Notice of variation and consolidation with introductory note

The Environmental Permitting (England & Wales) Regulations 2016

Phillips 66 Limited

Humber Refinery
Eastfield Road
South Killingholme
North Lincolnshire
DN40 3DW

Variation application number

EPR/UP3230LR/V014

Permit number

EPR/UP3230LR

Humber Refinery
Permit number EPR/UP3230LR

Introductory note

This introductory note does not form a part of the notice.

Under the Environmental Permitting (England & Wales) Regulations 2016 (schedule 5, part 1, paragraph 19) a variation may comprise a consolidated permit reflecting the variations and a notice specifying the variations included in that consolidated permit.

Schedule 1 of the notice specifies the conditions that have been varied and schedule 2 comprises a consolidated permit which reflects the variations being made. All the conditions of the permit have been varied and are subject to the right of appeal.

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. We have reviewed the permit for this installation against the revised BAT Conclusions for the refining of mineral oil and gas industry sector published on 28th October 2014.The rest of the installation is unchanged and continues to be operated as follows:

The Humber refinery is located at South Killingholme in North Lincolnshire and is operated by Phillips 66 Limited. The refinery processes crude oil for the production of fuels and petroleum coke.

The main environmental releases from the site are sulphur dioxide, oxides of nitrogen, Dust matter and volatile organic compounds. Conditions within the permit have been set to ensure the permitted operation can comply with environmental standards relating to local receptors.

The schedules specify the changes made to the permit.

The status log of a permit sets out the permitting history, including any changes to the permit reference number.

Status log of the permit		
Description	**Date**	**Comments**
Original Application UP3230LR - Issued	14/12/2007	
Variation Application JP3431XS - Issued	20/06/2008	
Variation EPR/UP3230LR/V003 – Issued (YP3337GH)	11/09/2009	
Administrative variation EPR/UP3230LR/V004 – Issued (NP3430TP)	29/04/2010	
Variation Application EPR/UP3230LR/V005 submitted		Variation V006 applied for prior to V005 being duly made.
Variation Application EPR/UP3230LR/V006 Duly Made	18/01/2012	
Variation EPR/UP3230LR/V006 issued	01/05/2012	Varied and consolidated permit issued.
Variation Application EPR/UP3230LR/V007 Duly Made	03/08/2012	Administrative variation to change company name
Variation EPR/UP3230LR/V007	16/08/2012	Varied permit issued

Application EPR/UP3230LR/V008 (variation and consolidation) Duly made	31/01/2013	Application to vary and update the permit
Schedule 5 notice	11/03/2013	Questions relating to air modelling checklist, background concentration levels, assessment of critical load predictions and clarification on normalised flow rates used for calculating modelled emissions.
Further Information	26/07/2013	This includes a request for a time limited derogation to the FCC Dust limit in case there is a failure of the ammonia injection equipment.
Variation determined EPR/UP3230LR/V008	07/02/2014	Varied and consolidated permit issued in modern condition format.
Application EPR/UP3230LR/V009 (variation and consolidation)	Duly made 13/02/2015	Application to vary and consolidate the permit. Variation modifies release limits for emission points A6b, A8, A9 and A11.
Variation determined EPR/UP3230LR/V009 (PAS Billing Ref SP3837WX)	14/04/2015	Varied and consolidated permit issued in modern condition format.
Variation Application EPR/UP3230LR/V010	Duly made 10/06/2015	Application to extend commissioning period of TGTU and temporary SO2 emission limits.
Variation determined EPR/UP3230LR/V010	07/07/2015	Variation Notice issued.
Variation Application EPR/UP3230LR/V011	Duly made 16/11/2015	Application to reduce the reduction required from 01/01/2016 in the sulphur dioxide annual mass emission limit.
Variation determined EPR/UP3230LR/V011	23/12/2015	Variation Notice issued.
Regulation 60 Notice sent to the Operator	05/08/2015	Issue of a Notice under Regulation 60(1) of the EPR. Environment Agency Initiated review and variation to vary the permit under IED to implement the 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.
Regulation 60 Notice sent to the Operator	05/08/2015	Issue of a Notice under Regulation 60(1) of the EPR. Environment Agency initiated review and variation to vary the permit under IED to implement Chapter II following the publication of the revised Best Available Techniques (BAT) Reference Document for the Refining of Mineral Oil and Gas.
Regulation 60 Notice response	30/10/2015	Response received from the Operator (Chapter III).
Additional information received	14/12/2015	Response to request for further information (RFI) dated 16/11/2015. Compliance route and operating technique identified in response to questions 2f (methodology for assigning periods of start up and shutdown).
Variation determined EPR/UP3230LR/V012 (PAS Billing ref: HP3334RJ)	16/05/2017	Varied and consolidated permit issued Variation effective from 16/05/2017.
Variation Application EPR/UP3230LR/V013	Duly made 02/11/2017	Application to allow the processing of waste feedstocks through the catalytic cracker and

		to allow planned single unit Sulphur Recovery Unit start-ups and shutdowns bypassing the Tail Gas Treatment Unit.
Variation determined EPR/UP3230LR/V013 (PAS Billing ref: QP3439JF)	25/01/2018	Variation Notice issued.
Regulation 60 Notice response	05/02/16	Compliance and operating techniques identified in response to the BAT Conclusions for the refining of mineral oil and gas industry sector published on 28th October 2014.
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	03/07/17	Compliance and operating techniques identified in response to the BAT Conclusions 20,22,25,45,47 and 54.
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	06/10/17	Compliance and operating techniques identified in response to the BAT Conclusions 3,15,29,49 and 56.
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	16/11/17	Compliance and operating techniques identified in response to the BAT Conclusions 32,44,46 and 52.
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	13/02/18	Compliance and operating techniques identified in response to BAT Conclusion 19.
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	09/10/18	Approved Integrated Emissions Management Protocol
Variation determined EPR/UP3230LR/V014 (PAS Billing ref: EP3432QV)	23/10/18	Varied and consolidated permit issued Variation effective from 28/10/2018.

End of introductory note

Notice of variation and consolidation

The Environmental Permitting (England and Wales) Regulations 2016

The Environment Agency in exercise of its powers under regulation 20 of the Environmental Permitting (England and Wales) Regulations 2016 varies and consolidates

Permit number

EPR/UP3230LR

Issued to

Phillips 66 Limited ("the operator")

whose registered office is

7th Floor
200 - 202 Aldersgate Street
London
EC1A 4HD

company registration number **00529086**

to operate an Installation at

Humber Refinery
Eastfield Road
South Killingholme
North Lincolnshire
DN40 3DW

to the extent set out in the schedules.

The notice shall take effect from 28/10/2018

Name	Date
M Bischer	**23/10/2018**

Authorised on behalf of the Environment Agency

Schedule 1

All conditions have been varied by the consolidated permit as a result of an Environment Agency initiated variation.

Schedule 2 – consolidated permit

Consolidated permit issued as a separate document.

Permit

The Environmental Permitting (England and Wales) Regulations 2016

Permit number

EPR/UP3230LR

This is the consolidated permit referred to in the variation and consolidation notice for application EPR/UP3230LR/V014 authorising,

Phillips 66 Limited ("the operator"),

whose registered office is

7th Floor
200 - 202 Aldersgate Street
London
EC1A 4HD

company registration number **00529086**

to operate an installation at

Humber Refinery
Eastfield Road
South Killingholme
North Lincolnshire
DN40 3DW

to the extent authorised by and subject to the conditions of this permit.

Name	Date
M Bischer	**23/10/2018**

Authorised on behalf of the Environment Agency

Conditions

1 Management

1.1 General management

1.1.1 The operator shall manage and operate the activities:

(a) in accordance with a written management system that identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances, closure and those drawn to the attention of the operator as a result of complaints; and

(b) using sufficient competent persons and resources.

1.1.2 Records demonstrating compliance with condition 1.1.1 shall be maintained.

1.1.3 Any person having duties that are or may be affected by the matters set out in this permit shall have convenient access to a copy of it kept at or near the place where those duties are carried out.

1.2 Energy efficiency

1.2.1 The operator shall:

(a) take appropriate measures to ensure that energy is used efficiently in the activities;

(b) review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and

(c) take any further appropriate measures identified by a review.

1.3 Efficient use of raw materials

1.3.1 The operator shall:

(a) take appropriate measures to ensure that raw materials and water are used efficiently in the activities;

(b) maintain records of raw materials and water used in the activities;

(c) review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and

(d) take any further appropriate measures identified by a review.

1.4 Avoidance, recovery and disposal of wastes produced by the activities

1.4.1 The operator shall take appropriate measures to ensure that:

(a) the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste by the activities; and

(b) any waste generated by the activities is treated in accordance with the waste hierarchy referred to in Article 4 of the Waste Framework Directive; and

(c) where disposal is necessary, this is undertaken in a manner which minimises its impact on the environment.

1.4.2 The operator shall review and record at least every four years whether changes to those measures should be made and take any further appropriate measures identified by a review.

2 Operations

2.1 Permitted activities

2.1.1 The operator is only authorised to carry out the activities specified in schedule 1 table S1.1 (the "activities").

2.2 The site

2.2.1 The activities shall not extend beyond the site, being the land shown edged in green on the site plan at schedule 7 to this permit.

2.3 Operating techniques

2.3.1 (a) The activities shall, subject to the conditions of this permit, be operated using the techniques and in the manner described in the documentation specified in schedule 1, table S1.2, unless otherwise agreed in writing by the Environment Agency.

(b) If notified by the Environment Agency that the activities are giving rise to pollution, the operator shall submit to the Environment Agency for approval within the period specified, a revision of any plan or other documentation ("plan") specified in schedule 1, table S1.2 or otherwise required under this permit which identifies and minimises the risks of pollution relevant to that plan , and shall implement the approved revised plan in place of the original from the date of approval, unless otherwise agreed in writing by the Environment Agency.

2.3.2 For the following activities referenced in schedule 1, table S1.1: LCP 64, LCP 259, LCP 260, LCP 261, LCP 262 and LCP 263 the end of the start up period and the start of the shutdown period shall conform to the specifications set out in Schedule 1, table S1.2.

2.3.3 Any raw materials or fuels listed in schedule 2 table S2.1 shall conform to the specifications set out in that table.

2.3.4 Waste shall only be accepted if:

(a) it is of a type and quantity listed in schedule 2 table S2.2 and S2.3; and

(b) it conforms to the description in the documentation supplied by the producer and holder.

