Notice of variation and consolidation with introductory note

The Environmental Permitting (England & Wales) Regulations 2016

Essar Oil (UK) Limited

Stanlow Manufacturing Complex
PO Box 3
Ellesmere Port
Cheshire
CH65 4HB

Variation application number

EPR/FP3139FN/V009

Permit number

EPR/FP3139FN

Stanlow Manufacturing Complex
Permit number EPR/FP3139FN

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 that all the conditions of the permit have been varied and schedule 2 comprises a consolidated permit which reflects the variations being made and contains all conditions relevant to this permit. All the conditions of the permit have been varied and are subject to the right of appeal.

Purpose of this variation

Review permit conditions

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 28 October 2014.

We have set improvement conditions to track progress against compliance for a number of the BAT Conclusions.

We have also taken the opportunity to set improvement conditions that will deliver compliance with the Water Framework Directive (WFD).

Derogations

Article 15(4) of the IED enables the Environment Agency to allow derogations from BAT AELs (Associated Emission Levels) stated in the BAT Conclusions under specific circumstances. Derogations from BAT AELs were requested for the BAT conclusions listed below. A brief explanation of each is included in the Annex to the conditions of this permit:

- **BAT 12**
  Supporting a time limited delay to 30 September 2021, which requires a reduction in the emission load of a number of pollutants in the waste water discharge to the receiving water bodies.
- **BAT 27**
  Supporting a long-term delay for the life of the BREF (BAT reference document for the Refining of Mineral Oil and Gas), which requires a reduction in the carbon monoxide (CO) emissions to air from the catalytic cracking process (regenerator).
- **BAT 34 Crude Distillation Unit 4 (CDU-4)**
  Supporting a time limited delay to 31 December 2022 (or until the next permit review if sooner), which requires a reduction in the NO_x emissions from CDU-4 combustion units.
- **BAT 52**
  Supporting a time limited delay to 31 December 2020, which requires a reduction in the volatile organic compound (VOC) emissions to air from loading and unloading operations of volatile liquid hydrocarbon compounds.

The rest of the installation is unchanged and continues to be operated as follows:

The main features of the installation

Stanlow Manufacturing Complex is situated south of the Mersey Estuary near Ellesmere Port and is operated by Essar Oil (UK) Limited. The Mersey Estuary is within 10km of the site and identified as a Special Protection Area (SPA) and Ramsar site. The Manchester Ship Canal (MSC) is located to the north, with the villages of Ince and Elton to the north east and the village of Thornton-le- Moors to the south.

Refinery activities (Primary activity)

The installation processes crude oil in a refinery which includes crude distillation units (CDU-3 and CDU-4), a fluid catalytic cracker, alkylation unit, platformer and hydrodesulphurisation plant.

In general terms, crude oil is imported by ship into tankage at the Tranmere Oil Terminal some 15 miles away on the Mersey. The Tranmere Oil Terminal is subject to a separate EPR Permit (EPR/YP3238FT). Crude oil is transferred by pipeline to tankage at Stanlow. This is the main feed-stock for crude distillation, which separates the crude oil into fuel gas, liquefied petroleum gases (LPGs), naphtha, kerosene, gas oil and a residue for further processing.

The naphtha (gasoline) fraction from distillation is the feed for the platformer which reforms it into high octane motor gasoline. The product from the Platformer is fed to the Aromatics plant, which produces aromatic hydrocarbons such as benzene, toluene and xylene. The kerosene and gas oil streams are treated to remove sulphur before sale.

The bottom product of the distillation, termed ‘long residue’ is the feed for the catalytic cracking unit and high viscosity index (HVI) luboil complexes. The fluidised catalytic cracker and its associated gas separation units produce fuel gas, LPG, high octane motor gasoline, gas oil, and fuel oil. LPG streams from the cracker and distillation provide the feed for the Alkylation plant, which converts them into motor gasoline.

Other cracker LPG streams are feedstock for chemicals production both on and off-site. The fuel gas from the cracker and benzene from the Aromatics plant are the feedstocks for the production of ethyl benzene, which is exported for conversion to styrene.

The oil movements include receipts and storage of oil (and chemical) feedstocks, for the collection, storage, blending and internal distribution of products and for those parts of ship and road loading of products and intermediates.

Finished products are exported by pipeline then transported either by road tanker from the loading terminal or by water via the Manchester Ship Canal.

The utilities plants supply cooling, fire and process water, steam, electricity, nitrogen and instrument air to most of the site. The utilities area also includes units for extracting hydrogen sulphide from refinery sour water and processing to produce elemental sulphur.

These activities fall under the following descriptions in Part 2 of Schedule 1 of the Environmental Permitting Regulations (EPR) 2016:

- Section 1.2 Part A(1)(d) – Refining mineral oil (cracking, secondary processes and distillation).
- Section 1.2 Part A(1)(e) - The loading, unloading or other handling of, the storage of, or the physical, chemical or thermal treatment of crude oil (oil movements).

Chemical activities

The refinery is integrated with adjoining chemicals plants. Although some feeds for the chemical production units are or can be received from other units on site, these are essentially stand-alone chemical plants, based almost entirely on imported feed-stocks. The ‘naphtha’ feed for the Synthesis Gas unit is the only refinery stream still processed by the chemical plants. They use the utilities and general facilities of the Stanlow site.

The chemical plants fall under the following Schedule 1 listed activity descriptions:

- Section 4.1 Part A(1)(a)(i) - Producing organic chemicals such as hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic) (Shell Higher Olefins Process (SHOP)).
- Section 4.1 Part A(1)(a)(ii) - Producing organic chemicals such as organic compounds containing oxygen (Alcohols (Neodol and Linevol) and production of syngas and epoxy resins).
- Section 4.2 Part A(1)(a)(v) – Producing inorganic chemicals such as, non-metals, metal oxides, metal carbonyls or other inorganic compounds (for example calcium carbide, silicon, silicon carbide, titanium dioxide) (Amine recovery unit , amine systems, sour water stripper units and sulphur recovery unit plants)

Incineration activity (Energy Recovery Plant)

Process wastes arising from the oils and chemicals production (and other Essar UK sites such as the Tranmere Oil Terminal) are disposed of by incineration which is subject to the conditions in Chapter IV of the IED.

Incineration falls under the following Schedule 1 listed activity description:

- Section 5.1 Part A(1)(a) - The incineration of hazardous waste in a waste incineration plant with a capacity exceeding 10 tonnes per day.

Combustion activities

The installation also operates a number of combustion plant, some of which are categorised as large combustion plant (LCP), defined as LCP 138 to 143. Some of these are included in the refining and chemicals activities; however they fall under the following Schedule 1 listed activity description:

- Section 1.1 Part A(1)(a) - Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts (HPBH and Medium Pressure Boiler House Boiler (MPBH)).

Installation emissions

The site effluent is treated by a combination of physico-chemical and biological treatments on-site and off-site. Treated effluent is discharged to the River Gowy, Manchester Ship Canal or the Ellesmere Port Waste Water Treatment Works dependant on composition. Improvements are being made to secure compliance with BAT Conclusion 12 which requires a reduction in the emission load of pollutants in the waste water discharge to the receiving body.

The installation releases a number of pollutants to air, including sulphur dioxide (SO_2), NOx, particulates and VOCs. These are from the activities described above and also from the burning of sour and sweet gases at the flares. Improvements are being made to secure compliance with BAT Conclusions 34 (NOx) and 52 (VOCs) which require the reduction of the emission load of pollutants to air.

Waste recovery/disposal

There are a number of waste recovery/disposal activities taking place at the installation which fall under the following Schedule 1 listed activity descriptions:

- Section 5.3 Part A(1)(a)(i)(ii) - Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment & physico-chemical treatment.
- Section 5.4 Part A(1)(a)(ii) - Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment (effluent treatment).

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**
Application EPR/NP3237LS/A001	21/08/06	Duly Made
Additional information received	25/01/07	Dated 19/01/07
Additional information received	01/03/07, 02/05/07, 07/07/07, 08/08/07, 11/09/07, 30/11/07	
Permit EPR/NP3237LS granted	21/12/07	
Variation Application EPR/NP3237LS/V002	22/12/08	Duly Made
Variation EPR/NP3237LS/V002 issued	23/12/08	
Transfer Application EPR/FP3139FN/T001	Duly made 27/07/11	Full transfer of permit EPR/NP3237LS from Shell Oil Products Limited
Additional information received	28/07/11	Relating to technical and financial capability plus specific asset management
Transfer EPR/FP3139FN/T001 issued	01/08/11	Full transfer of permit to Essar Oil (UK) Limited
Variation Application EPR/FP3139FN/V002	Duly made 24/11/11	To vary and reduce the flow and monitoring frequency for outlet W3 (N38)
Variation EPR/FP3139FN/V002 issued	27/01/12	Varied permit issued
Variation Application EPR/FP3139FN/V003	Duly made 21/11/11	To vary the monitoring requirements for SOx at emission point A-11 and update the permit to modern conditions
Variation EPR/FP3139FN/V003 issued	22/03/12	Varied permit issued
Variation EPR/FP3139FN/V004 issued	28/12/12	Environment Agency led variation to reduce the annual emission limit for SO_2 in 2013 from 10,000 tonnes per annum to 8,800 tonnes per annum (IC29 response)
Variation EPR/FP3139FN/V005 issued	31/03/14	Variation to change annual sulphur dioxide limits for 2014-2016 and to add an IC for the Eels Regulations Varied and consolidated permit issued in modern condition format
Variation EPR/FP3139FN/V006 issued	08/04/14	Variation to correct errors in table S3.2 introduced in variation EPR/FP3139FN/V002 Varied and consolidated permit issued in modern condition format
Regulation 61 Notice sent to the Operator (EPR/FP3139FN/V008)	05/08/15	Issue of a Notice under Regulation 61 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 61 Notice response (EPR/FP3139FN/V008)	30/09/15	Response received from the Operator Methodology for assigning periods of start-up and shutdown provided in Notes section for each LCP in the response

Status log of the permit		
Description	**Date**	**Comments**
Additional information received (EPR/FP3139FN/V008)	01/10/15	Response to request for further information
	15/10/15	Corrected data for LCP 143 (SHOP)
	04/11/15	Worked example for LCP emission limit value calculation
	26/11/15	Response to the additional questions Additional information
	15/12/15	Additional information including LCP 140 (HPBH) rating
	06/10/16	IED LCP Response Letter including fuels & LCP 140 (HPBH) operations and fuel mix
	04/11/16	LCP 140 (HPBH) Representative emission limit value demonstration
	16/12/16	LCP 140 (HPBH) improvements commitment
	13/01/17	Annual LCP 140 (HPBH) NOx emission limit
Variation EPR/FP3139FN/V008 issued	03/03/17	LCP Chapter III Varied and consolidated permit issued in modern condition format Variation effective from 03/03/17
Part Surrender Application EPR/FP3139FN/S007	Duly made 06/05/16	Application to surrender land and amend permitted area to remove an area of land (Argent) that was never used to carry out any site operations or directly associated activities
Part Surrender EPR/FP3139FN/S007 issued	13/09/16	Part surrender complete
Regulation 61 Notice dated 05/08/15 (Notice requiring information for statutory review of permit) (EPR/FP3139FN/V009)	Response Received 05/02/16	Technical standards detailed in response to the information notice Information to demonstrate that relevant BAT conclusions are met for the refining activities Derogation requests (superseded, see below)
Response to request for further information dated 04/10/17	24/10/17	Updated technical standards provided in spreadsheet format Supersedes all previous submissions from 05/02/16, not included in this status log
Request for further information sent by email 22/03/18	06/04/18	General queries, including updated non-technical summary
	18/07/18	Updated site plan
	31/07/18	Explanation of changes
	02/08/18	Amended
Additional information received	07/06/18	General information and clarification
Additional information received	13/06/18	Phenol monitoring equivalence
Additional information received	17/07/18	Hydrogen content of refinery fuel gas
Additional information received	18/07/18	General information and clarification
Additional information received	24/07/18 30/07/18	Flaring information

