEM) as described in the application otherwise agreed in writing by the Environment Agency.
		380 mg/m ³	95% of validated daily means within a calendar year		
	Carbon monoxide	318 mg/m ³	Monthly mean of validated hourly averages	Continuous	
		350 mg/m ³	95% of validated daily means within a calendar year		
A2, Unit B LCP 237 (<500 hr)	Oxides of Nitrogen (NO and NO ₂ expressed as NO ₂)	-	-	Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.	Agreed in writing with the Environment Agency
	CO				
A3, Unit C LCP 235 (ELV)	Oxides of Nitrogen (NO and NO ₂ expressed as NO ₂)	75 mg/m ³	Monthly mean of validated hourly averages	Continuous	Predictive Emissions Monitoring as described in the application or otherwise agreed in writing by the Environment Agency
		82 mg/m ³	Daily mean of validated hourly averages		
		150 mg/m ³	95% of validated hourly averages within a calendar year		
A3, Unit C LCP 235 (ELV)	Carbon Monoxide	100 mg/m ³	Monthly mean of validated hourly averages	Continuous	Predictive Emissions Monitoring as described in the application or otherwise agreed in writing by the Environment Agency
		100 mg/m ³	Daily mean of validated hourly averages		
		100 mg/m ³	95% of validated hourly averages within a calendar year		

Currently NGG have limits set only at >55% MCR. Below this the emissions increase significantly and so normally we would consider raising the SU/SD to an appropriate level. In this case however, they are required by the gas grid to operate at low levels of operation for (normally) short periods of time. We therefore have the option of setting additional ELVs or recording the hours below 55% operation and retaining the explanation in table S3.1 that the limits are excluded at operation <55%.

We agreed to record the hours as:

1. Under the annex V ELV route, 3 ELVs would be required
2. Under TNP and LLD, 2 ELVs would be required, and
3. The ELVs would have to be set very high which would not reflect environmental risk

This would further complicate an already complex system where more than one ELV is set and the environmental risk is low and should be monitored using the number of operating hours in this mode as a proxy.

Therefore we have included a note in the emission limit column of table S3.1 for all NGG sites that states 'excluding start up, shut down and operation at loads <55% of MCR.

Gas Turbines:

Sulphur dioxide emissions from natural gas firing of gas turbines and boilers will be reported as six monthly concentrations under the LLD and ELV compliance routes 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. Under the <500 hr compliance route sulphur dioxide emissions will be reported every 4380 operational hours or 2 years, whichever is sooner.

Dust emissions for natural gas fired boilers will, likewise, be reported on the basis of emission factors without continuous or periodic monitoring. For 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.

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. We have assessed the emissions over the operating range and set elvs for >55% MCR in line with the existing permit. 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.

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:

The Operator uses predictive emissions monitoring (PEMS). 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. Although this plant is not ESI, we consider that reporting of the resource efficiency data is appropriate and have included the requirement in Table S4.2. The table includes a full suite of potential parameters. The operator only needs to provide data for the parameters that apply at their installation.

Additional IED Chapter II requirements:

Condition 3.1.3 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.