2.3.5 The operator shall ensure that where waste produced by the activities is sent to a relevant waste operation, that operation is provided with the following information, prior to the receipt of the waste:

(a) the nature of the process producing the waste;

(b) the composition of the waste;

(c) the handling requirements of the waste;

(d) the hazardous property associated with the waste, if applicable; and

(e) the waste code of the waste.

2.3.6 The operator shall ensure that where waste produced by the activities is sent to a landfill site, it meets the waste acceptance criteria for that landfill.

2.3.7 (a) The Operator shall implement measures to ensure that periods when the acid gas removal systems are not available are minimised and that they operate with sufficient capacity to treat the acid gases produced.

(b) These measures shall include procedures for minimising the impact of periods of other than normal operation of the acid gas removal systems.

(c) The operator shall record periods when sufficient capacity is not available in the acid gas removal systems, to treat the sour gases produced. The Operator shall record the duration of the period of loss of capacity, the cause of the event and measures taken to reinstate the system's availability

2.3.8 The operator shall, wherever practicable, treat process offgas streams which are to be used as refinery fuel gas (RFG), to remove acid gases such that the relevant BAT-AEL is achieved or ensure equivalence is met through the Integrated Emissions Management Technique.

2.4 Improvement programme

2.4.1 The operator shall complete the improvements specified in schedule 1 table S1.3 by the date specified in that table unless otherwise agreed in writing by the Environment Agency.

2.4.2 Except in the case of an improvement which consists only of a submission to the Environment Agency, the operator shall notify the Environment Agency within 14 days of completion of each improvement.

2.5 Pre-operational conditions

2.5.1 There are no pre-operational conditions in this permit.

3 Emissions and monitoring

3.1 Emissions to water, air or land

3.1.1 There shall be no point source emissions to water, air or land except from the sources and emission points listed in schedule 3 tables S3.1, S3.1a and S3.2.

3.1.2 The limits given in schedule 3 shall not be exceeded.

3.1.3 Total annual emissions from the emission point(s) set out in tables schedule 3 S3.1, S3.1a and S3.2 of a substance listed in schedule 3 table S3.3 shall not exceed the relevant limit in table S3.3.

3.1.4 Periodic monitoring shall be carried out at least once every 5 years for groundwater and 10 years for soil, unless such monitoring is based on a systematic appraisal of the risk of contamination.

3.2 Emissions of substances not controlled by emission limits

3.2.1 Emissions of substances not controlled by emission limits (excluding odour) shall not cause pollution. The operator shall not be taken to have breached this condition if appropriate measures including, but not limited to, those specified in schedule 1 table S1.4, have been taken to prevent or where that is not practicable, to minimise, those emissions.

3.2.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution, submit to the Environment Agency for approval within the period specified, an emissions management plan which identifies and minimises the risks of pollution from emissions of substances not controlled by emission limits;

(b) implement the approved emissions management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.2.3 All liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container.

3.3 Monitoring

3.3.1 The operator shall, unless otherwise agreed in writing by the Environment Agency, undertake the monitoring specified in the following tables in schedule 3 to this permit:

(a) point source emissions specified in tables S3.1, S3.1a, S3.1b, S3.2 and S3.3;

(b) process monitoring specified in table S3.4.

3.3.2 The operator shall maintain records of all monitoring required by this permit including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.

3.3.3 Monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme and the environmental or other monitoring specified in condition 3.3.1 shall have either MCERTS certification or MCERTS accreditation (as appropriate), where available, unless otherwise agreed in writing by the Environment Agency.

3.3.4 Newly installed Continuous Emission Monitors (CEMs), or CEMs replacing existing CEMs, shall have MCERTS certification and have an MCERTS certified range which is not greater than 2.5 times the daily emission limit value (ELV) specified in schedule 3 table S3.1. The CEM shall also be able to measure instantaneous values

over the ranges which are to be expected during all operating conditions. If it is necessary to use more than one range setting of the CEM to achieve this requirement, the CEM shall be verified for monitoring supplementary, higher ranges.

3.3.5 Permanent means of access shall be provided to enable sampling/monitoring to be carried out in relation to the emission points specified in schedule 3 tables S3.1, S3.1a, and S3.2 unless otherwise agreed in writing by the Environment Agency.

3.3.6 The operator shall monitor and record the following parameters for flaring events when the rate of gas flared exceeds 4 million standard cubic feet per day (MMSCFD) on emission point A21 (No.1 Flare) as a 15-min mean value; and/or 9 million standard cubic feet per day (MMSCFD) on emission point A22 (No.3 Flare) as a 15-min mean value:

(a) Duration of event;

(b) Total mass of gas flared;

(c) Mass of SO_2 released; and

(d) Calorific value of the gas flared.

The operator shall identify the root cause of the flaring event and consider ways to prevent or reduce the frequency and duration of recurrences.

3.4 Odour

3.4.1 Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures including, but not limited to, those specified in schedule 1 table S1.4, to prevent or where that is not practicable to minimise the odour.

3.4.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to odour, submit to the Environment Agency for approval within the period specified, an odour management plan which identifies and minimises the risks of pollution from odour;

(b) implement the approved odour management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.5 Noise and vibration

3.5.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures including, but not limited to, those specified in schedule 1 table S1.5, to prevent or where that is not practicable to minimise the noise and vibration.

3.5.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to noise and vibration, submit to the Environment Agency for approval within the period specified, a noise and vibration management plan which identifies and minimises the risks of pollution from noise and vibration;

(b) implement the approved noise and vibration management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.6 Monitoring for the purposes of Chapter III of the Industrial Emissions Directive

3.6.1 All LCP monitoring required by this permit shall be carried out in accordance with the provisions of Annex V of the Industrial Emissions Directive.

3.6.2 If the monitoring results for more than 10 days a year are invalidated within the meaning set out in condition 3.6.7, the Operator shall:

(a) within 28 days of becoming aware of this fact, review the causes of the invalidations and submit to the Environment Agency for approval, proposals for measures to improve the reliability of the continuous measurement systems, including a timetable for the implementation of those measures; and

(b) implement the approved measures.

3.6.3 Continuous measurement systems on emission points from the LCP shall be subject to quality control by means of parallel measurements with reference methods at least once every calendar year.

3.6.4 Unless otherwise agreed in writing by the Environment Agency in accordance with condition 3.6.5 below, the operator shall carry out the methods, including the reference measurement methods, to use and calibrate continuous measurement systems in accordance with the appropriate CEN standards.

3.6.5 If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall be used, as agreed in writing with the Environment Agency.

3.6.6 Where required by a condition of this permit to check the measurement equipment the operator shall submit a report to the Environment Agency in writing, within 28 days of the completion of the check.

3.6.7 Where Continuous Emission Monitors are installed to comply with the monitoring requirements in schedule 3, table S3.1; the Continuous Emission Monitors shall be used such that:

- for the continuous measurement systems fitted to the LCP release points defined in Table S3.1 the validated hourly, monthly and daily averages shall be determined from the measured valid hourly average values after having subtracted the value of the 95% confidence interval;
- the 95% confidence interval for nitrogen oxides and sulphur dioxide of a single measured result shall be taken to be 20%;
- the 95% confidence interval for dust releases of a single measured result shall be taken to be 30%;
- the 95% confidence interval for carbon monoxide releases of a single measured result shall be taken to be 10%;
- an invalid hourly average means an hourly average period invalidated due to malfunction of, or maintenance work being carried out on, the continuous measurement system. However, to allow some discretion for zero and span gas checking, or cleaning (by flushing), an hourly average period will count as valid as long as data has been accumulated for at least two thirds of the period (40 minutes). Such discretionary periods are not to exceed more than 5 in any one 24-hour period unless agreed in writing. Where plant may be operating for less than the 24-hour period, such discretionary periods are not to exceed more than one quarter of the overall valid hourly average periods unless agreed in writing; and
- any day, in which more than three hourly average values are invalid shall be invalidated.

3.7 Integrated Air Emissions Management

3.7.1 In order to assess compliance with the integrated emissions management limit for oxides of nitrogen (NOx), specified in Table S3.1b:

(a) the operator shall undertake the monitoring and calculations described in the Integrated Emissions Management Technique Protocol as approved by the Environment Agency, for all units covered by the bubble limit.

(b) during a period of other than normal operation of one of these units, the operator shall use the 'standard contribution value' (as specified in the approved Integrated Emissions Management Technique Protocol) when assessing compliance with the bubble emission limit value. The Operator will record the start and conclusion of periods of 'other than normal operating conditions' and record the emissions from the affected unit(s) during that period.

3.7.2 In order to assess compliance with the integrated emissions management limit for sulphur dioxide (SO_2), specified in Table S3.1b:

(a) the operator shall undertake the monitoring and calculations described in the Integrated Emissions Management Technique Protocol as approved by the Environment Agency, for all units covered by the bubble limit.

(b) during a period of other than normal operation of one of these units, the operator shall use the 'standard contribution value' (as specified in the approved Integrated Emissions Management Technique Protocol) when assessing compliance with the bubble emission limit value. The Operator will record the start and conclusion of periods of 'other than normal operating conditions' and record the emissions from the affected unit during that period.

4 Information

4.1 Records

4.1.1 All records required to be made by this permit shall:

(a) be legible;

(b) be made as soon as reasonably practicable;

(c) if amended, be amended in such a way that the original and any subsequent amendments remain legible, or are capable of retrieval; and

(d) be retained, unless otherwise agreed in writing by the Environment Agency, for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:

(i) off-site environmental effects; and

(ii) matters which affect the condition of the land and groundwater.

4.1.2 The operator shall keep on site all records, plans and the management system required to be maintained by this permit, unless otherwise agreed in writing by the Environment Agency.

4.2 Reporting

4.2.1 The operator shall send all reports and notifications required by the permit to the Environment Agency using the contact details supplied in writing by the Environment Agency.

4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to the Environment Agency by 31 January (or other date agreed in writing by the Environment Agency) each year. The report(s) shall include as a minimum:

(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data;

(b) the annual production /treatment data set out in schedule 4 table S4.2; and

(c) the performance parameters set out in schedule 4 table S4.3 using the forms specified in table S4.4 of that schedule.

(d) details of any contamination or decontamination of the site which has occurred.

4.2.3 Within 28 days of the end of the reporting period the operator shall, unless otherwise agreed in writing by the Environment Agency, submit reports of the monitoring and assessment carried out in accordance with the conditions of this permit, as follows:

(a) in respect of the parameters and emission points specified in schedule 4 table S4.1;

(b) for the reporting periods specified in schedule 4 table S4.1 and using the forms specified in schedule 4 table S4.4; and

(c) giving the information from such results and assessments as may be required by the forms specified in those tables.

