

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/BJ8162IR
The Operator is: BP Chemicals
The Installation is: Hull Chemical Industry
This Variation Notice number is: EPR/BJ8162IR/V014

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 of 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 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. 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 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

BAT	best available techniques
BREF	best available techniques reference document
ELV	emission limit value set out in either IED or LCPD
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
MCR	Maximum Continuous Rating
MSUL/MSDL	Minimum start up load/minimum shut-down load

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 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 Variation Notice contains several 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 October 2015 requiring the Operator to provide information for each LCP they operate, including:

- The type of plant, size and configuration.
- The proposed compliance route.
- Minimum start up and shut down loads.
- The proposed emission limits and how they accord with the 2014 BAT review paper.

The Regulation 60 Notice response from the Operator was received on 11 May 2015.

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 on 11 November 2015. Suitable further information was provided by the Operator on 23 November 2015. 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.

A copy of the further information request was placed on our public register.

3 The legal framework

The 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 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;	Not applicable
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	Schedule 3, Table 3.1
41(a)	Determination of start-up and shut-down periods	2.3.16 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	Schedule 6, Interpretation
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	Schedule 6, Interpretation
AnnV Pt 3(2, 3, 5)	Monitoring derogations	3.5.1 Schedule 3, Table S3.1
AnnV Pt3(4)	Measurement of total mercury	Schedule 6, Interpretation

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	Schedule 6, Interpretation
AnnV Part 3(8,9,10)	Monitoring methods	3.5, 3.6
AnnV Pt 4	Monthly, daily, 95%ile hourly emission limit value compliance	Schedule 6, Interpretation
AnnV Pt7	Refinery multi-fuel firing SO2 derogation	Schedule 6, Interpretation

4. Key Issues

Unless the decision document specifies otherwise we have accepted the operator'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 Variation Notice.

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

- **LCP68** is changed to **LCP12**

The conditions associated with the remaining activities on this site are not affected by this variation.

LCP12

This LCP consists of a single boiler with a total net rated thermal input of 96.4MW which vents via release point Acetyls/Air 10. The unit is fired on natural gas with hydrogen and / or carbon monoxide as additional fuels.

Compliance Route:

The operator has proposed to operate this LCP under the following compliance route:

- ELV

Net Rated Thermal Input:

The operator has stated that the Net Thermal Input is 96.4MWth. The Operator provided sufficient information in the RFI to justify the figure provided. This was in the form of the component (specific fuel type) thermal inputs calculated using higher heating values (HHV) and a flow component for each input as:-

$$\text{Thermal input}_{(\text{component})} = \text{Flow}_{(\text{component})} \times \text{HHV}_{(\text{component})}$$

The overall thermal input is the sum of each component (fuel type)

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 3 of the RFI in terms of three discrete processes or thresholds for operational parameters 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 all of these definitions and have set these thresholds in table S1.4 of the permit accordingly. Standard permit condition 2.3.16 has been set to define the period of start up and shut down, referring to the thresholds in this table.

Table S1.4 Start-up and Shut-down thresholds		
Emission Point and Unit Reference	“Minimum Start-Up Load” Load in MW and as steam flow rate in tonnes/hour and as percent of rated thermal output (%)	“Minimum Shut-Down Load” Load in MW and as steam flow rate in tonnes/hour and as percent of rated thermal output (%)
Acetyls/Air 10:LCP12	36t/hr steam; 30% of ISO base load at 44.5bar and 360°C	23t/hr steam; 20% of ISO base load at 43bar and 360°C

Emission limits for Oxides of Nitrogen:

BP operates a gas multi fuel fired (MFF) gas < 100MW boiler which provides steam to the adjacent multi operator chemical installation.