Status log of the permit		
Description	**Date**	**Comments**
Derogation requests		
BAT Conclusion 12 Effluent	28/10/16	Supporting information
	10/07/17	Supporting information
	19/09/17	Supporting information and cost benefit analysis (CBA) submitted as Appendix 5 Supersedes previous submissions
	18/12/17	Supporting information supersedes previous submission
	22/02/18	Confirmation of contractual date for third party works
	22/06/18	Supporting information and CBA Supersedes previous submissions Derogation end date changed due to complexity of construction works
BAT Conclusion 27 CO Boiler	31/03/16	Supporting information and CBA
	27/10/17	Supporting information
	17/11/17	Supporting information and CBAs Supersedes previous submissions
BAT Conclusion 34 CDU-4	23/11/17	Supporting information – initial (first stage) submission
	07/12/17	Supporting information and CBA Supersedes previous submissions
	18/12/17	Supporting information and CBA Supersedes previous submissions Submission based on correction of the relevant BAT AELs for gas and multi-fuel firing
	24/05/18	Supporting information and CBA Supersedes previous submissions Submission based on updated proposal with partial compliance via the NOx emissions bubble
BAT Conclusion 34 HPBH	31/03/16	Supporting information
	20/07/17	Supporting information
	20/10/17	Supporting information and CBA Supporting information supersedes previous submissions
	07/11/17	Additional information and amended CBA
	22/02/18	Supporting information and CBA, supersedes previous submissions
	23/02/18	Supporting information supersedes previous submissions – clarification of derogation date
	20/04/18	Email confirming withdrawal of derogation
BAT Conclusion 52 Loading/unloading operations	17/11/17	Supporting information – initial (first stage) submission
	23/11/17	Supporting information and CBA Supersedes previous submission

Status log of the permit		
Description	**Date**	**Comments**
	14/12/17	Supporting information and CBA Supersedes previous submission
	04/01/18	Supporting information. Supersedes previous submission
	24/01/18	Clarification on unloading/unloading
	01/02/18	Clarification on unloading/unloading
DRAFT DECISION EPR/FP3139FN/V009	09/08/18	Statutory review of permit - BAT Conclusions published 28 October 2014 Varied and consolidated permit Consultation 13/08/18 to 10/09/18
FINAL DECISION EPR/FP3139FN/V009 (Billing ref: NP3030QZ)	26/09/18	Statutory review of permit - BAT Conclusions published 28 October 2014 Varied and consolidated permit issued

Other Part A installation permits relating to this installation		
Operator	**Permit number**	**Date of issue**
Essar Oil (UK) Limited	EPR/YP3238FT Tranmere Oil Terminal	Original permit EPR/NP3437LX issued to Shell UK Oil Products Ltd 28/06/07 Permit transferred in full from Shell UK Oil Products Ltd 01/08/11

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 13 of the Environmental Permitting (England and Wales) Regulations 2016 varies and consolidates

Permit number

EPR/FP3139FN

Issued to

Essar Oil (UK) Limited ("the operator")

whose registered office is

The Administration Building
5th Floor
Stanlow Manufacturing Complex
Ellesmere Port
Cheshire
CH65 4HB

company registration number **07071400**

to operate an Installation at

Stanlow Manufacturing Complex
PO Box 3
Ellesmere Port
Cheshire
CH65 4HB

to the extent set out in the schedules.

The notice shall take effect from 26/09/2018

Name	Date
Anne Nightingale	**26/09/2018**

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/FP3139FN

This is the consolidated permit referred to in the variation and consolidation notice for application **EPR/FP3139FN/V009** authorising,

Essar Oil (UK) Limited ("the operator"),

whose registered office is

The Administration Building
5th Floor
Stanlow Manufacturing Complex
Ellesmere Port
Cheshire
CH65 4HB

company registration number **07071400**

to operate an installation at

Stanlow Manufacturing Complex
PO Box 3
Ellesmere Port
Cheshire
CH65 4HB

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

Name	Date
Anne Nightingale	**26/09/2018**

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.

1.2.2 The operator shall provide and maintain steam and/or hot water pass-outs such that opportunities for the further use of waste heat may be capitalised upon should they become practicable.

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;

(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").

2.1.2 Waste authorised by this permit in condition 2.3.6 shall be clearly distinguished from any other waste on the site.

2.1.3 Hazardous waste shall not be mixed, either with a different category of hazardous waste or with other waste, substances or materials, unless it is authorised by schedule 1 table S1.1 and appropriate measures are taken.

2.2 The site

2.2.1 The activities shall not extend beyond the site, being the land shown edged in red 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 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 Any raw materials or fuels listed in schedule 2 table S2.1 shall conform to the specifications set out in that table.

2.3.3 For the following activities referenced in schedule 1, table S1.1: LCP 139 stand by liquid fuel may be used for periods of up to 240 hours per calendar year in accordance with section 6 of 'IED Chapter III Protocol for Multi-fuel Firing Refinery Combustion Plants granted a Permit prior to 7th January 2013'. Version 5 or any later version unless otherwise agreed in writing by the Environment Agency ('the MFF Protocol').

2.3.4 For the following activities referenced in schedule 1, table S1.1: LCP 138, LCP 139, LCP 140, LCP 141, LCP 142 and LCP 143 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.

2.3.5 The following activities referenced in schedule 1, table S1.1: LCP 138 and LCP 141 (HVI only) shall not take place until the operator has submitted a report in writing to the Environment Agency demonstrating compliance with the requirements of this Permit and has obtained written approval from the Environment Agency.

2.3.6 For the following activity referenced in schedule 1, table S1.1: "incineration of hazardous waste". Waste shall only be accepted if:

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

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

2.3.7 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.

2.3.8 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.

2.3.9 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”: The operator shall burn only those hazardous wastes specified in table S2.3 of schedule 2.

2.3.10 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”: Waste shall not be charged, or shall cease to be charged, if:

(a) the combustion chamber temperature is below, or falls below, 850^{o}C for non-hazardous waste or hazardous waste where the content of halogenated organic substances (as chlorine) does not exceed 1%; or

(b) any continuous emission limit value in schedule 3 table S3.1(c) is exceeded; or

(c) any continuous emission limit value in schedule 3 table S3.1(b) is exceeded, other than under abnormal operating conditions; or

(d) monitoring results required to demonstrate compliance with any continuous emission limit value in schedule 3 table S3.1(b) are unavailable other than under abnormal operating conditions.

2.3.11 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”: The operator shall have at least one auxiliary burner in each line at start up or shut down or whenever the operating temperature falls below that specified in condition 2.3.10, as long as incompletely burned waste is present in the combustion chamber. Unless the temperature specified in condition 2.3.10 is maintained in the combustion chamber, such burner(s) may be fed only with fuels which result in emissions no higher than those arising from the use of gas oil, liquefied gas or natural gas.

2.3.12 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”. The operator shall record the beginning and end of each period of “abnormal operation”.

2.3.13 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”: During a period of “abnormal operation”, the operator shall restore normal operation of the failed equipment or replace the failed equipment as rapidly as possible.

2.3.14 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”: Where, during “abnormal operation”, on an incineration line, any of the following situations arise, waste shall cease to be charged on that line until normal operation can be restored:

(a) continuous measurement shows that an emission exceeds any emission limit value in schedule 3 table S3.1(b) due to disturbances or failures of the abatement systems, or continuous emission monitor(s) are out of service, as the case may be, for a total of 4 hours uninterrupted duration;

(b) the cumulative duration of “ abnormal operation” periods over 1 calendar year has reached 60 hours;

(c) continuous measurement shows that an emission exceeds any emission limit value in schedule 3 table S3.1(c) due to disturbances or failures of the abatement systems; and

(d) continuous emission monitors or alternative techniques to demonstrate compliance with the emission limit value(s) for particulates, TOC and / or CO in schedule 3 table S3.1(c), as detailed in the application or as agreed in writing with the Environment Agency, are unavailable.

2.3.15 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste”. The operator shall interpret the end of the period of “abnormal operation” as the earliest of the following:

(a) when the failed equipment is repaired and brought back into normal operation;

(b) when the operator initiates a shut-down of the waste combustion activity, as described in the application or as agreed in writing with the Environment Agency;

(c) when a period of four hours has elapsed from the start of the “abnormal operation”; and

(d) when, in any calendar year, an aggregated period of 60 hours “abnormal operation” has been reached .

2.3.16 For the following activity referenced in schedule 1, table S1.1: “incineration of hazardous waste” Bottom ash and APC residues shall not be mixed.

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 The operations specified in schedule 1 table S1.4 shall not commence until the measures specified in that table have been completed.

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, S3.1(a), S3.1(b), S3.2, S3.2(a), S3.2(b), S3.3 and S3.3(a).

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

3.1.3 Where a substance is specified in schedule 3 tables S3.2, S3.2(a), S3.2(b) or S3.3 and S3.3(a) but no limit is set for it, the concentration of such substance in emissions to water from the relevant emission point shall be no greater than the background concentration.

3.1.4 Total annual emissions from the emission point(s) set out in tables schedule 3 S3.1, S3.1(a), S3.1(b), S3.2, S3.2(a), S3.2(b), S3.3 and S3.3(a) of a substance listed in schedule 3 table S3.4 shall not exceed the relevant limit in table S3.4.

3.1.5 Wastes produced at the site shall, as a minimum, be sampled and analysed in accordance with schedule 3 table S3.6 Additional samples shall be taken and tested and appropriate action taken, whenever:

(a) disposal or recovery routes change; or

(b) it is suspected that the nature or composition of the waste has changed such that the route currently selected may no longer be appropriate.

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 any approved emissions management plan, 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.

3.2.4 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.

3.3 Odour

3.3.1 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 any approved odour management plan, to prevent or where that is not practicable to minimise the odour.

3.3.2 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.

3.4 Noise and vibration

3.4.1 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 any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration.

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 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.

3.5 Monitoring

3.5.1 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, S3.1(a), S3.1(b), S3.2, S3.2(a), S3.2(b), S3.3 and S3.3(a);

(b) process monitoring specified in table S3.5;

(c) residue quality in table S3.6.