4.2.4 The operator shall, unless notice under this condition has been served within the preceding four years, submit to the Environment Agency, within six months of receipt of a written notice, a report assessing whether there are other appropriate measures that could be taken to prevent, or where that is not practicable, to minimise pollution.

4.2.5 Within 1 month of the end of each quarter, the operator shall submit to the Environment Agency using the form made available for the purpose, the information specified on the form relating to the site and the waste accepted and removed from it during the previous quarter, if during that quarter the total amount accepted exceeds 100 tonnes of non-hazardous waste or 10 tonnes of hazardous waste.

4.3 Notifications

4.3.1 (a) In the event that the operation of the activities gives rise to an incident or accident which significantly affects or may significantly affect the environment, the operator must immediately—

(i) inform the Environment Agency,

(ii) take the measures necessary to limit the environmental consequences of such an incident or accident, and

(iii) take the measures necessary to prevent further possible incidents or accidents;

(b) in the event of a breach of any permit condition the operator must immediately—

(i) inform the Environment Agency, and

(ii) take the measures necessary to ensure that compliance is restored within the shortest possible time;

(c) in the event of a breach of permit condition which poses an immediate danger to human health or threatens to cause an immediate significant adverse effect on the environment, the operator must suspend the operation of the activities or the relevant part of it in a safe and controlled manner until compliance with the permit conditions has been restored.

4.3.2 Any information provided under condition 4.3.1(a)(i), or 4.3.1 (b)(i) where the information relates to the breach of a limit specified in the permit, shall be confirmed by sending the information listed in schedule 5 to this permit within the time period specified in that schedule.

4.3.3 Where the Environment Agency has requested in writing that it shall be notified when the operator is to undertake monitoring and/or spot sampling, the operator shall inform the Environment Agency when the relevant monitoring and/or spot sampling is to take place. The operator shall provide this information to the Environment Agency at least 14 days before the date the monitoring is to be undertaken.

4.3.4 The Environment Agency shall be notified within 14 days of the occurrence of the following matters, except where such disclosure is prohibited by Stock Exchange rules:

Where the operator is a registered company:

(a) any change in the operator's trading name, registered name or registered office address; and

(b) any steps taken with a view to the operator going into administration, entering into a company voluntary arrangement or being wound up.

Where the operator is a corporate body other than a registered company:

(a) any change in the operator's name or address; and

(b) any steps taken with a view to the dissolution of the operator.

4.3.5 Where the operator proposes to make a change in the nature or functioning, or an extension of the activities, which may have consequences for the environment and the change is not otherwise the subject of an application for approval under the Regulations or this permit:

(a) the Environment Agency shall be notified at least 14 days before making the change; and

(b) the notification shall contain a description of the proposed change in operation.

4.3.6 The Environment Agency shall be given at least 14 days notice before implementation of any part of the site closure plan.

4.3.7 The operator shall inform the Environment Agency in writing of the closure of any LCP within 28 days of the date of closure.

4.3.8 In the event that more than 2 tonnes of sulphur dioxide has been, or is likely to be is emitted in a 24 hour period from the flaring of acid gases (emission points A21 and A22), the operator must immediately inform the Environment Agency, providing details of:

(a) The likely duration of the flaring event;

(b) The cause of the flaring event;

(c) Any remedial actions being taken.

The operator shall confirm:

(d) The quantity of sulphur dioxide emitted and the duration of the flaring event;

(e) Whether the event had a negative impact on local air quality.

4.3.9 In the event that the operator wishes to make a change to the design or operation of the integrated emission management technique, for nitrous oxides and sulphur dioxide:

(a) The operator shall notify the Environment Agency at least 14 days before making the change;

(b) The notification shall contain details of the change in operation or design, such as the addition or removal of process units from the emissions bubble and an assessment of the impact this change will have on the monthly emission limit specified in Table S3.1b; and

(c) The operator shall not implement the change until the changes have been approved in writing by the Environment Agency.

4.4 Interpretation

4.4.1 In this permit the expressions listed in schedule 6 shall have the meaning given in that schedule.

4.4.2 In this permit references to reports and notifications mean written reports and notifications, except where reference is made to notification being made “immediately”, in which case it may be provided by telephone.

Schedule 1 - Operations

Table S1.1 activities		
Activity listed in Schedule 1 of the EPR Regulations	**Description of specified activity**	**Limits of specified activity**
S1.1 A(1) (a)	Burning any fuel in an appliance with a rated thermal input of 50MW or more	Refinery fuel gas (including the cryogenic unit) and natural gas supply systems to combustion units and any associated activities necessary to maintain the operation of the plant and fuel supplies through to the discharge of exhaust gases from the stacks, abatement plant and the export of steam to the steam systems, including: (i) Onsite 42MWth CHP unit (GTA 711 and GTA 712)
S1.2 A(1) (d)	Refining mineral oil (Primary operations)	From feed to oil refining unit to use, including each of the following units: (i) #1 vacuum distillation unit (#1 VDU), including process heater (ii) #2 vacuum distillation unit (#2 VDU), including process heater (iii) #3 vacuum distillation unit (#3 VDU), including process heater (iv) Gas oil hydrodesulphurisation unit (GOHDS), including process heater (v) Heavy oil filtration unit (vi) #1 Calciner including coke handling, storage and rail/road loading, and petroleum coke unloading, handling, storage and loading area (including flare pad) (vii) #2 Calciner including coke handling, storage and rail/road loading, and petroleum coke unloading, handling, storage and loading area (including flare pad) (viii) #3 Calciner including coke handling, storage and rail/road loading, and petroleum coke unloading, handling, storage and loading area (including flare pad) (ix) Virgin hydrodesulphurisation unit (VHDS), including process heaters (x) Cracked hydrodesulphurisation unit

Table S1.1 activities		
Activity listed in Schedule 1 of the EPR Regulations	**Description of specified activity**	**Limits of specified activity**
		(CHDS), including process heaters (xi) Diesel hydrodesulphurisation unit (DHDS), including process heaters (xii) Gasoline hydrodesulphurisation unit (GHDS), including process heater (xiii) Penex unit, including process heater (xiv) Saturated gas plant (SGP) (xv) Cracked gas plant (CGP) including CPU Merox, Selective Hydrogenation Process (SHP-2), and flare gas recovery compressors (xvi) Catalytic reforming unit #2 (CRU-2), including process heaters and hydrogen system (xvii) Catalytic reforming unit #3 (CRU-3), including process heaters and hydrogen system (xviii) Pressure swing adsorber (PSA) (xix) Aromatics extraction unit (AEU) (xx) Fluid catalytic cracking unit (FCCU), process heaters, FCCU gasoline heart-cut treatment (Minalk system) and selective hydrogenation unit (xxi) Propylene recovery unit (PRU) including PRU Merox and selective hydrogenation process (SHP-1) (xxii) Vapour recovery unit (VRU) including VRU Merox (Minalk) (xxiii) Alkylation Unit including process heater and Butamer unit (xxiv) Thermal cracking unit (TCU) including process heater (xxv) GTA 706
S1.2 A(1) (d)	Refining mineral oil (Secondary operations – oil movements and blending)	From receipt of feed, through blending (where necessary) to feed, intermediate and product storages and export including: liquefied petroleum gases, white oils (including rail loading of petrol/diesel and petrol vapour recovery unit), heavy gas oils and other black oils, slops, etc. in support of the above primary operations.

Table S1.1 activities		
Activity listed in Schedule 1 of the EPR Regulations	**Description of specified activity**	**Limits of specified activity**
S1.2 A(1) (e) (i)	The handling, storage and physical/ thermal treatment of crude oil	From receipt and storage of crude (including unloading from road tankers and blending of slops) to operation of crude distillation units, including: (i) #1 Crude topping unit (#1 CTU), process heater and associated feed and product system for this activity (ii) #2 Crude topping unit (#2 CTU), process heater, kerosene treatment and associated feed and product system for this activity
S1.2 A(1) (f) (v)	Activities involving the pyrolysis, carbonisation, distillation, partial oxidation or other heat treatment of mixtures of carbonaceous materials and oil.	From feed to unit to discharge to further processing including: (i) #1 Coker, process heaters and green coke storage pit (ii) #2 Coker, process heaters and green coke storage (iii) FCCU (R9 Oil re-refining or other reuses of oil)
S4.1 A(1)(a) (i)	Producing organic chemicals, such as aromatic hydrocarbons	Hydro de-alkylation unit (HDA), for the manufacture of benzene, process heaters and associated feed and product storage/export system for this activity
S4.2 A(1) (a) (v)	Producing inorganic chemicals such as non-metals (e.g. sulphur)	Sulphur recovery unit plant (with associated amine systems, amine recovery unit, sour water stripper units), including: (i) #1 Sulphur recovery unit (#1 SRU) utilising Claus technology (ii) #2 Sulphur recovery unit (#2 SRU) utilising Claus technology (iii) Tail Gas Treatment Unit (TGTU) utilising the Beavon sulphur removal process (iv) Incineration of remaining tail gas, storage/loading of products
S5.3 A(1) (a) (i)	Disposal of hazardous waste in a facility with a capacity of more than 10 tonnes per day (by biological treatment)	The receipt and treatment of liquid waste for disposal in the main biological effluent treatment plant (ETP), including oil water separators, IAF units, activated sludge unit, #1, #2, #3 and Alkylation holding ponds, storage of sludge and waste receipt detailed in table S2.2.
S5.4 A(1) (a) (ii)	Disposal of non-hazardous waste in a facility with a capacity of more than 50 tonnes per day by physico - chemical treatment.	Physical treatment of South tank farm (STF) surface waters in oil-water separator, including bund/surface water collection systems and holding pond