The IED (Annex V, Part 4, section 1) requires that each series of periodic measurements must comply with the “emission limit values” set out in the relevant section of Annex V. This is somewhat imprecise as three different ELVs are set, each with a different time basis (monthly, daily and hourly as defined in Annex V, Part 4, Section 1). Periodic monitoring is usually undertaken for a limited time period (ranging from 30 minutes to a number of hours depending on the details of monitoring standard applicable at the time). Consequently, we believe that the most applicable short term emission limit value applicable where only periodic monitoring is required is the daily average value (i.e. 110% of the headline IED Annex V emission limit value). However, we also recognise that this limit value may not be appropriate in some situations (e.g. for those plant that routinely operate at reduced firing rates or where plant operate at highly variable loads). In such cases, a site specific emission limit value would be set, based on the consideration of BAT. Any elevated emission limit value shall not exceed a maximum value of 200% of the headline IED Annex V emission limit value.

The ELV(s) for a MFF plant are calculated via the methodology set out in Article 40(1) of the IED. The operator confirmed on 23 November 2015 that the Article 40 calculated range of ELVs can be complied with and they have been incorporated into Table S3.1 of the permit. The Operator provided a comprehensive set of monitoring data: NOx emissions for different boiler loads and firing regimes (fuel inputs).

The methodology for setting the ELVs is as follows:-

- a) The Operator proposed a lower ELV of 200mg/m³ when LCP12 is fired on natural gas only. This is 200% of the headline figure, which is 100mg/m³ in Annex V. The Operator has justified this figure based on the current operational performance of the plant. It is the maximum

value permissible and is in-line with the current permit limit. The ELV is calculated as follows:-

The lower ELV of 200mg/m³ is set as follows:-

$$((GJ/h_{[m]} \times ELV_{[m]}) / GJ/h_{[t]}) \times C_{[1]}$$

Where

GJ/h _[m]	=	thermal input from natural gas
ELV _[m]	=	headline Annex V ELV for natural gas
GJ/h _[m]	=	total thermal input of appliance
C _[1]	=	site specific correction factor of 200/100

- b) The Operator has proposed an upper ELV of 300mg/m³. This is applicable when the thermal input attributed to 'other gases' is 65% of the total net rated thermal input of the plant. This is 130% of the headline figure as calculated via Article 40(1) of the IED, that figure being 230mg/m³. The Operator has justified this figure based on the current operational performance of the plant. It is lower than the current ELV which is 400mg/m³. The ELV is calculated as follows:-

The upper ELV of 300mg/m³ is set as follows:-

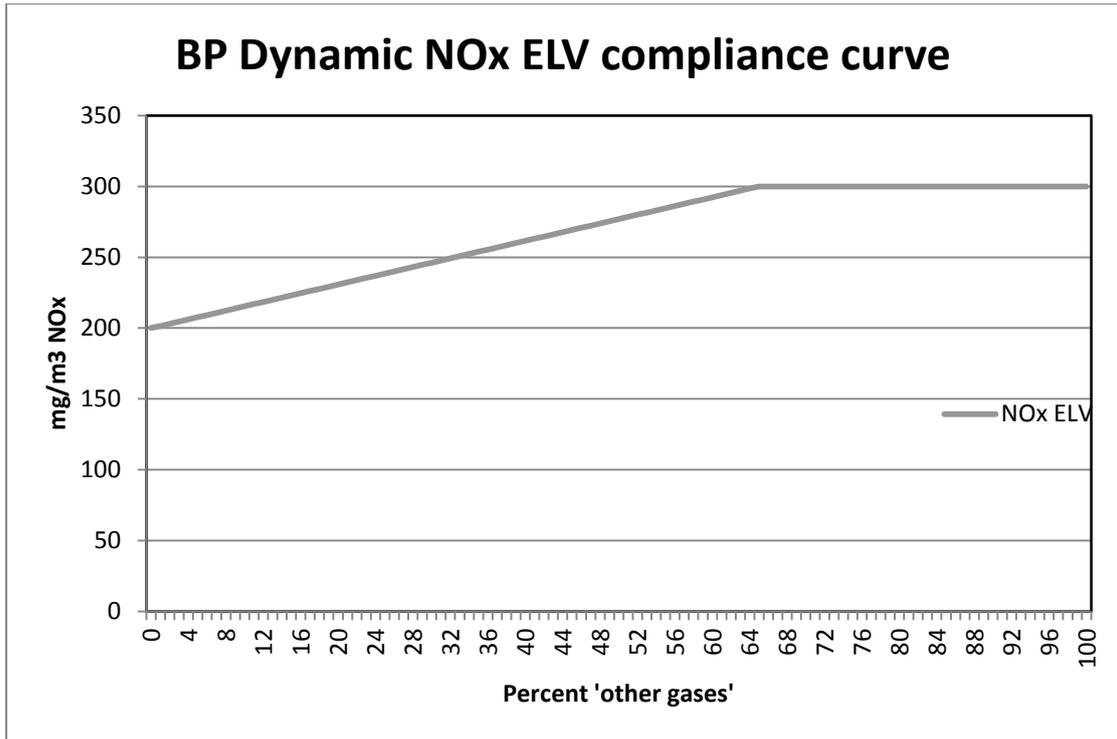
$$(((GJ/h_{[m]} \times ELV_{[m]}) / GJ/h_{[m]}) + ((GJ/h_{[o]} \times ELV_{[o]}) / GJ/h_{[m]})) \times C_{[2]}$$