3.5.2 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.

3.5.3 Monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme and the environmental or other monitoring specified in condition 3.5.1 shall have either MCERTS certification or MCERTS accreditation (as appropriate) unless otherwise agreed in writing by the Environment Agency. Newly installed CEMs, or CEMs replacing existing CEMs, shall have MCERTS certification and have an MCERTS certified range which is not greater than 1.5 times the daily emission limit value (ELV) specified in schedule 3 tables S3.1, S3.1(a), S3.1(b) and S3.1(c). 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.

3.5.4 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, S3.1(a), S3.1(b), S3.2, S3.2(a), S3.2(b), S3.3 and S3.3(a) unless otherwise agreed in writing by the Environment Agency.

3.5.5 Where Continuous Emission Monitors are installed to comply with the monitoring requirements for the incineration of waste in schedule 3 table S3.1(b); the Continuous Emission Monitors shall be used such that;

(a) the values of the 95% confidence intervals of a single measured result at the daily emission limit value shall not exceed the following percentages:

- Carbon monoxide 10%
- Sulphur dioxide 20%
- Oxides of nitrogen (NO & NO_2 expressed as NO_2) 20%
- Dust 30%
- Total organic carbon (TOC) 30%
- Hydrogen chloride 40%

(b) valid half-hourly average values shall be determined within the effective operating time (excluding the start-up and shut-down periods) from the measured values after having subtracted the value of the confidence intervals in condition 3.5.5 (a);

(c) where it is necessary to calibrate or maintain the monitor and this means that data are not available for a complete half-hour period, the half-hourly average shall in any case be considered valid if measurements are available for a minimum of 20 minutes during the half-hour period. The number of half-hourly averages so validated shall not exceed 5 per day;

(d) daily average values shall be determined as the average of all the valid half-hourly average values within a calendar day. The daily average value shall be considered valid if no more than five half-hourly average values in any day have been determined not to be valid;

(e) no more than ten daily average values per year shall be determined not to be valid.

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, tables S3.1 and S3.1(a); the Continuous Emission Monitors shall be used such that:

- for the continuous measurement systems fitted to the LCP release points defined in tables S3.1 and S3.1(a) 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 Monitoring for the purposes of integrated air emissions management

3.7.1 In order to assess compliance with the integrated emissions management limit for NOx, specified in table S3.1(d) of this permit:

(a) The operator shall undertake the monitoring and calculations described in their response to IC50 and as approved in writing by the Environment Agency, for all units covered by the 'bubble emission limit'; and

(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 response to IC50) when assessing compliance with the 'bubble emission limit'. The operator shall record the start and conclusion of periods of 'other than normal operation' and record the emissions from the affected unit during that period.

3.7.2 In order to assess compliance with the integrated emissions management limit for SO_2, specified in Table S3.1(d) of this permit:

(a) The operator shall undertake the monitoring and calculations described in their response to IC51 and as approved in writing by the Environment Agency, for all units covered by the 'bubble emission limit'; and

(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 response to IC51) when assessing compliance with the 'bubble emission limit'. The operator shall record the start and conclusion of periods of 'other than normal operation' 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 reports 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;

(c) the performance parameters set out in schedule 4 table S4.3 using the forms specified in table S4.5 of that schedule;

(d) the total annual emissions from, and total amount of energy input to each Large Combustion Plant in accordance with the requirements of Chapter III of the IED set out in schedule 4 table S4.4 using the forms specified in table S4.5 of that schedule; and

(e) the functioning and monitoring of the incineration plant in a format agreed with the Environment Agency. The report shall, as a minimum requirement give an account of the running of the process and the emissions into air and water compared with the emission standards in the IED.

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 S4.5 ; 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.

4.2.6 Every quarter, the operator shall report details to the Environment Agency, as specified in Form AIR: F1, of periods of flaring; where the aggregate quantity of gas flared from the installation exceeds 2.9 tonnes/hour, as a daily mean value.

4.2.7 Every quarter, the operator shall report details to the Environment Agency, as specified in Form AIR: F2, of all flaring.

4.2.8 The operator shall keep a record of each flaring event, where the gas flared exceeded 2.9 tonnes/hour, including the cause of the event, whether sour and/or acidic gases were routed to the flare at the time, whether the event was planned and any action taken to minimise the duration of and/or the impact of flaring.

4.2.9 By 31 January each year the operator shall prepare and submit a report to the Environment Agency on the management of flaring, which includes:

(a) a summary of the root causes of any flaring events reported on form AIR F1, in accordance with condition 4.2.6;

(b) a review of possible improvements to minimise the number and/or impact of all flaring events, with proposals for improvement and timescales for implementation;

(c) progress against any improvement proposals, identified in previous reports submitted in compliance with condition 4.2.8; and

(d) any other actions taken in the previous 12 months to minimise the number and/or impact of flaring events.

4.3 Notifications

4.3.1 The Operator shall

(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 immediately 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.

(d) any incident which has led to a period of abnormal operation of the incineration plant.

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.

In any other case:

(a) the death of any of the named operators (where the operator consists of more than one named individual);

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

(c) any steps taken with a view to the operator, or any one of them, going into bankruptcy, entering into a composition or arrangement with creditors, or, in the case of them being in a partnership, dissolving the partnership.

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 Where the operator has entered into a climate change agreement with the Government, the Environment Agency shall be notified within one month of:

(a) a decision by the Secretary of State not to re-certify the agreement;

(b) a decision by either the operator or the Secretary of State to terminate the agreement; and

(c) any subsequent decision by the Secretary of State to re-certify such an agreement.

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

4.3.9 In the event that more than 6.4 tonnes of sulphur dioxide has or is likely to be emitted in a 24 hour period, from the flaring of acid gases (emission point A14); the operator shall immediately inform the Environment Agency, providing details of:

(a) the likely duration of the flaring event;

(b) the cause of the flaring event;

(c) remedial actions being taken;

The operator shall confirm:

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

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

4.3.10 In the event that the operator proposes to make a change to the design or operation of the integrated emissions management technique (emissions bubble), for oxides of nitrogen or sulphur dioxide;

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

(b) the notification shall contain details of the change in operation or design, and an assessment of the impact that this change will have on the monthly emission limit, specified in Table S3.1(d) of this permit; and

(c) the operator shall not implement the change until it has 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 EP Regulations	**Description of specified activity**	**Limits of specified activity**
Section 1.2 Part A(1)(d) Primary activity	Refining mineral oils (Cracking)	From receipt of feed to oil refining unit to use, intermediate or product storage, or export, including each of the following units: i. Catalytic Cracking Unit no 2 (including process heaters), with a capacity of 11,000 tpd, consisting of the reactor and regenerator section, the main fractionator distillation column and a carbon monoxide (CO) boiler ii. Gas Separation Unit iii. Hydrogen Fluoride Alkylation (Butamer and Selective Hydrogenation (SHU) units iv. Ethyl benzene production unit (EBU) including process heater: F6800 9.45 MWth v. Low Sulphur Mogas Units (CD Hydro and HD Select) including process heater: F4001 7.0 MWth
Section 1.2 Part A(1)(d) Primary activity	Refining mineral oils (Secondary Processes)	From receipt of feed, through blending (where necessary) to feed, intermediate and product storages including: i. Iso-Pentane Unit ii. Kerosene Merox Treater No.2 iii. **LCP 142**: Platformer No.3 and Hydrotreater No.3 including process heaters: F9301 16.8 MWth F9401 30.4 MWth F9402 42.4 MWth F9403 28.8 MWth F9404 16.8 MWth iv. Hydrotreater No. 2 including process heater: F501 17.4 MWth v. **LCP 141**: Aromatics production including process heaters: F5901A 63.1 MWth F5901B 63.1 MWth vi. **LCP 141**: Hydrodesulphurisation unit 2 including process heater: F6301 18.3 MWth vii. **LCP 141**: HVI lubricating oil including process heaters: F4101 44.5 MWth F4102 5.6 MWth F4901A 44.5 MWth F4901B 44.5 MWth

Table S1.1 activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
Section 1.2 Part A(1)(d) Primary activity	Refining mineral oils (Distillation)	From receipt of crude to operation of crude distillation units including: **LCP 138**: Crude Distillation Unit 3 (CDU-3) (throughout 8,000 t/d) and High Vacuum Unit 3 (throughout 4,500 t/d) including process heaters: F301 33.2 MWth F301U 37.6 MWth F302 27.9 MWth **LCP 139**: Crude Distillation Unit 4 (CDU-4) including process heaters: F201A 58.9 MWth F201B 58.9 MWth F201C 49.0 MWth F202 53.3 MWth F650 2.4 MWth
Section 1.2 Part A(1)(e)	The loading, unloading or other handling of, the storage of, or the physical, chemical or thermal treatment of crude oil (Oil movements)	From receipt of feed, through blending (where necessary) to feed, intermediate and product storages including: liquefied petroleum gases, white oils, gas oils/ black oils, crude oil/slops. Locations identified on site plan provided as Appendix 3 of the BAT 52 derogation received 04 January 2018. Loading/unloading at White Oil Docks (Berths 1 and 3 on Stanlow Island) shall be limited to **<1 million m^3/annum from 01 January 2021**.
Section 1.1 Part A(1)(a)	Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts (MW)	From receipt of natural gas, fuel oil and storage of fuel oil. Natural gas, fuel oil and refinery fuel 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, ash removal from the combustion process and the export of steam to the steam systems, including: i. LCP 140 HPBH boilers 21 to 26 6 x 104 MWth boilers Combined capacity limited by software interlock to less than 500 MWth in accordance with Environment Agency Regulatory Guidance Note 2 and subject to provisions set out in Section 4 of the MFF Protocol. ii. MPBH 2 x 28 MWth boilers <u>Note</u> **LCPs 138**, **139, 141 & 142** included in listed activity Section 1.2 Part A(1)(d) **LCP 143** included in listed activity Section 4.1 Part A(1)(a)(i)

Table S1.1 activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
Section 4.1 Part A(1)(a)(i)	Producing organic chemicals such as hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)	**LCP 143**: Higher Olefins SHOP Production capacity 395 kt/a (kilotonnes per annum) From receipt of raw materials to the manufacture, storage and despatch of finished product. Including the cleaning of the process plant, operation of abatement systems and the storage and handling of waste arising from the process and including process heaters: F9460 1.5 MWth F9401 1.5 MWth F9801 64 MWth
Section 4.1 Part A(1)(a)(ii)	Producing organic chemicals such as organic compounds containing oxygen, such as alcohols, aldehydes, ketones, carboxylic acids, esters, ethers, peroxides, phenols, epoxy resins	**Alcohols (Neodol and Linevol) including Syngas production** Production capacity: Neodol: 93 kt/a and Linevol: 48 kt/a From receipt of raw materials to the manufacture, storage and despatch of finished product. Including the cleaning of the process plant, operation of abatement systems and the storage and handling of waste arising from the process and including process heaters: F2102 26 MWth F2101 A,B 2.3 MWth F3901 5.2 MWth F4701 5.2 MWth
Section 4.1 Part A(1)(a)(ii)	Producing organic chemicals such as organic compounds containing oxygen, such as alcohols, aldehydes, ketones, carboxylic acids, esters, ethers, peroxides, phenols, epoxy resins	**Epoxy Resins** Production capacity 15 kt/a From receipt of raw materials to the manufacture, storage and despatch of finished product. Including the cleaning of the process plant, operation of abatement systems and the storage and handling of waste arising from the process.
Section 4.2 Part A(1)(a)(v)	Producing inorganic chemicals such as, non-metals, metal oxides, metal carbonyls or other inorganic compounds (for example calcium carbide, silicon, silicon carbide, titanium dioxide)	**Sulphur recovery and production** Amine recovery unit, amine systems, sour water stripper units and sulphur recovery unit plants including: i. Unit 5300 (100 t/d design feed rate for sour gas) ii. Unit 5500 (100 t/d design feed rate for sour gas) iii. Claus Off gas Treating Unit
Section 5.1 Part A(1)(a)	The incineration of hazardous waste in an incineration plant with a capacity exceeding 10 tonnes per day	**Energy Recovery Plant** From receipt and preparation of wastes for incineration to export of ashes and air pollution control (APC) residues. The incinerator is permitted to burn 50,000 tonnes/year of hazardous and non-hazardous waste as specified in Table 2.3 of this permit. Energy is recovered from the burning of the waste.