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Application	The response to section 2.1 to 2.2.	24/08/06
Response to Schedule 4 Notice dated 08/12/06	Response to Q1 – 2 subject to the limits set in Schedule 4.1 Response to Q3 – 5 subject to the conditions in schedule 1.3	09/02/07 09/02/07
Response to Schedule 4 Notice dated 03/04/07	Response to FCCU Regenerative Scrubbing BAT review.	15/05/07
Additional information	Application Resubmission – The revised response to sections 2.1 to 2.2, and consolidation of the Schedule 4 responses.	24/08/07
Application	The response to C2.1 – C2.12 in the variation request JP3431XS	19/05/08
Additional information	App. 9 Section a) of Supplementary Information to Calciner Stack Limit variation associated with the operation of the sulphur degassing facility for SRU1.	29/12/11
	App. 9 Section c) of Supplementary Information to Calciner Stack Limit variation associated with the operation of the mercury trap on the Alkylation Unit.	29/12/11
	App. 9 Section f) of Supplementary Information to Calciner Stack Limit variation associated with the Common Pumping Station surface water connection to South tank farm effluent discharge.	29/12/11
	Supplementary Information regarding installation of Tail gas Treatment Unit.	04/11/11
Application	HOR VAR DEC2012 Section1, 2, 4, annex 1, section A and B (assessment of Ammonia emissions)	20/12/13
Response to Schedule 5 Notice dated 22/02/13	Response to Q1-Q5 regarding report format, background concentrations, assessing non-statutory sites, ecological critical loads and emission rates used in the air modelling.	11/03/13
Additional information	Further information for ammonia injection tests.	30/04/13
Additional information	Information relating to air modelling of dust emissions and a request for a five day per calendar year raised limit when the ammonia injection system is not operational	26/07/13
Application EPR/UP3230LR/V009	Parts C2 and C3 of the application together with supplementary information supplied with these parts and further information received by email on 03/02/15 and 13/02/15.	13/02/15
Response to regulation 60(1) Notice – request for information dated 05/08/15	Compliance route and operating techniques identified in response to questions 1 (ELV and monitoring requirements) and 2c (LCP configuration, layout, fuel options available and flue configuration), 2d (methodology for assessing which ELVs apply in accordance with Articles 40(2) and 40(3) of IED), 2e (methodology for assessing compliance with relevant ELVs for NOx, SO_2 and dust by reference to parts 3 and 4 of Annex V of Chapter III of IED).	30/10/15
Receipt of additional information to the regulation 60(1) Notice. requested by letter dated 16/11/15	Compliance route and operating technique identified in response to questions 2f (methodology for assigning periods of start up and shutdown).	14/12/15
Application EPR/UP3230LR/V013	Parts C2 and C3 of the application together with supplementary information supplied with these parts.	27/10/17

Response to regulation 60(1) Notice – request for information dated 05/11/15 EPR/UP3230LR/V014	Compliance and operating techniques identified in response to the BAT Conclusions for the refining of mineral oil and gas industry sector published on 28th October 2014.	05/02/16
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	Compliance and operating techniques identified in response to BAT Conclusions 20,22,25,45,47 and 54.	03/07/17
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	Compliance and operating techniques identified in response to BAT Conclusions 3,15,29,49 and 56.	06/10/17
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	Compliance and operating techniques identified in response to BAT Conclusions 32,44,46 and 52.	16/11/17
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	Compliance and operating techniques identified in response to BAT Conclusion 19.	13/02/18
Additional information in response to regulation 60(1) Notice EPR/UP3230LR/V014	Approved Integrated Emissions Management Protocol	09/10/18

Table S1.3 Improvement programme requirements

Reference	Requirement	Date
IC1	A written procedure shall be submitted to the Agency detailing the measures to be used so that monitoring equipment, personnel and organisations employed for the emissions to air monitoring programme shall have either MCERTS certification or accreditation in accordance with condition 3.3.3. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the procedure. The procedure shall be implemented by the operator from the date of approval by the Agency	Completed
IC2	A written plan shall be submitted to the Agency for approval detailing the results of a survey of hard-standing, kerbing and secondary containment for raw material, intermediate, product and waste storage areas and the measures to comply with the requirements of section 2.2.5 of TGN S 1.02. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC3	A written plan shall be submitted to the Agency for approval detailing the results of a survey of bunding and other secondary containment measures for raw materials, intermediates, products and waste storage areas and the measures to meet the requirements of section 2.2.2 and 2.2.3 of Sector Guidance Note S 1.02. Where appropriate the plan shall contain dates for the implementation of individual measures. The	Completed

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	
IC4	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to achieve a sulphur recovery efficiency of 99.5% in accordance with the Sector Guidance Note S 1.02. The plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC5	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to achieve a reduction in the sulphur dioxide emission concentration from the FCCU regenerator. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC6	A written plan shall be submitted to the Agency for approval detailing the work to be undertaken to carry out Leak Detection and Repair across all plant and pipework at the refinery installation. The plan shall include work necessary to bring the LDAR monitoring status at the installation to Tier 1, Tier 2 and Tier 3 versus the USEPA Method 21, all within 4 years. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC7	A written procedure shall be submitted to the Agency detailing the measures to be used so that monitoring equipment and sampling for the emissions to water monitoring programme shall have either MCERTS certification or accreditation in accordance with condition 3.6.3. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the procedure. The procedure shall be implemented by the operator from the date of approval by the Agency	Completed
IC8	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to reduce oxides of nitrogen (NOx) emissions from the refinery installation. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC9	A written plan shall be submitted to the Agency for approval detailing the implementation programme for continuous monitoring of SO_2 and NO_x for release points A9 and A11. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan.	Completed

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	The plan shall be implemented by the operator from the date of approval by the Agency.	
IC10	A written evaluation shall be submitted to the Agency for approval detailing the technical and economic feasibility of installing liquid ring pumps on VDU1 and VDU2. Where appropriate the plan shall contain dates for the implementation of various measures. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC11	A written report shall be submitted to the Agency for approval detailing the findings of a water use audit. Where appropriate the report shall contain dates for the implementation of individual measures. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC12	A written report shall be submitted to the Agency giving details of any hydrocarbon-containing wastes that are currently disposed of. The report shall include a proposed plan and programme, for approval by the Agency, for the introduction of any techniques necessary to ensure the following in relation to the above wastes: (a) prevention or reduction of waste arisings, (b) recovery and/or recycling of any wastes that do arise, and (c) disposal of any wastes for which recovery is technically and economically impossible is carried out in a way that avoids or reduces any impact on the environment. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Completed
IC13	A written evaluation shall be submitted to the Agency for approval detailing the potential for reuse or recovery for the following waste streams; (a) Sodium hydroxide containing sodium naphthenate (b) Spent potassium hydroxide solution. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency	Completed
IC14	A written report shall be submitted to the Agency for approval detailing the ambient benzene levels around the installation, and an evaluation made of the technical and economic feasibility of options to reduce emissions. Where appropriate the report shall contain dates for the implementation of individual measures. The notification requirements of 2.4.2 shall be	Completed

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	deemed to have been complied with on submission of an implementation plan. The plan shall be implemented by the operator from the date of approval by the Agency	
IC15	A written report shall be submitted to the Agency for approval detailing the ambient VOC levels other than benzene around the installation for VOCs considered significant in the application H1 assessment, and an evaluation made of the technical and economic feasibility of options to reduce emissions. Where appropriate the report shall contain dates for the implementation of individual measures The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of an implementation plan The plan shall be implemented by the operator from the date of approval by the Agency	Completed
IC16	A written evaluation shall be submitted to the Agency for approval detailing the technical and economic feasibility of improving the dispersion of releases to air from release point A11. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency	Completed
IC17	A written plan shall be submitted to the Agency for approval detailing the installation of continuous SO2 and NOx monitors for release points A1, A3 and A5 at the refinery installation. The plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency	Completed
IC18	A written plan shall be submitted to the Agency for approval detailing the technical and economic feasibility of returning a FCCU expander back into service. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency	Completed
IC 19	A written report shall be submitted to the Agency for approval detailing the measures proposed to improve the hourly estimation of normalised flue gas volumes from release points A6, A8, A9 and A11. Where appropriate the report shall contain dates for the implementation of individual measures. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of an implementation plan.	Completed

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	The plan shall be implemented by the operator from the date of approval by the Agency	
IC20	A written report shall be submitted to the Agency for approval detailing the findings of a refinery effluent heat load balance identifying major sources. Where appropriate the report shall contain dates for the implementation of individual measures to minimise effluent discharge temperature. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency	Completed
IC21	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to reduce oxides of nitrogen (NOx) emissions from the refinery calciners. An initial plan detailing proposed measures to optimise and minimise current releases shall be submitted. A further plan shall then be submitted based on a review of available abatement techniques and applicable guidance. Where appropriate the plan shall contain dates for the implementation of technically and economically feasible individual measures. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Agency.	Written plan completed, implementation requirement withdrawn
IC22	A written report shall be submitted to the Agency for approval detailing the measures proposed to improve the hourly estimation of normalised flue gas volumes from release points A8 from the TGTU based on the detailed process design. The notification requirements of 2.4.2 shall be deemed to have been complied with on submission of a report.	Completed
IC23	A written report shall be submitted to the Environment Agency for approval detailing the findings of an FCC ammonia injection rate optimisation study. Monitoring shall be undertaken for a range of ammonia injection rates to show how the concentration of Dusts released from emission point A6b (ST3401) changes with the rate of ammonia injection. The report should include details of the optimum ammonia injection rate(s) for the different FCC operating regimes and how they will be implemented. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan.	Completed
IC24	A written report shall be submitted to the Environment Agency for approval to review the monitoring regime for the emissions of ammonia from release point A6b (ST3401). The report shall take account of Technical guidance Note M2 (Monitoring of stack emissions to air) and include an assessment of continuous and non-continuous monitoring techniques, monitoring methods, and a justification for each of the proposed measures selected. The report shall also include a written plan	Completed

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	containing dates for the implementation of individual measures identified in the report. The notification requirements of condition 2.4.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval by the Environment Agency.	
IC25	The Operator shall submit a diffuse VOC monitoring plan to the Environment Agency for written approval. This shall include but not be limited to: • The nature of the material handled; • The sources of emissions; • Justification of the monitoring techniques selected • How the monitoring data will be recorded and reviewed The plan shall take into account the appropriate techniques for VOC monitoring specified in BAT conclusion 6 for the Refining of Mineral Oil and Gas. The Operator shall implement the approved plan and produce and submit an annual report on the results of the monitoring undertaken under the plan.	01/11/19
IC26	The Operator shall develop and implement a monitoring programme for measuring point source emissions of non-methane volatile organic compounds and benzene from the loading and unloading of liquid hydrocarbons as specified in BAT conclusion 52 for the Refining of Mineral Oil and Gas. The monitoring programme and associated methodologies shall be agreed in writing with the Agency having regard to the Agency M2 and M16 Guidance Notes. Routine benzene monitoring is not required where it can be demonstrated that benzene emissions are consistently less than 1mg/m^3 from a point source.	01/05/19
IC27	The Operator shall undertake an assessment of measures to reduce point source and fugitive emissions of VOCs from the loading and unloading of liquid hydrocarbons at road and rail terminals. The assessment shall, as a minimum consider: • Whether the existing recovery rate of VOC's is at least 95% (for sites that have a recovery system in place) • What combination of abatement technology can be used to achieve a VOC recovery rate of at least 95% • If vapour recovery is not practicable, for safety or technical reasons, an explanation of those reasons shall be provided and alternative VOC control measures such as a vapour destruction unit considered. The assessment will take into account the techniques identified in BAT conclusion 52 for the Refining of Mineral Oil and Gas. A written report of the assessment shall be submitted to the Agency, along with a timetable for implementing improvements. The Operator shall implement the improvements identified to the timetable agreed with the Agency.	01/05/20
IC28	The operator shall submit a written monitoring plan to the Environment Agency for approval that includes: (a) proposals to undertake representative monitoring of hazardous pollutants (as set out in the Environment Agency's Surface Water Pollution Risk Assessment guidance) in the discharge to surface water from points W2a/W2b including the parameters to be monitored, frequencies of monitoring and methods to be used. The operator shall carry out the monitoring in accordance with the Environment Agency's written approval.	01/07/19
IC29	The operator shall submit a written report to the Environment Agency for approval that includes:	01/11/20

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	the results of an assessment of the impact of the emissions to surface water from the site in accordance with the Environment Agency's Surface Water Pollution Risk Assessment Guidance available on our website. The report shall: (a) be based on the parameters monitored in IC28 above; and Include proposals for appropriate measures to mitigate the impact of any emissions where the assessment determines they are liable to cause pollution, including timescales for implementation of individual measures.	