Where

GJ/h _[o]	=	thermal input from 'other gases'
ELV _[o]	=	headline Annex V ELV for 'other gases'
GJ/h _[m]	=	total thermal input of appliance
C _[2]	=	site specific correction factor of 300/230

- c) The calibration function is a straight line graph between the two i.e.
 $y = 1.5385x + 200$.

The operator has also proposed an ELV of 300mg/m³ where the thermal input attributed to 'other gases' ranges between 65% and 100% of the total net rated thermal input of the plant. The ELV compliance curve is therefore:-



The sampling period will reflect that specified in relevant CEN standards or that in relevant guidance. The monitoring results should be expressed as an average over the sampling period(s) corrected to the relevant reference conditions.

There shall be no subtraction of any sampling uncertainty levels from the reported result. However, the sampling uncertainty of the reference monitoring method will be taken into account when assessing compliance. The limit value will be set as an absolute ELV with no percentile allowances (i.e. a 100% compliance basis over the sampling period).

For completeness:-

LCP12 – Release point Acetyls/Air 10

Net thermal input of Hydrogen as a % of total net rated thermal input of LCP12	Current	IED range	Applied for	Granted
0	200	110 – 200	200	200
Up to 15	250	143 – 260	See compliance curve	See compliance curve
15 – 35	300	187 – 340		
35 – 50	350	220 – 400		
50 – 65	400	253 – 460		
65 - 100	400	253 – 460	300	300

The ELV of 200mg/m³ applies when the boiler is fired on 100% natural gas only. The ELV of 300mg/m³ applies when the energy input to the boiler from hydrogen and / or carbon monoxide is 65% or greater the total rated thermal input of the boiler. This ELV applies up to 100% firing of hydrogen and / or carbon monoxide. Over the range of 0 – 65% hydrogen and / or carbon

monoxide the ELV is as calculated via the compliance curve:- $y = 1.5385x + 200$. This is shown in the ELV compliance curve above.

Emission limits for Carbon Monoxide:

Based on the methodology above the CO ELV could range from 110 – 200mg/m³ i.e. 110% - 200% of the headline Annex V ELV. However, the current permit ELV is 30mg/m³. In-line with the Non-ESI BAT paper this ELV has been retained. It is applicable to all firing modes.

Sulphur Dioxide and Dust:

Sulphur dioxide emissions from natural gas firing of gas turbines and boilers 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. Dust emissions for natural gas fired boilers will, likewise, be reported on the basis of emission factors without continuous or periodic monitoring. This is an additional reporting requirement.

Energy efficiency:

The LCP provides steam to a number of customers within the installation. The permit already requires the operator to undertake a 4-yearly efficiency review.

Reporting efficiency:

In order to ensure the efficiency of plant using fossil fuels or biomass is maximised and regularly recorded, condition 1.2.1(c) has been added. Condition 4.2.2(b) was already in the permit and table S4.2 has been amended accordingly.

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.

There is a requirement to continue to report for 2015 in the transition from LCPD to IED LCP Reporting process annual emissions of dust, sulphur dioxide and oxides of nitrogen including energy usage for the year 01/01/2015 to 31/12/2015. For this reason an Improvement condition has been added to table S1.3.

END.