Table S1.1 activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
Section 5.3 Part A(1)(a)(i)	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment	**North Dissolved Air Flotation** (**NDAF): Biological treatment of waste waters and storage of sludge >50t/day** From collection and treatment of process effluent including: Receipt of ballast water received from ships in Manchester Ship Canal (MSC) berths, surface waters from north site and effluent from No 1 and No 2 Gate road car terminals and subsequent physical and biological treatment to the discharge point W2, to the River Gowy. Discharge point shall normally be to sewer following completion of BAT 12 as specified by IC41 in Table S1.3 of this permit.
Section 5.3 Part A(1)(a)(i)	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment	**South Dissolved Air Flotation (SDAF): Biological treatment of waste waters and storage of sludge >50t/day** From collection and treatment of process effluent including: Surface waters from storages West and East of Gowy, the distillation department and non-process effluents arising from HF Alkylation unit and subsequent physical and biological treatment to the discharge point W1, to Thornton Brook, tributary of River Gowy. Discharge point shall normally be to sewer following completion of BAT 12 as specified by IC41 in Table S1.3 of this permit.
Section 5.3 Part A(1)(a)(ii)	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment	**Spent Caustic Neutralisation Unit: Disposal of hazardous waste** From collection and treatment of spent caustic from CDU-4 furnaces, HDS2 unit, Merox and Gas plant to transfer to the Process Dissolved Air Flotation (PDAF) and subsequent discharge at W3, MSC. Discharge point shall normally be to sewer following completion of BAT 12 as specified by IC41 in Table S1.3 of this permit.
Section 5.3 Part A(1)(a)(ii)	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment	**Unit 78: Physico-chemical treatment of waste waters and storage of sludge >50t/day** From collection and treatment of process effluent including: Process effluents arising from chemicals units located at north and south sites and effluent by pipeline from Argent Energy (UK) Limited (EPR/LP3233DK) which is subject to pH correction and physical treatment prior to discharge to sewer.
Section 5.3 Part A(1)(a)(ii)	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment	**PDAF: Physico-chemical treatment of waste waters and storage of sludge >50t/day** From collection and treatment of process effluent including: Process effluents from refinery operation and subsequent treatment to joint discharge point with surface waters from refinery operations (N38) to W3, MSC. Discharge point shall normally be to sewer following completion of BAT 12 as specified by IC41 in Table S1.3 of this permit.

Table S1.1 activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
Section 5.3 Part A(1)(a)(ii)	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment:	**Storage (Maintenance): Disposal of hazardous waste** The de-sludging together with the dewatering and/or de-oiling of hazardous sludge including; tank/vessel bottoms, oil water separators and interceptors. Recovered oil to be directed to existing tankage. Recovered water to be discharged via an effluent emission point listed in Schedule 3 Tables S3.2/3.2(a) of this permit.
Section 5.4 Part A(1)(a)(ii)	Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment:	**Effluent (Maintenance): Physico-chemical treatment of non- hazardous waste** The de-sludging and dewatering of non-hazardous sludge from the demineralisation plant (CT2) and component parts of the effluent management system (including settlement ponds, grit chambers and channels). Recovered water to be discharged via an effluent emission point listed in Schedule 3 Tables S3.2/3.2(a) of this permit.
Directly Associated Activity		
Flaring of gases	Burning of sour and sweet gases at flares	Hydrocarbon gas recovery compressor, flare headers, knock-out pots and flare stacks and any ancillary equipment consisting of Flares 1 to 4 (emission point A-14) on South Site.
Flaring of gases	Burning of hydrocarbon gases at flare	SHOP flare headers, knock-out pots and flare stacks and any ancillary equipment.
Nitrogen generation	On-site generation by third party	From the production facility piped to the respective plants.
Cooling water system	Closed circuit natural draft cooling tower	Cooling Tower 1 serves Resins, Sulfolane, Alcohols, Instrument Air compressors and sour water stripper.
Cooling water system	Once through cooling tower	CT2 serves HVI Luboil, Crude Distillers, Feed Preparation Units, Merox Treater 2 and HPBH.
Cooling water system	Closed circuit natural draft cooling towers	CT5 serves Platformers, Aromatics, Hydrodesulphuriser 2, Catalytic Cracking Units and Gas Separation Units.
Cooling water system	Closed circuit natural draft cooling towers	CT7, 8 and 9 serves SHOP, HF alkylation unit, HPBH and Distillation PU.
Surface water drainage	Collection and handling of surface waters within installation	Handling and storage of site drainage until discharge to the site waste water treatment system or to discharge off-site.
Demineralised water unit	HPBH demineralised water plant	From the production of demineralised water to process water use in the HPBH.

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Application EPR/NP3237LS/A001	The response to sections 2.1 and 2.2 in the Application not including: That part of KMT2 operation involving the use of R1101	21/08/06
Receipt of additional information to the application	Responses to informal request for clarification on a number of sections on the application – dated 19/01/07	25/01/07
Receipt of additional information to the application	Responses to informal request for clarification on a number of sections on the application	01/03/07
Receipt of additional information to the application	Responses to informal request for clarification on improvement programme with respect to reduction in sulphur dioxide emissions	02/08/07 and 23/08/07
Receipt of additional information to the application	Responses to informal request for clarification on improvement programme with respect to reduction in emissions of oxides of nitrogen and particulates	31/08/07
Receipt of additional information to the application	Summary of key aspects of the additional information supplied during the determination period	30/11/07
Application EPR/NP3237LS/V002	All parts	22/12/08
Application EPR/FP3139FN/T001 (full transfer of permit EPR/NP3237LS)	All parts	27/07/11
Additional information	Information relating to technical and financial capability plus specific asset management	28/07/11
Variation Application EPR/FP3139FN/V002	All parts - application to vary and reduce the flow and monitoring frequency for outlet W3 (N38)	24/11/11
Variation Application EPR/FP3139FN/V003	All parts	21/11/11
Variation Application EPR/FP3139FN/V004	Environment Agency led variation to reduce the SO_2 limit in accordance with IC29	28/12/12
Variation Application EPR/FP3139FN/V005	Environment Agency led variation to change annual SO_2 limits and to add IC for Eels Regulations	26/03/14
Receipt of additional information	By email - Procedures for compliance with storm overflow conditions	24/03/14 and 25/03/14
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) and 2f (methodology for assigning periods of start-up and shutdown).	30/09/15

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Receipt of additional information to the regulation 60(1) Notice	Compliance route(s) and operating techniques identified in 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) and 2f (methodology for assigning periods of start-up and shutdown) for LCP 143 (SHOP).	15/10/15
Receipt of additional information to the regulation 60(1) Notice	Confirmation of the rate limiting approach for LCP 140 (HPBH)	15/12/15
Receipt of additional information to the regulation 60(1) Notice	Confirmation of the compliance route chosen approach for LCP 138 (CDU-3), LCP 139 (CDU-4), LCP 141 (Secondary Processes), LCP 142 (Platformer 3 & HDT3) and LCP 143 (SHOP)	06/10/16
Receipt of additional information to the regulation 60(1) Notice	Confirmation of the compliance route chosen approach and representative ELV for LCP 140 (HPBH)	04/11/16
Minor operational change	By email – Changes to nitrogen generation & supply by third party	26/11/15
Minor operational change	By email – Receiving effluent by pipeline from Argent Energy (UK) Limited (EPR/LP3233DK) via Unit 78 before discharging to sewer	29/11/16
Receipt of information to the Regulation 61 Notice. Initial request by letter dated 05/08/15 and final request by email sent 04/10/17	Technical standards detailed in response to BAT conclusions of the notice provided under Regulation 61 of Environmental Permitting Regulations. Best available techniques as described in BAT conclusions under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions for the Refining of Mineral Oil and Gas.	24/10/17
Annex to conditions in Variation EPR/FP3131FN/V009	Operating techniques for BAT Conclusions 12, 27, 34 and 52	-
Environmental Management System	<u>BAT Conclusion 7</u> (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.	To be available for inspection by an Environment Agency officer from 21/12/18
Environmental Management System	<u>BAT Conclusion 54</u> Wherever practicable, the Operator shall treat off-gas streams, which are to be used as refinery fuel gas (RFG), to remove acid gases such as hydrogen sulphide.	To be available for inspection by an Environment Agency officer from 21/12/18

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Environmental Management System	BAT Conclusions 57 & 58 Approved bubble design and monitoring protocol for Integrated Air Emissions Management, subject to response provided for improvement conditions IC50 and IC51 in Table S1.3 of this permit. Any approved revisions to this protocol shall automatically supersede earlier approved submissions.	Date of written approval by the Environment Agency
Installation operation on natural gas	POC1 Approved submission for pre-operational condition POC1 (previously in Table S1.4 of the permit).	26/06/12
Cease burning of the remaining sour water stripper off-gases in combustion plant at the installation (i.e. from HDS2 sour water stripper, C6501) and sulphur recovery	IC4 submission Approved submission for improvement condition IC4 (previously in Table S1.3 of the permit).	13/11/13

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
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 sections 2.2.2. and 2.2.5 of TGN S1.02 and section 2.2.5 of TGN S 4.01, including but not limited to: • kerbing at HVI lube plant and north site berths; • materials of construction of acids and alkali storages at HVI lube oil and alcohols plants; • basis of design for bunding for D17 gas oil area, EOG, WOG T site storage, NDAF and NO3 VRU ballast 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.	To be delivered through IC34
IC19	A written plan shall be submitted to the Agency for approval detailing the timescale to address the issues identified in the Application Site Report sections D2A and D2B with regard to potential for pollution Where appropriate, the plan shall contain the 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.	To be delivered through IC34