Table S1.4 Appropriate measures for odour	
Measure	**Dates**
The operator shall maintain the odour management plan as described in section 2.2.6 of the application. The operator shall review the plan annually and record at least once a year or as soon as practicable after a complaint (whichever is the earlier), whether changes to the plan should be made and make any appropriate changes to the plan identified by a review.	From date of permit issue.

Table S1.5 Appropriate measures for noise	
Measure	**Dates**
The operator shall maintain the noise management plan as described in section 2.9 of the application. The operator shall review the plan annually and record at least once a year or as soon as practicable after a complaint (whichever is the earlier), whether changes to the plan should be made and make any appropriate changes to the plan identified by a review.	From date of permit issue.

Schedule 2 - Waste types, raw materials and fuel

Table S2.1 Raw materials and fuels	
Raw materials and fuel description	**Specification**
For release points A1, A3, A5, A6a, A10 and A19, where the fuel fired is a mixture of natural gas and refinery fuel gas	The fraction of natural gas must be less than 50%

Table S2.2 Permitted waste types and quantities for Effluent Treatment Plant	
Maximum quantity	Rate to be controlled to comply with the limits in Table S3.2
Waste code	**Description**
05 01 03*	Tank Bottom Sludges
05 01 09*	Oily Water Separator Sludge
10 01 19	Fuel gas knockout pot condensate
16 03 05*	Bioethanol solution (contaminated)
16 07 08*	Tank roof seal decontamination effluent
16 10 01*	Tank Water Bottoms and line flushing/ pigging water
16 10 02	Humber LPG Caverns pigging water and caverns abstracted water contaminated with methanol that has been segregated from the onsite lagoon to minimise the quantity of water contaminated.
	Tank Water Bottoms and line flushing/ pigging water
	Used fire fighting foam solution

Table S2.3 Permitted waste types and quantities for Refinery Processing	
Maximum quantity	
Waste code	**Description**
02 01 03	Plant – tissue waste
02 03 04	Materials unsuitable for consumption or processing
16 03 06	Organic wastes other than those mentioned in 16 03 05*
20 01 25	Edible oil and fat

Schedule 3 – Emissions and monitoring

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A1	LCP 259 ST 101 Firing on RFG and Natural Gas 140 MWth (Total stack including additional 9 MWth unit is 149 MWth)	Sulphur dioxide	35 mg/m^3 Note X (1000 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			1000 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			1000 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m^3 Note X (300 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			330 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			600 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
		Dust	5 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			5.5 mg/Nm^3	Daily mean of validated hourly averages	Continuous	BS EN 14181 Note 2

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A1	LCP 259 ST 101 Firing on RFG and Natural Gas 140 MWth (Total stack including additional 9 MWth unit is 149 MWth)		10 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181 Note 2
		Carbon monoxide	100 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
A2	ST102 No.1 Coker Charge Heater 46 MWth	Sulphur dioxide	35 mg/m^3 Note X	Calendar monthly mean of validated hourly averages	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	150 mg/m^3 Note X	Average over sampling period	Annually	BS EN 14792
		Dust	No limit set	-	-	-
		Carbon monoxide	100 mg/m^3	Average over sampling period	At least every 6 months	BS EN 15058
A3	LCP 261 ST201 Firing on RFG and Natural Gas 166 MWth	Sulphur dioxide	35 mg/m^3 Note X (1000 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous Note 1	BS EN 14181
			1000 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			1000 mg/m^3	95% of validated hourly averages within a	Continuous	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A3	LCP 261 ST201 Firing on RFG and Natural Gas 166 MWth			calendar year		
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m^3 Note X (300 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			330 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			600 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
		Dust	5 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			5.5 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			10 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181 Note 2
		Carbon monoxide	100 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A3		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
A4	ST202 No.2 Coker Charge Heater 27 MWth	Sulphur dioxide	35 mg/m^3 Note X	Calendar monthly mean of validated hourly averages	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	150 mg/m^3 Note X	Average over sampling period	Annually	BS EN 14792
		Dust	No limit set	-	-	-
		Carbon monoxide	100 mg/m^3	Average over sampling period	At least every 6 months	BS EN 15058
A5	LCP 260 ST301 Firing on RFG and Natural Gas 107 MWth (Total stack including additional 2 x 9 MWth units is 125 MWth)	Sulphur dioxide	35 mg/m^3 Note X (1000 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous Note 1	BS EN 14181
			1000 mg/m^3	Daily mean of validated hourly averages	Continuous Note 1	BS EN 14181
			1000 mg/m^3	95% of validated hourly averages within a calendar year	Continuous Note 1	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m^3 Note X (300 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			330 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			600 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A5	LCP 260 ST301 Firing on RFG and Natural Gas 107 MWth (Total stack including additional 2 x 9 MWth units is 125 MWth)	Dust	5 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			5.5 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			10 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181 Note 2
		Carbon monoxide	100 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
A6a	LCP 262 ST3401a Firing on RFG and Natural Gas 65 MWth	Sulphur dioxide	35 mg/m^3 Note X (1000 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	Note 1
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m^3 Note X (300 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
		Dust	5 mg/m^3	-	At least every 6 months	BS EN 13284-1 Note 2
		Carbon monoxide	100 mg/m^3	Average over sampling period	At least every 6 months	BS EN 15058
A6b	ST3401b FCCU Regenerator	Sulphur dioxide	800 mg/m^3 Note X 600 mg/m^3 Note Z	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (as NO_2)	300 mg/m^3 Note X Note 7	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	50 mg/m^3 Note 7	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		CO	200 mg/m^3 Note 7	Daily	Continuous	BS EN 14181
		Ammonia	15 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Metals (Nickel, Antimony and Vanadium)	No limit set	-	At least every 6 months or after significant changes to the unit	Direct measurement or analysis based on metals content in the catalyst fines
A7	ST3501 DHDS feed preheater and reboiler 35 MWth	Sulphur dioxide	35 mg/m^3 Note X	Calendar monthly mean of validated hourly averages	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	150 mg/m^3 Note X	Average over sampling period	Annually	BS EN 14792
		Dust	No limit set	-	-	-
		Carbon monoxide	100 mg/m^3	Average over	At least every 6 months	BS EN 15058

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
				sampling period		
A8	ST401 SRU/TGTU	Sulphur dioxide	0.42 t/h Note 9	Hourly	Continuous	Note 1
			1.32 tpd Note 9	Daily		
		Oxides of nitrogen (as NO_2)	No limit set	-	-	-
A9	ST5602 No. 3 Calciner	Sulphur dioxide	Note X	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			2800 mg/m^3	Hourly	Continuous	BS EN 14181
			0.24 t/h Note 8	Hourly	Continuous	BS EN 14181
		Oxides of nitrogen (as NO_2)	Note X	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	150 mg/m^3	Daily	Continuous	BS EN 14181
A10	LCP 64 ST6001 Firing on RFG and Natural Gas 127 MWth	Sulphur dioxide	35 mg/m^3 Note X (600 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous Note 1	BS EN 14181
			600 mg/m^3	Daily mean of validated hourly averages	Continuous Note 1	BS EN 14181
			600 mg/m^3	95% of validated hourly averages within a calendar year	Continuous Note 1	BS EN 14181
		Oxides of nitrogen	150 mg/m^3 Note X (200 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A10	LCP 64 ST6001 Firing on RFG and Natural Gas 127 MWth	(NO and NO_2 expressed as NO_2)	220 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			400 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
		Dust	5 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			5.5 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181 Note 2
			10 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181 Note 2
		Carbon monoxide	100 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards Note 2
A11	ST601 No's 1 and 2 Calciner stack	Sulphur dioxide	Note X	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			1700 mg/m^3	Hourly	Continuous	BS EN 14181
			0.2 t/h Note 8	Hourly	Continuous	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
		Oxides of nitrogen (as NO_2)	No limit set	Hourly	Continuous	BS EN 14181
		Dust	150 mg/m^3	Daily	Continuous	BS EN 14181
A12	ST602 No's 1 and 2 Calciner cooler stack	Dust	150 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
			230 mg/m^3	Daily	Continuous	BS EN 14181
A13	ST701 GTA-706 Start up stack 41 MWth	Sulphur dioxide	No limit set	Hourly	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	No limit set	Average over sampling period	Annually Note 5	BS EN 14792
		Carbon monoxide				
A14	ST703 42 MWth (2 x 21 MWth Gas Turbines)	Sulphur dioxide	No limit set	-	-	-
		Oxides of nitrogen (as NO_2)	120 mg/m^3 Note X	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (as NO_2)	125 mg/m^3	Daily	Continuous	BS EN 14181
		Dust	5 mg/m^3	Daily	Continuous	Agreed Factor
		Carbon monoxide	100 mg/m^3	Average over sampling period	At least every 6 months	BS EN 15058
A15	ST801 Rail loading vapour recovery stack	VOC's	10 g/m^3 Note 3	Hourly average	At least every 6 months	To be agreed following completion of IC 26
		Benzene	<1 mg/m^3	Hourly average	At least every 6 months	To be agreed following completion of IC 26
A16	H4102 (VDU-2) 19 MWth	Sulphur dioxide	No limit set Note X	Hourly	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	No limit set Note X	Average over sampling period	Annually Note 5	BS EN 14792
		Dust	No limit set	-	-	-
A17	H571	Sulphur dioxide	No limit set Note X Note 4	Hourly	Continuous	Note 1

