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/HP3939LN
The Operator is: Medway Power Limited
The Installation is: Medway Power Station
This Variation Notice number is: EPR/HP3939LN/V003

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 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 and any changes to the operation of the installation.

How this document is structured

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
MCR	Maximum Continuous Rating
MSUL/MSDL	Minimum start up load/minimum shut-down load
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)
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 09/12/14 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 higher efficiency gas turbines where they wish to apply for the NO_x emission derogation, the energy efficiency details of the LCP.
- For gas turbines, proposed emission limits for each unit between the MSUL/MSDL and 70% load, with a justification.
- For gas fired plant, whether they wish to apply for derogation from monitoring when on standby fuels.
- Any request to move from continuous to 6 monthly monitoring, or to derogate from 6 monthly monitoring, 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 29/05/15.

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.

2.2 Requests for Further Information during determination

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: ELV compliance, and TNP.

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 they wanted in the variation notice by letter dated 21/12/12. The confirmed route was:
TNP for LCP 218 and LCP219.
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.	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.	3.1.3 Schedule 3, Table S3.3
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	Not applicable
41(a)	Determination of start-up and shut-down periods	2.3.6 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	2.3.7, 2.3.8, 4.2.2e
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	3.5, 3.6 Schedule 3, Table S3.1
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	3.5.1 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.

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

- LCP 212 is changed to LCP 218; and
- LCP 213 is changed to LCP 219.

LCP 217 and LCP218

Both LCPs consist of a 755 MWth CCGT which vent via two windshields at emission points A1 and A2 respectively. The units currently burn natural gas.

The units were designed, and previously operated as duel fuel units – able to operate using either gas, or oil, but not as mixed fuel. Oil firing has not occurred for at least 5 years, and extensive re-engineering work is required to allow the units to now run on oil. The operator wishes though to retain oil firing capability. The original PPC Application was submitted and assessed on the basis of oil firing of up to 2400 hours per year, and the existing permit restricts oil firing to this duration.

Oil is hence not strictly standby fuel in the sense of short term use (for example at times of interruption of gas supply), but rather as an option for longer term use.

Compliance Route:

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

For plant operating under the TNP, ELVs are set which have been derived for the period 2016 – 30 June 2020 (the duration of the TNP). At the end of this period it is expected that both Annex V and the revised LCP BREF will become applicable, in which case Annex V or the BAT conclusions must be achieved (whichever is stricter), or operators must have applied for a derogation from the BAT conclusion (if that is stricter: Annex V will apply in any event). The operator will apply, at the appropriate time, to vary the permit again to reflect this.

The operator's current proposals to achieve the stricter ELVs by 30 June 2020, could involve:

- compliance with the Emission Limit Values that apply under Annex V, through the application of the necessary pollution abatement techniques, or
- compliance with the Emission Limit Values that apply under the 1500 operating hours derogation specified in Annex V, through the application of the necessary pollution abatement techniques, or
- the closure of the plant.

This information is not in any way binding upon the operator and may change.

Net Rated Thermal Input:
The Applicant has stated that the Net Thermal Input is 755MWth per GT. They have justified this figure by providing sets of operational data with GTs running at maximum load.
We have accepted these figures.

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, in terms of the output load (i.e. electricity generated) as one of three discrete 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. The other two parameters are when the GT combustion state enters (or leaves) fully pre-mix steady state (known as 6.3 firing mode), and when gas flow rate exceeds (or falls below) 10 kg/s.

We agree with all of these definitions and have set these thresholds in table S1.4 of the permit accordingly. Standard permit condition 2.3.7 has been set to define the period of start up and shut down, referring to the thresholds in this table.

Emission limits:

For gas firing, 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.

NOx – Gas firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	100	100
50 mg/m3	24 hourly averages	55	50
None	Monthly averages	50	50

The existing permit sets a daily NOx ELV of 50 mg/m3. Under the no backsliding rule, this will be carried forwards as the daily limit under the IED variation. The monthly average ELV is set at the IED limit of 50mg/m3. The hourly average is also set at the IED limit of 100 mg/m3.

CO – Gas firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	200	100
50 mg/m3	24 hourly averages	110	50
None	Monthly averages	100	50

The existing permit sets a daily CO ELV of 50 mg/m3. Under the no backsliding rule, this will be carried forwards as the daily limit under the IED variation. The monthly average ELV is thus set lower than the IED limit, also at 50mg/m3. The hourly average is set at the IED ratio of 200% of the monthly limit, at 100 mg/m3.

NOx – Oil firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	180	250
125 mg/m3	24 hourly averages	99	125
None	Monthly averages	90	125

For oil firing under the TNP, the operator has proposed limits for NOx of 125 mg/m3 monthly, 125 mg/m3 daily, and 227 mg/m3 hourly. These are based on the existing permit ELV of 125 mg/m3 as a daily average. Whilst there is a lack of historical data to justify the use of these values, we have accepted the Operators proposed ELVs.

The existing permit sets a daily NOx ELV of 125mg/m3. The monthly average ELV is thus also set at 125mg/m3. The hourly average is set at the IED ratio of 200% of the monthly limit, at 250 mg/m3 (not 227 mg/m3 as requested).