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
IC34	The Operator shall prepare and submit a desk top study in line with Stages 1–7 set out within the European Commission Guidance concerning baseline reports dated 5th May 2014 (Ref: 2014/C 136/03) and the Environment Agency's H5 guidance to the Environment Agency for review and approval. This shall include but not be limited to the following: • An assessment to determine whether there is a possibility of soil and / or groundwater contamination from relevant hazardous substances (RHS) used, stored or released from site; • A review of existing soil and groundwater measurements to determine whether an appropriate baseline can be established for RHS in the locations that they will be used, stored or released, having regard to the possibility of soil and/or groundwater contamination; • Proposals to undertake site investigation works should additional soil and groundwater measurements be required to enable an baseline to be established for RHS in the locations that they will be used, stored or released, having regard to the possibility of soil and/or groundwater contamination; and • An assessment to demonstrate that the requirements of improvement conditions IC2 and IC19 have been addressed.	31/10/18
IC35	The Operator shall undertake any relevant intrusive works identified within IC34 to enable an adequate baseline to be established for relevant hazardous substances (RHS) in the locations that they will be used, stored or released, having regard to the possibility of soil and/or groundwater contamination in line with the requirements set out within Stage 7 of European Commission Guidance concerning baseline reports dated 5th May 2014 (Ref: 2014/C 136/03) and the Environment Agency's H5 guidance; and Prepare and submit a baseline report to the Environment Agency for approval in line with the requirements set out within Stage 8 of the European Commission Guidance concerning baseline reports dated 5th May 2014 (Ref: 2014/C 136/03) and the Environment Agency's H5 guidance.	31/08/19
IC36	The Operator shall submit an updated site condition report to the Environment Agency for review. The Report shall include, but not be limited to, the following: • The baseline report required by IC35 above. • Baseline reference data for any 'other polluting substances'. • A soil and groundwater monitoring plan, to demonstrate proposed compliance with permit condition 3.2.4 in respect of periodic monitoring of relevant hazardous substances (RHS) in soil and groundwater and proposed monitoring for 'any other polluting substances'. Further information in respect of setting baseline reference data for any other polluting substances is detailed within the Environment Agency's H5 guidance.	31/12/19
IC38	The Operator shall undertake an impact assessment in accordance with the methodology in the Environment Agency H1 screening tool for all determinands listed in Schedule 3 Table S3.2 for emissions points to water W1, W2, W3 and W4. Based on the outcomes of the H1 screening and IC5, the Operator shall propose a revised Table S3.2 (or Table S3.2(a)(b) as appropriate), including applicable emission limit values, a monitoring schedule, and a revised Table S3.4 annual limit for oil in water (total). These shall be submitted in writing to the Environment Agency for approval.	31/03/19

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
IC39	BAT Conclusion 6 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 (in accordance with permit condition 4.2.2) on the results of the monitoring undertaken under the plan.	31/10/18
IC40	BAT Conclusion 11 The Operator shall carry out an assessment of the options available for segregation of waste water streams and the viability of their implementation; to reduce the volume of process water produced, as detailed in BAT Conclusion 11 for the Refining of Mineral Oil and Gas. A written report summarising the findings shall be submitted to the Environment Agency for approval, along with a timetable for implementing viable improvements identified. The Operator shall implement the improvements to the approved timetable.	31/07/19
IC41	BAT Conclusion 12 The Operator shall submit, for approval by the Environment Agency, reports setting out progress to achieving compliance with the BAT 12 AELs by no later than **30 September 2021** for this **time limited** derogation. The report shall include, but not be limited to, the following: • Current performance against the BAT Conclusion 12 AELs. • Methodology for reaching the AELs. • Associated targets / timelines for reaching compliance by **30 September 2021** at W1 to W4 defined in Tables S3.2, S3.2(a) and S3.2(b) of this permit for emissions of: Hydrocarbon oil index (HOI) at W1 to W4 Chemical Oxygen Demand (COD) at W2 Total Suspended Solids (TSS) at W2 & W3 Benzene at W3 Total nitrogen expressed as N at W4 Lead, cadmium, nickel & mercury at W4 • Address any potential uncertainties about the quality of the remaining surface water within the intermittent discharges, which will no longer receive DAF treatment. This shall include a review of these releases to confirm the requirement for any future monitoring that may be required to determine the significance of any residual impacts. • Procedures to control effluent releases at W1 & W2 in the event that they cannot be discharged to the third party waste water treatment works. These shall include an assessment of the impact of any such releases. • Any alterations to the initial plan – for progress reports. • Address each deficiency identified in the Flowcheck Ltd. Report No. SV1160F, dated 7 March 2012. The Operator shall submit reports on progress with the approved compliance plan on a six monthly frequency specified by this condition. The final report shall be submitted three months after the compliance date specified by this condition.	Initial Report 31/12/18 Progress reports by 30/06/19 31/12/19 30/06/20 31/12/20 30/06/21 Final Report 31/12/21

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
IC42	BAT Conclusion 27 The Operator shall submit, for approval by the Environment Agency, a summary report of the investigations carried out to assess the impact of modifications to the CO boiler for this **non time limited** derogation. The report shall include, but not be limited to the following: • The findings of the 'internal' assessment of the associated equipment carried out in 2018. • Implementation dates for any changes/modifications to the air flow. • The findings of the further simulation and design work, along with 'internal' inspection to assess the practicality of enhancing CO combustion by installation of a baffle in the combustion section of the CO boiler. • The changes to the CO/NOx emissions profile as a result of any changes/modifications identified. The Operator shall submit initial and final reports as specified by this condition.	Initial Report 31/12/18 Final Report 31/07/19
IC43	BAT Conclusion 34 – CDU-4 The Operator shall submit, for approval by the Environment Agency, reports setting out progress to achieving compliance with the BAT 34 NOx AEL. Compliance shall be achieved no later than 31 December 2022, for this **time limited** derogation. The report shall include any alterations to the initial plan – for progress reports. The Operator shall submit reports on progress with the approved compliance plan on a twelve monthly frequency specified by this condition. The final report shall be submitted as specified by this condition.	Initial Report 31/12/18 Progress reports by 31/12/19 31/12/20 31/12/21 Final Report 31/12/22
IC44	BAT Conclusion 48 The Operator shall prepare a caustic use minimisation plan, which shall consider: 1. Uses of caustic, including volume and caustic strength, in; i. Product treatment processes such as neutralisation of acid from the alkylation process, caustic washing of hydrocarbon streams leaving the FCC, caustic washing of propylene or butylene feeds to polymerisation units to remove mercaptans, gasoline sweetening. ii. Gas treatment, such as SRU off-gas scrubbing, tail-gas scrubbing, FCC regeneration vent gas scrubbing. iii. Corrosion protection of atmospheric distillation unit (ADU) overhead, steam conditioning, effluent pH adjustment. 2. Whether spent caustic streams generated from any of the processes in (i) above could be used as a raw material for the processes in (ii) or (iii) above. 3. Whether any other caustic minimisation measures could be applied, such as regeneration of caustic washings. The Operator shall implement measures identified in 2 & 3 above and provide the Environment Agency with a written copy of the plan for approval.	30/04/19
IC45	BAT Conclusion 49 The Operator shall undertake an assessment of measures to reduce point source and fugitive emissions of VOCs from the storage of liquid hydrocarbons. The assessment shall take into account the techniques identified in BAT Conclusion 49 for the Refining of Mineral Oil and Gas, together with any other suitable reduction techniques. A written report summarising the findings shall be submitted to the Environment Agency, along with a timetable for implementing improvements. The Operator shall implement the improvements identified to a timetable approved in writing with the Environment Agency.	31/08/19

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
IC46	BAT Conclusion 51 The Operator shall review all secondary containment measures, provided for liquid hydrocarbons that are stored or held on site, (excluding those bunds in scope of the COMAH Containment Policy). The review shall verify whether all storage tanks and areas designed for the storage of drums/IBCs and other portable liquid containers, within the installation; are sited on an impermeable base and with sufficient bunding as specified in the CIRIA C736 Guidance. Where containment provisions do not meet this standard, the Operator shall identify improvements, or alternative measures (such as additional primary or tertiary containment measures) to provide an equivalent level of protection. The Operator shall provide the Environment Agency with a written report of the review and shall implement identified improvements to a timescale approved in writing with the Environment Agency.	30/06/19
IC47	BAT Conclusion 52 The Operator shall submit, for approval by the Environment Agency, reports setting out progress to achieving compliance with BAT 52 by no later than **31 December 2020** for this **time limited** derogation. The report shall include, but not be limited to, the following: • A regular review of the progress to reduce loading/unloading operations at White Oil Docks to < 1 million m^3/annum by 1 January 2021 as specified in Table S1.1 of this permit. • Any alterations to the initial plan – for progress reports. The Operator shall submit reports on progress with the approved compliance plan as specified by this condition. The final report shall be submitted as specified by this condition.	Initial Report 31/12/18 Progress reports by 30/06/19 31/12/19 30/06/20 31/12/20 Final Report 30/06/21
IC48	BAT Conclusion 52 The Operator shall develop 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 approved in writing with the Environment Agency having regard to the Environment Agency M2 and M16 Guidance Notes. Routine benzene monitoring is not required where it can be demonstrated that benzene emissions are consistently less than 1 mg/Nm^3 from a point source.	31/10/18
IC49	BAT Conclusions 55 & 56 The Operator shall carry out a study of the flaring system and flare sources for the purpose of reducing baseline flaring. The study shall include: • Options to improve flare flow metering from individual sources. • Options to reduce arising of gases requiring flaring, giving consideration to the requirements of BAT Conclusions 55 and 56 for the Refining of Mineral Oil and Gas. • Assessment of the feasibility of installing a flare gas recovery system to minimise the base load to current flare systems, including arising from planned shut-downs. The Operator shall submit a written report, to the Environment Agency providing details of the findings of the study and a timetable for implementation of any improvements identified.	31/08/19

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
IC50	BAT Conclusion 57 Note 2 The Operator shall submit, for approval by the Environment Agency, the design for the fixed NOx emissions bubble for the installation and an associated monitoring programme to demonstrate compliance with the bubble. The bubble design and associated monitoring programme shall be in accordance with the principals described in the 'Integrated Air Emissions Management Protocol'. The bubble design shall specify, but not be limited to: 1. A description of the units to be included in the bubble including; the type of unit, the fuel fired, the representative flue gas flow-rate, the applicable BAT AEL for that unit, calculation of the fixed bubble limit. 2. A demonstration, using historic data from a representative period that the operations can comply with the bubble limit. The monitoring protocol shall include but not be limited to: 1. A description of the monitoring provision, or surrogate measure, for each unit included in the bubble. 2. Identification of the abnormal operating conditions for each unit, and specification of the 'standard contribution value' for each unit, equal to the representative flow-rate multiplied by the applicable BAT AEL, which will be used as a surrogate value during periods of abnormal operation.	28/10/18
IC51	BAT Conclusion 58 Note 2 The Operator shall submit, for approval by the Environment Agency, the design for the fixed SO_2 emissions bubble for the installation and an associated monitoring programme to demonstrate compliance with the bubble limit. The bubble design and associated monitoring programme shall be in accordance with the principals described in the 'Integrated Air Emissions Management Protocol' The bubble design shall specify, but not be limited to: 1. A description of the units to be included in the bubble including; the type of unit, the fuel fired, the representative flue gas flowrate, the applicable BATAEL for that unit, formulae for the calculation of the fixed bubble limit. 2. A demonstration, using historic data from a representative period that the operations can comply with the fixed bubble limit. The monitoring procedures shall specify, but not be limited to: 1. A description of the monitoring provision, or surrogate measure, for each unit included in the bubble. 2. The formulae that will be used to calculate the monthly average compliance value. 3. Identification of the abnormal operating conditions for each unit, and specification of the 'standard contribution value' for each unit, equal to the representative flow-rate multiplied by the applicable BAT AEL, which will be used as a surrogate value during periods of abnormal operation.	28/10/18