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
	HDA reactor charge heater 10 MWth	Oxides of nitrogen (as NO_2)	No limit set Note X	Average over sampling period	Annually Note 5	BS EN 14792
		Dust	No limit set	-	-	-
A18	H572 HDA purge tower reboiler 1 MWth	Sulphur dioxide	No limit set Note X Note 4	Hourly	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	No limit set Note X	Average over sampling period	Annually Note 5	BS EN 14792
		Dust	No limit set	-	-	-
A19	LCP 263 H6301/2 Firing on RFG and Natural Gas 76 MWth	Sulphur dioxide	35 mg/m^3 Note X (1000 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	Note 1
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m^3 Note X (300 mg/m^3) Note Y	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5 mg/m^3	-	At least every 6 months	BS EN 13284-1 Note 2
		Carbon monoxide	100 mg/m^3	Average over sampling period	At least every 6 months	BS EN 15058
A20	H6303/4/5 Reformer Furnace 47 MWth	Sulphur dioxide	35 mg/m^3 Note X	Calendar monthly mean of validated hourly averages	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	150 mg/m3	Average over sampling period	Annually Note 5	BS EN 14792
		Dust	No limit set	-	-	-
		Carbon monoxide	100 mg/m^3	Average over sampling period	At least every 6 months	BS EN 15058
A21	No 1 Flare	Sulphur dioxide	0.4 t/h equivalent	15 minutes	-	Note 1
A22	No 3 Flare	Sulphur dioxide	0.7 t/h equivalent	15 minutes	-	Note 1
A23	H151	Sulphur dioxide	No limit set Note X	Hourly	Continuous	Note 1

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
	GOHDS feed preheater 4 MWth	Oxides of nitrogen (as NO_2)	No limit set Note X	Average over sampling period	Annually Note 5	BS EN 14792
		Dust	No limit set	-	-	-
A24	H501 Drier Regenerator Furnace 2 MWth	Sulphur dioxide	No limit set Note X	Hourly	Continuous	Note 1
		Oxides of nitrogen (as NO_2)	No limit set Note X	Average over sampling period	Annually Note 5	BS EN 14792
		Dust	No limit set	-	-	-
A25	PSV3671	HF	No Release Permitted	-	-	-
A26	PSV3648	Tetrachloroethene	No Release Permitted	-	-	-
A28	AEU PSVs	Benzene	No Release Permitted	-	-	-
		Toluene	No Release Permitted	-	-	-
A29	W801	-	-	-	-	-
A31	D6305 CR2 Regen	VOCs (Class B)	No limit set	-	-	-
		PCDD/F	No limit set	Periodic over minimum 6 hours, maximum 8 hour period	Once a year or once a regeneration - whichever is longer	BS EN 1948 Parts 1, 2 and 3
A32	D6004 CR3 Regen	VOCs (Class B)	No limit set	-	-	-
		PCDD/F	No limit set	Periodic over minimum 6 hours, maximum 8 hour period	Once a year or once a regeneration - whichever is longer	BS EN 1948 Parts 1, 2 and 3
A33	ST4401 Amine filtration	Water vapour	No limit set	-	-	-
A34	D5422 Merox CPU	VOCs (Class B)	No limit set	-	-	-
A35	D3609 Merox PRU	VOCs (Class B)	No limit set	-	-	-
A36	Coking/Calciner silo vents and solid	Dust	Non visible	-	Daily	-

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)** From 01/11/18	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
	handling system vents					
A37	Hydrocarbon Storage Tank Vents	VOCs (Class B)	No limit set	-	-	Note 6
A38	PSVs/PRVs	VOCs (Class A)	No Release Permitted	-	-	-
		Benzene	No Release Permitted	-	-	-

Note 1 Continuous calculation of releases based on the method agreed with the Agency. Reference conditions for normalised flow (3% O_2, dry).

Note 2 An equivalent monitoring standard/method/technique can be used as agreed in writing with the Environment Agency.

Note 3 Limit does not apply when PSVs 8202/8203/8204 are releasing VOCs.

Note 5 Monitoring required for compliance with reporting condition 4.2.2 (c)

Note 6 Based on the USEPA method 21.

Note 7 The limit does not apply at start up and shutdown.

Note 8 Combined limit of 0.4 t/h of sulphur dioxide from release points A9 and A11 with individual limits not to be exceeded, applies during periods of planned shutdown of Tail Gas Treatment Unit (TGTU).

Note 9 Daily limit applies except for justified periods of planned shutdown of TGTU or planned Sulphur Recovery Unit (SRU) start-ups or shut downs bypassing the TGTU, when informed in advance with the Environment Agency, where hourly limit applies.

Note X Compliance with the emission limit value or performance standard for this unit can be achieved through inclusion of the unit in the BREF integrated emissions management bubble for SO_2/NOx.

Note Y When complying with the emission limit or performance standard through the BREF integrated emissions management bubble; the emission concentration from the emission point must not exceed the value specified in brackets.

Note Z Lower limit applies when using low sulphur feed (<0.5% w/w sulphur calculated as a monthly average).

Table S3.1a Point Source emissions to air – bubble emission limit and monitoring requirements						
Release Points	**Parameter**	**Sources**	**Bubble Limit**	**Reference Period**	**Monitoring frequency**	**Method**
A1-A11 A16-A20 A23-A24	Sulphur Dioxide	FCCU SRUs Calciners Heaters	900 mg/m^3 Note 1 0.90 t/h	Hourly	Continuous	Note 2
A1-A11 A16-A24		FCCU SRUs Calciners Heaters Flares	1.13 t/h			
A6a and A6b combined		LCP 262 and FCCU regenerator	2000 mg/m^3 0.33 t/h			

Note 1 The limit does not apply during an annual major refinery turnaround.

Note 2 Continuous calculation of releases based on the method agreed with the Agency. Reference conditions for normalised flow (3% O_2, dry).

Table S3.1b Point source emissions to air – Integrated Emissions Management limits and monitoring requirements						
Release Points	**Parameter**	**Sources**	**Integrated emissions management limit (including unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
The points specified in the Integrated Emissions Management Technique Protocol or subsequently notified in accordance with condition 4.3.9 and agreed in writing by the Environment Agency	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	Combustion units Calciners FCCU	Limit as calculated in accordance with approved bubble (mg/m^3)	Monthly average	Continuous	Calculation using the method agreed in writing by the Environment Agency in accordance with agreed Integrated Emissions Management Technique Protocol
The points specified in the Integrated Emissions Management Technique Protocol or subsequently notified in accordance with condition 4.3.9 and agreed in writing by the Environment Agency	Sulphur dioxide	Combustion units excluding gas turbines Calciners FCCU SRUs	Limit as calculated in accordance with approved bubble (mg/m^3)	Monthly average	Continuous	Calculation using the method agreed in writing by the Environment Agency in accordance with agreed Integrated Emissions Management Technique Protocol

Table S3.2 Point Source emissions to water (other than sewer) and land – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W1 emission to Habrough Marsh Drain	South tank farm surface water	Chemical Oxygen Demand	125 mg/l	Instantaneous	Monthly	METH 423 BS ISO 15705:2002
		Oil	15 mg/l	Instantaneous	Monthly	METH 410 IP426
W2a/W2b emissions to South Killingholme Drain	Effluent treatment plant	Total daily volume of discharge	16,000 m^3	24 hour total	Continuous	MCERTS self-monitoring of effluent flow scheme
		Temperature	32^0C	Hourly	Continuous	Thermometer
		pH	5 – 9	Hourly	Continuous	Meter
		TOC	50 mg/l	Instantaneous	Daily	METH 421/422 BS EN 1484:1997
		Chemical Oxygen Demand	125 mg/l (Annual average)	Time related 24-hour composite	Daily	BS ISO 15705:2002 or as agreed in writing with the Environment Agency Note 1
		Suspended solids	25 mg/l (Annual average)	Time related 24-hour composite	Daily	BS EN 872:2005 or as agreed in writing with the Environment Agency
		Hydrocarbon oil index	2.5 mg/l (Annual average)	Time related 24-hour composite	Daily	BS EN 9377 – 2 2002 or as agreed in writing with the Environment Agency Note 2
		Total nitrogen expressed as N	25 mg/l (Annual average)	Time related 24-hour composite	Daily	BS EN 12260 Note 3
		Phenol index	-	Time related 24-hour composite	Monthly	BS EN ISO 14402 2002 or as agreed in writing with the Environment Agency Note 4
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.05 mg/l (Annual average)	Instantaneous	Monthly	ISO 11423-1 2002 or as agreed in writing with the Environment Agency
		Lead expressed as Pb	0.03 mg/l (Annual average)	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885
		Cadmium expressed as Cd	0.008 mg/l (Annual average)	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885
		Nickel expressed as Ni	0.1 mg/l (Annual average)	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885

Table S3.2 Point Source emissions to water (other than sewer) and land – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W2a/W2b emissions to South Killingholme Drain	Effluent treatment plant	Mercury expressed as Hg	0.001 mg/l (Annual average)	Time related 24-hour composite	Quarterly	METH 206 EPA 3015, followed by BS EN ISO 17852
		Vanadium	-	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885
		Oil	5 mg/l	Time related 24-hour composite	Weekly	METH 410 IP426
		Ammoniacal nitrogen	10 mg/l	Time related 24-hour composite	Weekly	METH 455 BS EN ISO 14911
		Phenols	0.5 mg/l	Time related 24-hour composite	Weekly	METH 452
		Fluoride	20 mg/l	Time related 24-hour composite	Weekly	METH 454 BS EN ISO 10304–2
		Cyanide	-	Time related 24-hour composite	Quarterly	METH H127 (external lab) ISO 14403
		Chromium	0.25 mg/l	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885
		Copper	0.1 mg/l	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885
		Zinc	0.75 mg/l	Time related 24-hour composite	Quarterly	METH 205 EPA 3015, followed by BS EN ISO 11885

Table S3.2 Point Source emissions to water (other than sewer) and land – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**

Note 1: Measurement of TOC and application of a correlation factor may be used as a surrogate for COD. Parallel monitoring of TOC and COD shall be undertaken over a period of 1 year (to allow for seasonal variance) to determine the applicable correlation factor. The TOC correlation factor shall be agreed in writing with the Environment Agency before parallel monitoring of COD can cease.