CO – Gas firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	200	100
50 mg/m3	24 hourly	110	50

	averages		
None	Monthly averages	100	50

The existing permit sets a daily CO ELV of 50 mg/m3. Under the no backsliding rule, this will be carried forwards as the daily limit under the IED variation. The monthly average ELV is thus set lower than the IED limit, also at 50mg/m3. The hourly average is set at the IED ratio of 200% of the monthly limit, at 100 mg/m3.

Gas Turbines:

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. 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. 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.

Standby fuels:
The operator normally uses gas fuel and has applied to use gas oil as a alternative fuel. The existing limit for oil firing of 2400 hours per year per LCP has been retained, as this has previously been assessed and is currently permitted.

Oil fired gas turbines:
Sulphur dioxide emissions from oil firing of gas turbines will be reported as six monthly concentrations on the basis of the known fuel sulphur content without continuous or periodic monitoring.

Continuous dust monitoring (for >100MWth plant) has been required when oil firing, and reported as a daily mean of validated hourly averages.

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), condition 4.2.2(b) and table S4.2 have been added to the permit.

Notifications:

Schedule 5, Part C, takes account of the malfunction and breakdown requirements. A breach of permit condition is NOT implicit in notification under Part C.

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. Table S4.2 “Resource Efficiency Metrics” has been added requiring the reporting of various resource parameters, as this is an Electrical Supply Industry (ESI) power plant. This table is being used for all ESI plant.

Additional IED Chapter II requirements:
Condition 3.1.6 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.

Annex 1: Review and assessment of changes that are not part of the Chapter III IED derived permit review.

The Operator has requested the removal of the existing NOx ELV (1650 mg/3) set for the black start diesel facility, discharging at emissions point A3, and that this facility is not subject to any restrictions in operating hours. The existing permit does not set a restriction on operating hours per year.

The black start diesel generators are run for routine testing, and at times of main plant shut down, to provide auxiliary power to allow maintenance works to be undertaken. The facility comprises seven diesel engines, discharging through a common stack, each of c.9 MWth input. It is therefore a Section 1.1 A(1) (a) activity under the EP Regulations, although not an IED Chapter 3 combustion plant.

The PPC Application was submitted on the basis of the units running for 1 hour per day, and 21 days per month, for a total of 252 hours per year, and assessed on this basis. Actual operations can exceed this, with extended running during periods of plant shut down.

In order for the existing emission limit to be removed, or increased, the Operator will need to demonstrate no significant impact to air quality based on actual typical operations. They must also demonstrate that as operational practices differ from the original assessment basis, that the increased hours running, and extended periods of operation during shut down, do also not present air quality impacts.

An IC has therefore been set, which requires the Operator to:
"Submit a written report to the Environment Agency for approval. The report shall contain an assessment of the impacts of the emissions from emission point A3 - black start diesel generators, using our H1 guidance or equivalent methodology. Both short term and long term emissions shall be assessed, based on typical (and/or proposed) operational practices. Based on this assessment, the report shall, if appropriate propose a) either the removal of; or, an increase in, the emission limit values for oxides of nitrogen from A3; and b) propose an alternative limit on operational hours to the current 500 hour limit."

The case for removal of the NOx ELV, and unrestricted operation has not been made, and therefore the existing ELV will be retained. A new limit of 500 hours per year has also been set, to be in line with the definition of energy plant in the IED (although the diesel engines are too small to come under chapter III of the IED)

Annex 2: Summary of emission limits for ELV Compliance Route

The emission limits that would be applied had the Operator selected the ELV compliance route are summarised below, as a matter of record.

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.

NOx – Gas firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	100	100
50 mg/m3	24 hourly averages	55	50
None	Monthly averages	50	50

The existing permit sets a daily NOx ELV of 50 mg/m3. Under the no backsliding rule, this will be carried forwards as the daily limit under the IED variation. The monthly average ELV is set at the IED limit of 50mg/m3. The hourly average is also set at the IED limit of 100 mg/m3.

CO – Gas firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	200	100
50 mg/m3	24 hourly averages	110	50
None	Monthly averages	100	50

The existing permit sets a daily CO ELV of 50 mg/m3. Under the no backsliding rule, this will be carried forwards as the daily limit under the IED variation. The monthly average ELV is thus set lower than the IED limit, also at 50mg/m3. The hourly average is set at the IED ratio of 200% of the monthly limit, at 100 mg/m3.

NOx – Oil firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	180	180
125 mg/m3	24 hourly averages	99	99
None	Monthly	90	90

	averages		

The existing permit daily NOx ELV of 125 mg/m3 is above the IED limit, and hence the IED limits are applied directly for monthly, daily and hourly ELVs.

CO – oil firing

Existing mg/m3	Reference Period	Annex V mg/m3	New Permit limit mg/m3
None	95%ile of hourly averages	200	100
50 mg/m3	24 hourly averages	110	50
None	Monthly averages	100	50

The existing permit sets a daily CO ELV of 50 mg/m3. Under the no backsliding rule, this will be carried forwards as the daily limit under the IED variation. The monthly average ELV is thus set lower than the IED limit, also at 50mg/m3. The hourly average is set at the IED ratio of 200% of the monthly limit, at 100 mg/m3.

The existing permit sets a dust limit of 20 mg/m3 when operating on distillate fuel, which is carried forward as a requirement in the new permit.