Table S1.3 Improvement programme requirements		
Reference Note 1	**Requirement**	**Date**
IC52	BAT Conclusion 58 The Operator shall submit a written report to the Environment Agency for approval which provides evidence to evaluate the risk of potential exceedances of the short-term 15 minute SO_2 air quality objective. The purpose of this is to determine an hourly bubble SO_2 limit to replace the current limit in table S3.1(d) of this permit (Integrated Emissions Management). This evidence shall include the following: 1. Data for a number of representative years for current and future operations, including release profiles, peak emissions and how frequent these peaks are likely to be. • Hourly SO_2 concentrations from the SRU and the CO boiler; with a comparison to values used in the CERC report Note 3. • Hourly bubble SO_2 concentration (using CDU-4, HPBH, CO boiler and SRU). 2. Discussion and interpretation of these release profiles and peak concentrations with consideration to: • Operational scenario (e.g. potential unit off-sets, unusually high sulphur crudes, etc.); • Frequency of peaks within the year and their likelihood within future years; • How CERC's modelled values may or may not represent these short-term peaks.	31/12/18
IC53	WFD - sewer The Operator shall submit a written report to the Environment Agency for approval that includes: The results of an assessment of the impact of the emissions to surface water from the site following the treatment of the effluent at the United Utilities treatment works in accordance with the Environment Agency's Surface Water Pollution Risk Assessment Guidance available on our website. The report shall: (a) Be based on a representative monitoring dataset of hazardous pollutants. (b) 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. (c) Propose emission limit values at the point of discharge from the installation at S1. These limits shall be based on the treatment factor from the third party treatment works that shall be applied to each AEL associated with BAT Conclusion 12. (d) The outcomes shall also be used to propose a revised annual limit for oil in water in Table S3.4 (annual limits) of this permit.	31/03/19

Note 1: Completed ICs have been removed with numbering retained for ease of future reference.

Note 2: The bubble design and monitoring protocol shall be incorporated into Table S1.2 of this permit, subject to written approval by the Environment Agency.

Note 3: CERC report - Dispersion modelling of SO_2 emissions from Stanlow refinery, Cheshire. Draft report (Ref: FM1080/R3/16, dated 12 August 2016) produced by Cambridge Environmental Research Consultants (CERC), for Cheshire West and Chester Council.

Table S1.4 Pre-operational measures for future development		
Reference Note 1	**Operation**	**Pre-operational measures**
POC3	Operation of Crude Distillation Unit 3 (CDU-3) (LCP138)	At least 3 months prior to commencement of start-up of Crude Distillation Unit 3 the Operator shall submit a report for approval by the Environment Agency describing in detail any changes in operating techniques and fuels used, when compared to the techniques and fuels described in the '*reference relevant documents in the operating techniques table*'. Operating techniques shall also include a review of compliance against the BAT Conclusions for the Refining of Mineral Oil and Gas to demonstrate how the unit will meet or plan to meet the BAT standards. If compliance is subject to the refinery site bubble the Operator shall submit the necessary data and calculations in accordance with the principals described in the 'Integrated Air Emissions Management Protocol' and in accordance with condition 4.3.10 of this permit, for approval by the Environment Agency to demonstrate how this shall be achieved. The Operator shall also submit a periodic monitoring plan for approval which shall be implemented within one month of stable unit operation.
POC4	Operation of HVI unit (LCP141 - HVI part only)	At least 3 months prior to commencement of start-up of HVI, the Operator shall submit a report for approval by the Environment Agency describing in detail any changes in operating techniques and fuels used, when compared to the techniques and fuels described in the '*reference relevant documents in the operating techniques table*'. Operating techniques shall also include a review of compliance against the BAT Conclusions for the Refining of Mineral Oil and Gas to demonstrate how the unit will meet or plan to meet the BAT standards. If compliance is subject to the refinery site bubble the Operator shall submit the necessary data and calculations in accordance with the principals described in the 'Integrated Air Emissions Management Protocol' and in accordance with condition 4.3.10 of this permit, for approval by the Environment Agency to demonstrate how this shall be achieved. The Operator shall also submit a monitoring plan for continuous monitoring across the LCP; for approval, which shall be implemented from the start-up of the HVI operation.

Note 1: POC1 and POC2 are complete and have been removed with numbering retained for ease of future reference.

Schedule 2 - Waste types, raw materials and fuels

Table S2.1 Raw materials and fuels	
Raw materials and fuel description	**Specification**
Flushing Oil	Maximum 1.5% sulphur
Gas Oil (MP Boilers, etc.)	< 0.1% sulphur content
For release points: REF-A-5 (LCP142: Platformer 3 and HDT3), REF-A-6 (LCP141: HDS2 and Aromatics ONLY)	No liquid fuel shall be fired
For release point: REF-A-2 (LCP139: CDU-4)	Back up liquid fuel firing is allowed for 240 hours per calendar year as described in section 6 of the MFF Protocol

Table S2.2 Permitted waste types and quantities for receipt of ballast water	
Maximum quantity	**N/A**
Waste code	**Description**
16 07 08*	Waste containing oil (ballast water)

Table S2.3 Permitted waste types and quantities for Energy Recovery Plant (Incineration listed activity)	
Maximum quantity	Total hazardous and non-hazardous waste throughput shall not exceed 50,000 tonnes per year
Waste code	**Description**
01	**WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**
01 05	**drilling muds and other drilling wastes**
01 05 05	oil-containing drilling muds and wastes
05	**WASTES FROM PETROLEUM REFINING,NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL**
05 01	**Wastes from petroleum refining**
05 01 02*	wastes from petroleum refining
05 01 03*	desalter sludges
05 01 04*	acid alkyl sludges
05 01 05*	oil spills
05 01 06*	oily sludges from maintenance operations of the plant or equipment
05 01 08*	other tars
05 01 09*	Sludges from on-site effluent treatment containing dangerous substances
05 01 10	sludges from on-site effluent treatment other than those mentioned in 05 01 09
05 01 11*	wastes from cleaning of fuels with bases
05 01 13	oil containing acids
05 01 14	Wastes from cooling columns
05 01 15*	spent filter clays

Table S2.3 Permitted waste types and quantities for Energy Recovery Plant (Incineration listed activity)	
Maximum quantity	Total hazardous and non-hazardous waste throughput shall not exceed 50,000 tonnes per year
Waste code	**Description**
05 01 16	sulphur-containing wastes from petroleum desulphurisation
05 01 17	Bitumen
05 01 99	wastes not otherwise specified
05 07	**Wastes from Natural Gas Purification and transportation**
05 07 99	wastes not otherwise specified
06	**WASTES FROM INORGANIC CHEMICAL PROCESSES**
06 02	**wastes from the MFSU of bases**
06 02 01*	Calcium Hydroxide
06 02 03*	ammonium hydroxide
06 02 04*	sodium and potassium hydroxide
06 06	**wastes from the MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes**
06 06 02*	wastes containing dangerous sulphides
06 06 03	wastes containing sulphides other than those mentioned in 06 06 02
06 09	**wastes from the MSFU of phosphorous chemicals and phosphorous chemical processes**
06 09 03*	calcium-based reaction wastes containing or contaminated with dangerous substances
06 09 04	calcium-based reaction wastes other than those mentioned in 06 09 03
06 13	**wastes from inorganic chemical processes not otherwise specified**
06 13 02*	spent activated carbon (except 06 07 02)
07	**WASTES FROM ORGANIC CHEMICAL PROCESSES**
07 01	**wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals**
07 01 01*	aqueous washing liquids and mother liquors
07 01 04*	other organic solvents, washing liquids and mother liquors
07 01 08*	other still bottoms and reaction residues
07 01 10*	other filter cakes and spent absorbents
07 01 11*	sludges from on-site effluent treatment containing dangerous substances
07 01 12	sludges from on-site effluent treatment other than those mentioned in 07 01 11
07 01 99	wastes not otherwise specified
07 07	**wastes from the MFSU of fine chemicals and chemical products not otherwise specified**
07 07 01*	aqueous washing liquids and mother liquors
07 07 04*	other organic solvents, washing liquids and mother liquors
07 07 08*	other still bottoms and reaction residues
07 07 10*	other filter cakes and spent absorbents

Table S2.3 Permitted waste types and quantities for Energy Recovery Plant (Incineration listed activity)	
Maximum quantity	Total hazardous and non-hazardous waste throughput shall not exceed 50,000 tonnes per year
Waste code	**Description**
07 07 11*	sludges from on-site effluent treatment containing dangerous substances
07 07 12	sludges from on-site effluent treatment other than those mentioned in 07 07 11
07 07 08	other still bottoms and reaction residues
07 07 99	wastes not otherwise specified
10	**WASTES FROM THERMAL PROCESSES**
10 01	
10 01 01	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)
10 01 04*	Oily fly ash and boiler dust
10 01 23	aqueous sludges from boiler cleansing other than those mentioned in 10 01 22
12	**WASTES FROM SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS**
12 01	**wastes from shaping and physical and mechanical surface treatment of metals and plastics**
12 01 02	ferrous metal dust and particles
12 01 16*	waste blasting material containing dangerous substances
13	**OIL WASTES AND WASTES OF LIQUID FUELS (except edible oils, and those in chapters 05, 12 and 19)**
13 03	**Waste insulating and heat transmission oils**
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils
13 05	**oil/water separator contents**
13 05 02*	sludges from oil/water separators
13 05 03*	interceptor sludges
13 05 06*	oil from oil/water separators
13 05 07*	oily water from oil/water separators
13 07	**wastes of liquid fuels**
13 07 01*	fuel oil and diesel
13 07 02*	Petrol
13 08	**Oil wastes not otherwise specified**
13 08 01*	Desalter sludges or emulsions
13 08 02*	Other emulsions
14	**WASTE ORGANIC SOLVENTS, REFRIGERANTS AND PROPELLANTS**
14 06	**waste organic solvents, refrigerants and foam/aerosol propellants**
14 06 03*	other solvents and solvent mixtures