Note 2: Test method METH 410, IP426 shall be run in parallel with test method (BS EN ISO 9377-2) for up to 12 months adaptation period, whilst quality assurance of the new test method is undertaken. During this time compliance with the limit shall be assessed against the result from test method METH 410, IP426. At the end of the quality assurance period the operator shall confirm in writing that compliance with the hydrocarbon oil index BAT AEL is now assessed using monitoring standard BS EN ISO 9377-2.

Note 3: Analysis of ammoniacal nitrogen shall be undertaken in parallel with monitoring for total nitrogen for up to 12 months. During this period compliance shall be assessed against the ammoniacal nitrogen limit using the existing monitoring method. At the end of this period the operator shall confirm in writing that monitoring for total nitrogen is now in place and compliance will be measured against the total nitrogen limit.

Note 4: Test method 433, BS 6068–2.12:1990 shall be run in parallel with test method (BS EN ISO 14402) for up to 12 months adaptation period, whilst quality assurance of the new test method is undertaken. At the end of the quality assurance period the operator shall confirm in writing that monitoring according to BS EN ISO 14402 is now the method used for monitoring phenol index.

Note 5. For annual averages, compliance with the ELV is from 01/01/19 unless otherwise specified.

Table S3.3 Annual limits		
Substance	**Medium**	**Limit (including unit)**
Sulphur Dioxide from A6b	Air	410 tonnes
Sulphur dioxide	Air	4,500 tonnes

Table S3.4 Process monitoring requirements				
Emission point reference or source or description of point of measurement	**Parameter**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
SRU Survey	Performance Evaluation	Every 2 years	Not applicable	
Fugitive emissions of VOCs from operational plant at the installation, as described in Section 2.2.4 of their application.	VOCs	-	LDAR programme (with regard to the Institute of Petroleum [Energy Institute] protocol) for testing potential sources of fugitive emissions of VOCs.	The operator shall complete repairs and/or carry out other actions to prevent, or where that is not possible, minimise continued emissions from those sources.
Refinery Fuel Gas and Natural Gas Monitoring (RFG on-line analyser)	H_2S	Continuous	Continuously sampling chromatographic S gas analyser or Electrochemical cell or as approved by the Environment Agency	Sampling to be undertaken at locations within the RFG system that are representative of the RFG composition burnt in major combustion units. Monthly average, maximum and minimum values to be recorded from data collected.
Refinery Sulphur Balance	Sulphur	Quarterly	Calculation by method to be approved in writing by the Environment Agency that identifies the sources of the data used.	A mass balance shall be undertaken of incoming sources of sulphur to the refinery versus sulphur outputs.
Sulphur Recovery Units ST401	SRU availability and recovery efficiency	Continuous	Calculation by method to be agreed in writing with the Environment Agency that identifies the sources of the data used.	Sulphur recovery efficiency must be >98.5% Note 1
Note 1 Compliance with the emission limit value for this unit can be achieved through inclusion of the unit in the BREF integrated emissions management bubble for SO_2.				

Schedule 4 - Reporting

Parameters, for which reports shall be made, in accordance with conditions of this permit, are listed below.

Table S4.1 Reporting of monitoring data

Parameter	Emission or monitoring point/reference	Reporting period	Period begins
Emissions to air – sulphur dioxide Parameters as required by condition 3.3.1.	A1-A11, A13, A14, and A16-A24.	Every 3 months	From date of permit issue
Emissions to air – oxides of nitrogen Parameters as required by condition 3.3.1.	A1-A11, A13, A14, A16-A20 and A23-A24	Every 3 months	From date of permit issue
Emissions to air – Dust matter/dust Parameters as required by condition 3.3.1.	A1-A7, A9-A12, A14, A16-A20 and A23-A24	Every 3 months	From date of permit issue
Emissions to air – VOCs Parameters as required by condition 3.3.1.	A15	Every 12 months	From date of permit issue
Emissions to air – NOx Parameters as required by condition 3.3.1 and 3.7.1	All emission points specified in the integrated emissions management technique for NOx that is approved in writing by the Environment Agency, in accordance with condition 3.7.1.	Every 3 months	01/11/18
Emissions to air – SO_2 Parameters as required by condition 3.3.1 and 3.7.2	All emission points specified in the integrated emissions management technique for SO_2 that is approved in writing by the Environment Agency, in accordance with condition 3.7.2.	Every 3 months	01/11/18
Emissions to water – oil Parameters as required by condition 3.3.1	W1 and W2a/b	Every 3 months	From date of permit issue
Emissions to water – COD Parameters as required by condition 3.3.1	W1 and W2a/b	Every 12 months	01/01/19
Emissions to water – Flow Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – Temperature Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – pH Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – TOC Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – Suspended Solids Parameters as required by condition 3.3.1	W2a/b	Every 12 months	01/01/19
Emissions to water – Ammoniacal Nitrogen Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue

Table S4.1 Reporting of monitoring data			
Parameter	**Emission or monitoring point/reference**	**Reporting period**	**Period begins**
Emissions to water – Phenols Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – Fluorides Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – Cyanides Parameters as required by condition 3.3.1	W2a/b	Every 3 months	From date of permit issue
Emissions to water – Heavy Metals Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19
Emissions to water – Mercury Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19
Emissions to water – Total nitrogen expressed as N Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19
Emissions to water – Hydrocarbon oil index Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19
Emissions to water – Phenol index Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19
Emissions to water – BTEX Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19
Emissions to water – Vanadium Parameters as required by condition 3.3.1	W2a/b	Every 12 months	From 01/01/19

Table S4.2: Annual production/treatment	
Parameter	**Units**
Road and other transport fuels	Tonnes
Non-transport / heating fuels	Tonnes
Chemical / petrochemical feedstocks	Tonnes
Bitumen / petcoke / other heavy-end products	Tonnes

Table S4.3 Chapter III Performance parameters for reporting to DEFRA and other Performance parameters		
Parameter	**Frequency of assessment**	**Units**
Thermal Input Capacity for each LCP	Annually	MW
Annual Fuel Usage for each LCP	Annually	TJ
Total Emissions to Air of NOx for each LCP	Annually	Tonnes
Total Emissions to Air of SO_2 for each LCP	Annually	Tonnes
Total Emissions to Air of CO for each LCP	Annually	Tonnes
Total Emissions to Air of dust for each LCP	Annually	Tonnes
Operating Hours for each LCP	Annually	hr
NOx Factors by fuel type	Annually	Kg/tonne
Crude oil and other hydrocarbons import (i.e. feedstocks)	Annually	Tonnes
Water usage	Annually	Tonnes
Energy usage (electrical)	Annually	MWh
Energy usage (all fuels)	Annually	MJ
Total release of oil to water per tonne of feedstock	Annually	g oil / 1000 tonnes feedstock

Table S4.4 Reporting forms				
Media/ parameter	**Reporting format**	**Starting Point**	**Agency recipient**	**Date of form**
Air, Energy & Operating hours	Form IED AR1 – SO_2, NO_x and dust mass emission and energy	01/04/17	National	31/12/15
Air	Form IED CON 1 – continuous monitoring CEMs reporting for Boilers Only	01/04/17	Area Office	31/12/15
CEMs	Form IED CEM – Invalidation Log	01/04/17	Area Office	31/12/15
Air	Form IED PM1 - discontinuous monitoring and load.	01/04/17	Area Office	31/12/15
Air – Fuels, Sulphur Balance, SRU performance	Form Air – 5 Refinery fuel analyses (daily average data – RFO, RFG), Refinery Sulphur Balance and SRU availability and efficiency	01/01/08	Area Office	01/01/08
Air – FCCU SO_2, NOx, CO, Dust	Form Air – 6 continuous monitoring or other form as agreed in writing by the Agency	01/01/08	Area Office	01/01/08
Air - Flares	Form Air – 7 Report of the flaring rate and energy loss and SO_2 released from flaring.	01/01/08	Area Office	01/01/08
Air - VOCs	Form Air – 8 Report of VOC losses [following the Institute of Petroleum protocol]	01/01/08	Area Office	01/01/08
Air – VOCs	Form Air – 9 PRV VOC releases	01/01/08	Area Office	01/01/08
Air - NOx Factors	Form Air - 10 NOx factor annual review	01/01/08	Area Office	01/01/08
Air – SO2 ELVs	Form Air – 11 SO_2 Hourly Stack ELVs and Refinery Bubble	01/01/08	Area Office	01/01/08
Water	Form Water – 1 Daily. Flow, pH, temperature and TOC (W2)	01/01/08	Area Office	01/01/08
Water	Form Water – 2 Weekly. COD, Ammoniacal Nitrogen, phenols, sulphide, Fluoride, Oil and suspended solids (W2)	01/01/08	Area Office	01/01/08
Water	Form Water – 3 Quarterly Cyanide and Heavy Metals (W2)	01/01/08	Area Office	01/01/08
Water	Form Water – 4 Monthly Oil and COD (W1)	01/01/08	Area Office	01/01/08
Water	Form Water – 5 Annual suspended solids, heavy metals, mercury, total nitrogen, hydrocarbon oil index, phenol index, BTEX and vanadium.	01/01/19	Area Office	28/10/18
Water usage	Form Water Usage1 or other form as agreed in writing by the Agency	01/01/08	Area Office	01/01/08
Energy usage	Form Energy 1 or other form as agreed in writing by the Agency	01/01/08	Area Office	01/01/08
Waste	Form Waste1 or other form as agreed in writing by the Agency	01/01/08	Area Office	01/01/08
Other performance indicators	Form Performance 1 or other form as agreed in writing by the Agency Tables S4.2 and S4.3 indicators.	01/01/08	Area Office	01/01/08

Schedule 5 - Notification

These pages outline the information that the operator must provide.

Units of measurement used in information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

If any information is considered commercially confidential, it should be separated from non-confidential information, supplied on a separate sheet and accompanied by an application for commercial confidentiality under the provisions of the EP Regulations.

Part A

Permit Number	
Name of operator	
Location of Facility	
Time and date of the detection	

(a) Notification requirements for any malfunction, breakdown or failure of equipment or techniques, accident, or emission of a substance not controlled by an emission limit which has caused, is causing or may cause significant pollution	
To be notified within 24 hours of detection	
Date and time of the event	
Reference or description of the location of the event	
Description of where any release into the environment took place	
Substances(s) potentially released	
Best estimate of the quantity or rate of release of substances	
Measures taken, or intended to be taken, to stop any emission	
Description of the failure or accident.	

(b) Notification requirements for the breach of a limit	
To be notified within 24 hours of detection unless otherwise specified below	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value and uncertainty	
Date and time of monitoring	
Measures taken, or intended to be taken, to stop the emission	

Time periods for notification following detection of a breach of a limit	
Parameter	**Notification period**

(c) Notification requirements for the detection of any significant adverse environmental effect	
To be notified within 24 hours of detection	
Description of where the effect on the environment was detected	
Substances(s) detected	
Concentrations of substances detected	
Date of monitoring/sampling	

Part B - to be submitted as soon as practicable

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission	
The dates of any unauthorised emissions from the facility in the preceding 24 months.	

Name*	
Post	
Signature	
Date	

* authorised to sign on behalf of the operator

Schedule 6 - Interpretation

"accident" means an accident that may result in pollution.

"Acid Gas" (or sour gas) means an offgas that contains high levels of hydrogen sulphide (H_2S)

"Annual average" means average of all daily averages obtained within a year, weighted according to the daily flows.

"application" means the application for this permit, together with any additional information supplied by the operator as part of the application and any response to a notice served under Schedule 5 to the EP Regulations.

"authorised officer" means any person authorised by the Environment Agency under section 108(1) of The Environment Act 1995 to exercise, in accordance with the terms of any such authorisation, any power specified in section 108(4) of that Act.

"BAT" means Best available techniques, as defined in Article 3 of the Industrial Emissions Directive

"BATAEL" means the range of achievable emission levels associated with application of the best available techniques.

"BS EN 14181" will include the requirements of BS EN 15267-3 through QAL1. MCERTS certification for the appropriate ranges and determinands is a way of demonstrating of compliance with the requirements of BS EN 15267-3.

"Bubble emission limit" means a single aggregated emission limit, expressed as a mean monthly concentration, which when complied with will result in equivalent emission levels to those that could have been released when complying with each BREF BATAEL separately.

"CEM" Continuous emission monitor

"CEN" means Commité Européen de Normalisation

"DSD" means Dangerous Substances Directive.

"emissions of substances not controlled by emission limits" means emissions of substances to air, water or land from the activities, either from the emission points specified in schedule 3 or from other localised or diffuse sources, which are not controlled by an emission limit.**.**

"emissions to land" includes emissions to groundwater.

"EP Regulations" means The Environmental Permitting (England and Wales) Regulations SI 2016 No.1154 and words and expressions used in this permit which are also used in the Regulations have the same meanings as in those Regulations.

"FCCU" means fluidised catalytic cracking unit.

"Flaring event" means a large scale temporary operation of a flare system, caused by a process disruption.

"groundwater" means all water, which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

"Industrial Emissions Directive" means Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) as published in The Official Journal.

"Integrated emissions management technique" means the principle of delivering compliance with a number of BREF BATAELs for the same pollutant, by setting a single overarching "bubble emission limit".

"Invalid hourly average" means an hourly average period invalidated due to malfunction of, or maintenance work being carried out on, the continuous measurement system. However, to allow some discretion for zero and span gas checking, or cleaning (by flushing), an hourly average period will count as valid as long as data has been accumulated for at least two thirds of the period (40 minutes). Such discretionary periods are not to exceed more than 5 in any one 24-hour period unless agreed in writing. Where plant may be operating for less than the 24-hour period, such discretionary periods are not to exceed more than one quarter of the overall valid hourly average periods unless agreed in writing.

"invalid day" means any day in which more than three hourly average values are invalid.

"ISO" means International Standards Organisation.

"hazardous property" has the meaning given in Schedule 3 of the Hazardous Waste (England and Wales) Regulations 2005 No.894 and the Hazardous Waste (Wales) Regulations 2005 No. 1806 (W.138).

"large combustion plant" or "LCP" is a combustion plant or group of combustion plants discharging waste gases through a common windshield or stack, where the total thermal input is 50 MW or more, based on net calorific value. The calculation of thermal input, excludes individual combustion plants with a rated thermal input below 15MW.

"LDAR", means Leak Detection and Repair, a managed scheme and programme for testing potential sources of fugitive emissions, from operational plant at the installation, and repairing or carrying out other actions to prevent, or where that is not possible, minimise continued emissions from those sources. The LDAR programme at the installation shall be consistent with the requirements of the Institute of Petroleum (Energy Institute) Protocol.

"mcr" means maximum continuous rating.

"MCERTS" means the Environment Agency's Monitoring Certification Scheme.

MFF Protocol" means IED Chapter III Protocol for Multi-fuel Firing Refinery Combustion Plants granted a Permit prior to 7 January 2013, version 5.

"Natural gas" means naturally occurring methane with no more than 20% by volume of inert or other constituents.

"ncv" means net calorific value.

"Normal operation" means the range of process conditions that can occur when a process unit is performing its intended duty.

"Offgas" means a gas stream produced by a refinery process

"operational hours" are whole hours commencing from the first unit ending start up and ending when the last unit commences shut down.

"Other than normal operating conditions" means process conditions that would not occur during the normal operation of a process unit.

"quarter" means a calendar year quarter commencing on 1 January, 1 April, 1 July or 1 October.

"RFG" means Refinery Fuel Gas: off-gases from distillation or conversion units used as a fuel.

"Sector Guidance Note" means IPPC Sector Guidance Note on Gasification, Liquefaction and Refining Activities, IPPC S1.02.

"SRU" means sulphur recovery unit.

"*SRU performance evaluation*" means measurement of process stream compositions, overall and inter-stage material balances, calculation of overall and inter-stage recovery efficiency, performance check of key equipment items [reaction furnaces, condensers, reheaters, converters (including superclaus), incinerator], key analyser performance checks and recommendations for unit performance improvements [including how to restore recovery to design capability].

"Standard contribution value" means the typical flue gas flowrate multiplied by the typical emission concentration produced by a unit during normal operation, which is specified for the purpose of defining the standard (or typical) contribution of that unit to the monthly calculation of bubble emissions.

"The BREF" means the BAT Reference Document for the Refining of Mineral Oil and Gas published by the European commission 2014/738/EU.

"VOC" means Volatile organic compounds as defined in Article 3(45) of Directive 2010/75/EU - 'volatile organic compound' means any organic compound as well as the fraction of creosote, having at 293,15 K a vapour pressure of 0,01 kPa or more, or having a corresponding volatility under the particular conditions of use

"Waste code" means the six digit code referable to a type of waste in accordance with the List of Wastes (England)Regulations 2005, or List of Wastes (Wales) Regulations 2005, as appropriate, and in relation to hazardous waste, includes the asterisk.

"year" means calendar year ending 31 December.

Where a minimum limit is set for any emission parameter, for example pH, reference to exceeding the limit shall mean that the parameter shall not be less than that limit.

Unless otherwise stated, any references in this permit to concentrations of substances in emissions into air means:

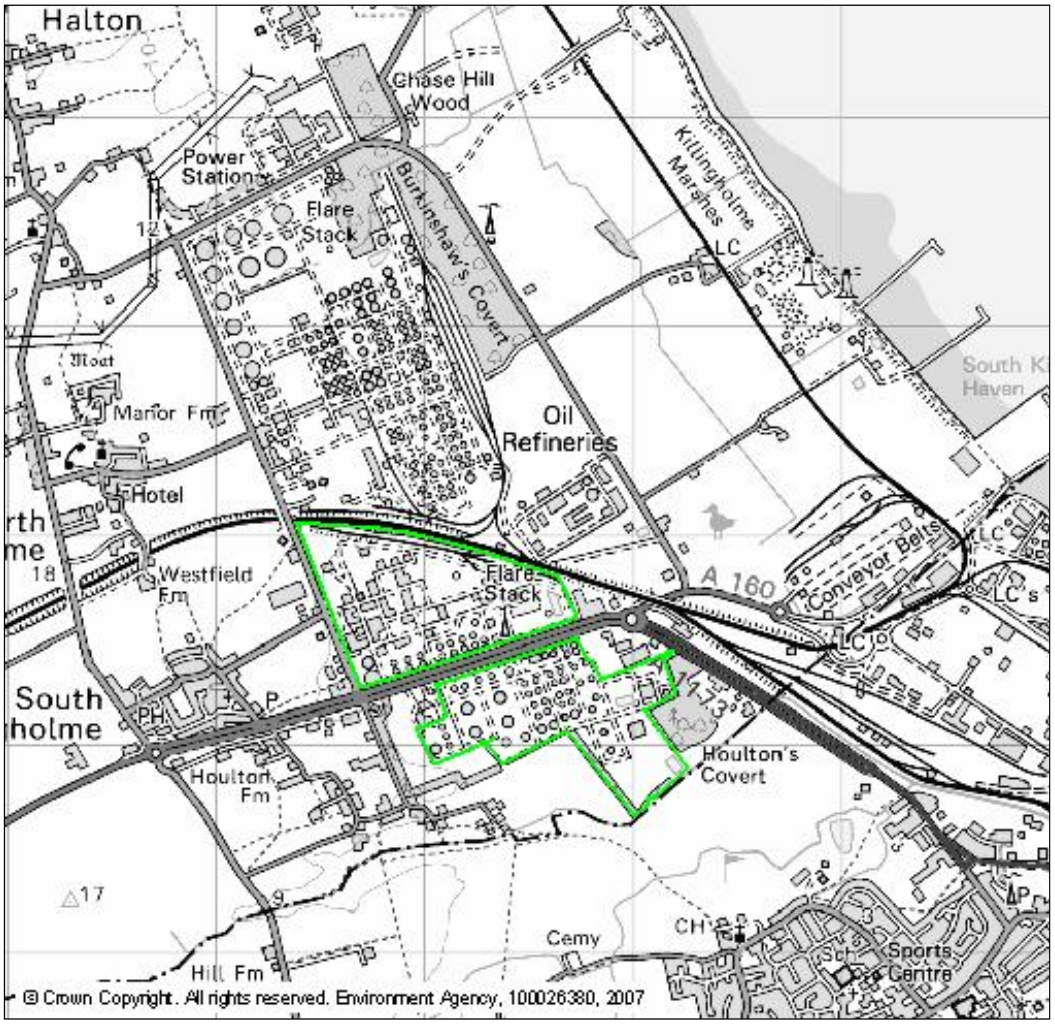
(a) in relation to emissions from combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 3% dry for liquid and gaseous fuels, 6% dry for solid fuels; and/or

(b) in relation to emissions from gas turbine and compression ignition engine combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 15% dry for liquid and gaseous fuels; and/or

(c) in relation to emissions from non-combustion sources, except (d) below, the concentration at a temperature of 273K and at a pressure of 101.3 kPa, with no correction for oxygen or for water vapour content;

(d) in relation to the monthly average emissions of SO_2/NOx from emission point A6b that may be included in the monthly BREF integrated emissions management bubble, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 3% dry.

Schedule 7 – Site Plan



End of Permit