Table S2.3 Permitted waste types and quantities for Energy Recovery Plant (Incineration listed activity)	
Maximum quantity	Total hazardous and non-hazardous waste throughput shall not exceed 50,000 tonnes per year
Waste code	**Description**
15	**WASTE PACKAGING;ABSORBANTS, WIPING CLOTHS,FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHRWISE SPECIFIED**
15 01	**Packaging(including separately collected municipal packaging waste**
15 01 10*	packaging containing residues of or contaminated by dangerous substances
15 02	**Absorbants, filter materials, wiping cloths and protective clothing**
15 02 02*	absorbants, filter materials including oil filters not specified) wiping cloths and protective clothing contaminated with dangerous substances
16	**WASTE NOT OTHERWISE SPECIFIED IN THE LIST**
16 03	**off-specification batches and unused products**
16 03 03*	inorganic wastes containing dangerous substances
16 03 04	inorganic wastes other than those mentioned in 16 03 03
16 03 05*	organic wastes containing dangerous substances
16 08	**spent catalysts**
16 08 02*	spent catalyst containing dangerous transition metals or dangerous transition metal compounds
16 08 04	spent catalysts contaminated with dangerous substances
16 08 07*	spent fluid catalytic cracking catalyst
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 01	**wastes from incineration or pyrolysis of waste**
19 01 11*	Bottom ash and slag containing dangerous substances
19 01 13*	Fly ash containing dangerous substances
19 08	**wastes from waste water treatment plants not otherwise specified**
19 08 02	Waste from de-sanding
19 08 05	sludges from treatment of Urban waste water
19 08 06*	saturated or spent ion exchange resins
19 08 07*	solutions and sludges from regeneration of ion exchangers
19 09	**wastes from the preparation of water intended for human consumption or water for industrial use**
19 09 04	spent activated carbon
19 09 05	saturated or spent ion exchange resins
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**separately collected fractions (except 15 01)**
20 01 01	Paper and Cardboard
20 01 02	Glass

Table S2.3 Permitted waste types and quantities for Energy Recovery Plant (Incineration listed activity)	
Maximum quantity	Total hazardous and non-hazardous waste throughput shall not exceed 50,000 tonnes per year
Waste code	**Description**
20 01 13*	Solvents
20 01 38	Wood other than that mentioned in 20 01 37
20 03	**other municipal wastes**
20 03 01	mixed municipal waste
20 03 03	Street cleaning residues

Schedule 3 – Emissions and monitoring

Locations of key emissions to air detailed as figure 2.2.1 (823161) in the application and key emissions to water detailed as figure 2.2 (figure 823160).

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-1 Crude Distillation Unit 3 (X, Y coordinates 343788, 374800)	**LCP 138**: CDU-3 furnaces: F301, F301U, F302 Flexible Multi-fuel firing (RFG & non-commercial liquid fuels) <100MWth	Sulphur dioxide	1000 mg/m^3 **Note 1**	-	At least every 6 months **Note 1**	BS EN 14791 or TGN M21
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300 - 450 mg/m^3 **Note 1**	-	At least every 6 months **Note 1**	BS EN 14792 or TGN M22
		Dust	5 - 50 mg/m^3 **Notes 1 & 9**	-	At least every 6 months **Note 1**	BS EN 13284-1
		Carbon monoxide	100 mg/m^3 **Note 1**	-	At least every 6 months	BS EN 15058
		Oxygen	-	-	Periodic As appropriate to reference	BS EN 14789
		Water vapour	-	-	Periodic As appropriate to reference	BS EN 14790
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202	Sulphur dioxide	1000 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
	Gas fired (Back-up liquid fuel firing)	Sulphur dioxide	1000 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Gas fired (Back-up liquid fuel firing)	Sulphur dioxide	1000 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Gas fired (Back-up liquid fuel firing)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300mg/m^3 **Note 2**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	330 mg/m^3 **Note 2**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	600 mg/m^3 **Note 2**	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Gas fired (Back-up liquid fuel firing)	Dust	5 mg/m^3 **Note 2**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5.5 mg/m^3 **Note 2**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	10 mg/m^3 **Note 2**	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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Back-up non-commercial liquid fuel firing	Sulphur dioxide	1000 mg/m^3 **Note 3**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/m^3 **Note 3**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/m^3 **Note 3**	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Back-up non-commercial liquid fuel firing	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	450 mg/m^3 **Note 3**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	495 mg/m^3 **Note 3**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	900 mg/m^3 **Note 3**	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Back-up non-commercial liquid fuel firing	Dust	50 mg/m^3 **Note 3**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	55 mg/m^3 **Note 3**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	100 mg/m^3 **Note 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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Back-up non-commercial liquid fuel firing	Carbon monoxide	-	-	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (X, Y coordinates. 343955,374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C, F202 Back-up non-commercial liquid fuel firing	Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards
REF-A-3 CD4 Molecular Sieve Start Up Heater (X, Y coordinates 343800, 374800)	F-650	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limits set			
		Oxides of sulphur	Subject to refinery bubble	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with Environment Agency
		Dust	No limits set	-	-	-

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-4 HP Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140**: HP21-HP26 (3 flues in a common stack, 2 boiler per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels)	Sulphur dioxide	1000 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-4 HP Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140**: HP21-HP26 (3 flues in a common stack, 2 boiler per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	411 mg/m^3 **Note 4**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	452 mg/m^3 **Note 4**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	822 mg/m^3 **Note 4**	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-4 HP Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140**: HP21-HP26 (3 flues in a common stack, 2 boiler per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels)	Dust	37 mg/m^3 **Note 4**	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	41 mg/m^3 **Note 4**	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	74 mg/m^3 **Note 4**	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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-4 HP Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140**: HP21-HP26 (3 flues in a common stack, 2 boiler per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels)	Carbon monoxide	-	-	Continuous	BS EN 14181
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards
REF-A-5 Platformer 3 and HDT3 (X, Y coordinates 343490, 375945)	**LCP 142**: PF3 (F9401-4) and HDT3 (F9301 RFG firing only	Sulphur dioxide	1000 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-5 Platformer 3 and HDT3 (X, Y coordinates 343490, 375945)	**LCP 142**: PF3 (F9401-4) and HDT3 (F9301 RFG firing only	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	330 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	600 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-5 Platformer 3 and HDT3 (X, Y coordinates 343490, 375945)	**LCP 142**: PF3 (F9401-4) and HDT3 (F9301 RFG firing only	Dust	5 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5.5 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	10 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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-5 Platformer 3 and HDT3 (X, Y coordinates 343490, 375945)	**LCP 142**: PF3 (F9401-4) and HDT3 (F9301 RFG firing only	Carbon monoxide	-	-	Continuous	BS EN 14181
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: Aromatics (F5901 A,B) and HDS2 (F6301) **ONLY** RFG firing only	Sulphur dioxide	1000 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: Aromatics (F5901 A,B) and HDS2 (F6301) **ONLY** RFG firing only	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	330 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	600 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: Aromatics (F5901 A,B) and HDS2 (F6301) **ONLY** RFG firing only	Dust	5 mg/m^3	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5.5 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	10 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 shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: Aromatics (F5901 A,B) and HDS2 (F6301) **ONLY** RFG firing only	Carbon monoxide	-	-	Continuous	BS EN 14181
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: HVI (F4101, F4102 and F4901 A,B) and Aromatics (F5901 A,B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels)	Sulphur dioxide	**Note 6**	Calendar monthly mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Sulphur dioxide	**Note 6**	Daily mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Sulphur dioxide	**Note 6**	95% of validated hourly averages within a calendar year	Continuous **Note 6**	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: HVI (F4101, F4102 and F4901 A,B) and Aromatics (F5901 A,B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**Note 6**	Calendar monthly mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**Note 6**	Daily mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**Note 6**	95% of validated hourly averages within a calendar year	Continuous **Note 6**	BS EN 14181
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: HVI (F4101, F4102 and F4901 A,B) and Aromatics (F5901 A,B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels)	Dust	**Note 6**	Calendar monthly mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Dust	**Note 6**	Daily mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Dust	**Note 6**	95% of validated hourly averages within a calendar year	Continuous **Note 6**	BS EN 14181

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141**: HVI (F4101, F4102 and F4901 A,B) and Aromatics (F5901 A,B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels)	Carbon monoxide	-	-	Continuous	BS EN 14181
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards
REF-A-7 HDT2 (X, Y coordinates 343575, 375350)	HDT-2 (F501)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limits set	-	-	-
		Oxides of sulphur	Subject to refinery bubble	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with Environment Agency
REF-A-8 HD Select (X, Y coordinates 343825, 375140)	HD Select (F4001)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limits set	-	-	-
		Oxides of sulphur	Subject to refinery bubble	As monitoring method	By calculation as agreed with Environment Agency	By calculation as agreed with the Environment Agency
REF-A-9 Ethyl benzene unit (X, Y coordinates 343500, 375290)	EBU (F6800)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limits set	-	-	-
		Oxides of sulphur	Subject to refinery bubble	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-10 Sulphur Recovery Unit (X, Y coordinates 344420, 375320)	Sulphur Recovery Unit	Oxides of sulphur	20,000 mg/m^3	As monitoring method	Continuous	BS EN 15267-3
REF-A-11 CO Boiler Exhaust (X, Y coordinates 343640, 375110)	CCU CO Boiler Exhaust (F2151)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	400 mg/m^3	Calendar monthly mean	Continuous	BS EN 14181
		Oxides of sulphur	1510 mg/m^3	Calendar monthly mean	Continuous	BS EN 14181
		Dust	100 mg/Nm^3	Calendar monthly mean **Note 7**	Continuous	BS EN 14181
		Carbon monoxide	-	Calendar monthly mean	Continuous	BS EN 14181
REF-A-12 MP Boiler Plant (X, Y coordinates 344260, 375125)	MP Boiler Plant (common stack for two vents)	Oxides of sulphur	See Table S2.1	-	-	By calculation as agreed with the Environment Agency
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	200 mg/m^3	As monitoring method	Every two years post maintenance	BS EN 14792
		Carbon monoxide	150 mg/m^3	As monitoring method	Every two years post maintenance	BS EN 15058
		Dust	100 mg/m^3	As monitoring method	Every two years post maintenance	BS EN 13284-1
REF-A-14 Refinery flare (X, Y coordinates 344155, 375360)	Refinery flare (4 flares in common structure)	Sour gas combustion products (sulphur dioxide)	Notification threshold: 0.47 T/h sulphur dioxide **Note 8**	As monitoring method	As required by flaring event	By calculation as agreed with the Environment Agency

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
ALC-A-1	Reformer F2102 (main fuel dry gas, standby RFG/ dry gas).	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	350 mg/m^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	35 mg/m^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
ALC-A-2	Common furnaces (hot oil system) local to A32-S1 (main fuel dry gas, standby RFG/ dry gas).	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	350 mg/m^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	35 mg/m^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
SHO-A-1	SHOP Flare	Sour gas combustion products (sulphur dioxide)	No limit set	As monitoring method	As required by flaring event	By calculation as agreed with the Environment Agency
SHO-A-2	F9460	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
SHO-A-3	F9401	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency

Table S3.1 Point source emissions to air – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
SHO-A-4	**LCP 143**: F9801 Flexible Multi-fuel firing (RFG & non-commercial liquid fuels) <100MWth	Sulphur dioxide	150 mg/m^3 **Note 9**	-	At least every 6 months	BS EN 14791
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300 - 450 mg/m^3 **Note 9**	-	At least every 6 months	BS EN 14792
		Dust	5 - 50 mg/m^3 **Note 9**	-	At least every 6 months	BS EN 13284-1
		Carbon monoxide	-	-	At least every 6 months	BS EN 15058
		Oxygen	-	-	Periodic As appropriate to reference	BS EN 14789
		Water vapour	-	-	Periodic As appropriate to reference	BS EN 14790

Note 1 Condition 2.3.5 and Pre-operational Condition to be fulfilled prior to CDU-3 operation following Section 6 III (a) of the MFF Protocol.
Note 2 Section 6 II of the MFF Protocol applies.
Note 3 These Emission Limit Values apply only when back up liquid fuels are used in accordance with condition 2.3.3 and Section 6 II of the MFF Protocol.
Note 4 Based on representative fuel split which shall be subject to annual review or if there are significant changes to the fuel split in accordance with Section 6 of the MFF Protocol.
Note 5 Capacity limited to <500MW by application of software interlock in accordance with RGN2 and guidance provided in Section 4 of the MFF Protocol.
Note 6 Condition 2.3.5 and Pre-operational Condition to be fulfilled prior to operation. Emission Limit Values to be set following Section 5 & 6 of the MFF Protocol.
Note 7 Excluding periods of soot blowing.
Note 8 Any Incident or event that results in an average of 0.47 t/hr of sulphur dioxide emitted from the flare for a period exceeding 72 hours shall be subject to a Notification to the Environment Agency.
Note 9 Section 6 III (a) of the MFF Protocol applies.

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-1 Crude Distillation Unit 3 (CDU-3) (X, Y coordinates 343788, 374800)	**LCP 138** CDU-3 furnaces F301, F301U, F302 Flexible multi-fuel firing (RFG & non-commercial liquid fuels) 98.8 MWth	Sulphur dioxide	600 mg/Nm^3 (1000 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	-	At least every 6 months **Note 1**	BS EN 14791 or TGN M21
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	450 mg/Nm^3 Note 9 (300 – 450 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	-	At least every 6 months **Note 1**	BS EN 14792 or TGN M22
		Dust	5 - 50 mg/Nm^3 Note 8	-	At least every 6 months **Note 1**	BS EN 13284-1
		Carbon monoxide	-	-	At least every 6 months **Note 1**	BS EN 15058
		Nickel (Ni) Antimony (Sb) Vanadium (V) Liquid/multi fuel firing only	-	-	Once every six months and after significant changes to the unit **Note 1**	BS EN 14385 or analysis based on metals content in the in the fuel
		Oxygen	-	-	Periodic As appropriate to reference Note 1	BS EN 14789
		Water vapour	-	-	Periodic As appropriate to reference Note 1	BS EN 14790

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
Requirements for gas firing						
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 Note 13 F202 Note 12 Gas fired with back-up non-commercial liquid fuels 222.5 MWth	Sulphur dioxide	35 mg/Nm^3 (1000 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 Note 13 F202 Note 12 Gas fired with back-up non-commercial liquid fuels 222.5 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	200 mg/Nm^3 Notes 2a & 10 (300 mg/Nm^3 LCP-Chapter III IED) Note 2a Subject to refinery bubble Note 12 &14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	330 mg/Nm^3 **Note 2** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	600 mg/Nm^3 **Note 2** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 Note 13 F202 Note 12 Gas fired with back-up non-commercial liquid fuels 222.5 MWth	Dust	5 mg/Nm^3 **Note 2** LCP-Chapter III IED	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5.5 mg/Nm^3 **Note 2** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	10 mg/Nm^3 **Note 2** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
Requirements for liquid/multi-fuel firing						
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 Note 13 F202 Note 12 Gas fired with back-up non-commercial liquid fuels 222.5 MWth	Sulphur dioxide	600 mg/Nm^3 (1000 mg/Nm^3 LCP-Chapter III IED) Note **3** Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 **Note 3** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 **Note 3** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 Note 13 F202 Note 12 Gas fired with back-up non-commercial liquid fuels 222.5 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	450 mg/Nm^3 **Notes 2a & 9** (450 mg/Nm^3 LCP-Chapter III IED) **Notes 2a and 3** Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	495 mg/Nm^3 **Note 3** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	900 mg/Nm^3 **Note 3** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 Note 13 F202 Note 12 Gas fired with back-up non-commercial liquid fuels 222.5 MWth	Dust	50 mg/Nm^3 **Note 3** LCP-Chapter III IED	Calendar monthly mean of validated hourly averages	Continuous Continuous	BS EN 14181
		Dust	55 mg/Nm^3 **Note 3** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	100 mg/Nm^3 **Note 3** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-2 Crude Distillation Unit 4 (CDU-4) (X, Y coordinates 343955, 374890)	**LCP 139**: CDU-4 furnaces: F201 A, B, C F202 222.5 MWth	Carbon monoxide	100 mg/Nm^3	Monthly mean	Continuous	BS EN 14181
		Nickel (Ni) Antimony (Sb) Vanadium (V) Liquid/multi fuel firing only	-	-	Once every six months and after significant changes to the unit	BS EN 14385 or analysis based on metals content in the in the fuel
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards
REF-A-3 CD4 Molecular Sieve Start Up Heater (X, Y coordinates 343800, 374800)	F-650 2.4 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-4 HPBH Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140** HP21-HP26 (3 flues in a common stack, 2 boilers per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels) 624 MWth limited to 500 MWth	Sulphur dioxide	600 mg/Nm^3 (1000 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-4 HPBH Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140** HP21-HP26 (3 flues in a common stack, 2 boilers per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels) 624 MWth limited to 500 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	450 mg/Nm^3 Note 9 (411 mg/Nm^3 LCP-Chapter III IED) **Note 4** Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	452 mg/Nm^3 **Note 4** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	822 mg/Nm^3 **Note 4** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-4 HPBH Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140** HP21-HP26 (3 flues in a common stack, 2 boilers per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels) 624 MWth limited to 500 MWth	Dust	37 mg/Nm^3 **Note 4** LCP-Chapter III IED	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	41 mg/Nm^3 **Note 4** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	74 mg/Nm^3 **Note 4** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-4 HPBH Boilers (X, Y coordinates 344200, 375180) **Note 5**	**LCP 140** HP21-HP26 (3 flues in a common stack, 2 boilers per flue) Multi-fuel firing (Natural gas, RFG & non-commercial liquid fuels) 624 MWth limited to 500 MWth	Carbon monoxide	100 mg/Nm^3	Monthly mean	Continuous	BS EN 14181
		Nickel (Ni) Antimony (Sb) Vanadium (V)	-	-	Once every six months and after significant changes to the unit	BS EN 14385 or analysis based on metals content in the in the fuel
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-5 Platformer 3 and HDT3 (vent from catalytic reformer) (X, Y coordinates 343490, 375945)	**LCP 142** PF3 (F9401-4) and HDT3 (F9301) Comprises five individual furnaces, F9401/2/3/4 & HDT3 F9301 with a common stack. **RFG firing only** 135.2 MWth	Sulphur dioxide	35 mg/Nm^3 (1000 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-5 Platformer 3 and HDT3 (vent from catalytic reformer) (X, Y coordinates 343490, 375945)	**LCP 142** PF3 (F9401-4) and HDT3 (F9301) Comprises five individual furnaces, F9401/2/3/4 & HDT3 F9301 with a common stack. **RFG firing only** 135.2 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	200 mg/Nm^3 **Note 10** (300 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	330 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	600 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-5 Platformer 3 and HDT3 (vent from catalytic reformer) (X, Y coordinates 343490, 375945)	**LCP 142** PF3 (F9401-4) and HDT3 (F9301) Comprises five individual furnaces, F9401/2/3/4 & HDT3 F9301 with a common stack. **RFG firing only** 135.2 MWth	Dust	5 mg/Nm^3 LCP-Chapter III IED	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5.5 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	10 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-5 Platformer 3 and HDT3 (vent from catalytic reformer) (X, Y coordinates 343490, 375945)	**LCP 142** PF3 (F9401-4) and HDT3 (F9301) Comprises five individual furnaces, F9401/2/3/4 & HDT3 F9301 with a common stack. **RFG firing only** 135.2 MWth	Polychlorinated dibenzodioxins/ furans (PCDD/F) emissions	-	Spot sample	Once a year, or once a regeneration, whichever is longer	Isokinetic sampling , extraction, then GC-MS analysis BS EN 1948 Parts 1,2 and 3 and MID
		Carbon monoxide	100 mg/Nm^3	Monthly mean	Continuous	BS EN 14181
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
Requirements for gas firing						
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** Aromatics (F5901 A and B) and HDS2 (F6301) **RFG ONLY** 139.1 MWth	Sulphur dioxide	35 mg/Nm^3 (1000 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Sulphur dioxide	1000 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** Aromatics (F5901 A and B) and HDS2 (F6301) **RFG ONLY** 139.1 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	200 mg/Nm^3 **Note 10** (300 mg/Nm^3 LCP-Chapter III IED) Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	330 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	600 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** Aromatics (F5901 A and B) and HDS2 (F6301) **RFG ONLY** 139.1 MWth	Dust	5 mg/Nm^3 LCP-Chapter III IED	Calendar monthly mean of validated hourly averages	Continuous	BS EN 14181
		Dust	5.5 mg/Nm^3 LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous	BS EN 14181
		Dust	10 mg/Nm^3 LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** Aromatics (F5901 A and B) and HDS2 (F6301) **RFG ONLY** 139.1 MWth	Carbon monoxide	100 mg/Nm^3	Monthly mean	Continuous	BS EN 14181
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
Requirements for liquid/multi-fuel firing Note 6						
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** HVI (F4101, F4102 and F4901 A and B) and Aromatics (F5901 A and B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels) 139.1 MWth	Sulphur dioxide	600 mg/Nm^3 **Note 6** (LCP-Chapter III IED limit) Note 6 Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Sulphur dioxide	**Note 6** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Sulphur dioxide	**Note 6** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous **Note 6**	BS EN 14181
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** HVI (F4101, F4102 and F4901 A and B) and Aromatics (F5901 A and B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels) 139.1 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300 mg/Nm^3 **Notes 6 & 9** (LCP-Chapter III IED limit) Note 6 Subject to refinery bubble Notes 12 & 14	Calendar monthly mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**Note 6** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**Note 6** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous **Note 6**	BS EN 14181

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** HVI (F4101, F4102 and F4901 A and B) and Aromatics (F5901 A and B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels) 139.1 MWth	Dust	50 mg/Nm^3 **Note 6** LCP-Chapter III IED	Calendar monthly mean of validated hourly averages	Continuous Note 6	BS EN 14181
		Dust	**Note 6** LCP-Chapter III IED	Daily mean of validated hourly averages	Continuous **Note 6**	BS EN 14181
		Dust	**Note 6** LCP-Chapter III IED	95% of validated hourly averages within a calendar year	Continuous **Note 6**	BS EN 14181
REF-A-6 Secondary Processes (X, Y coordinates 343640, 375450)	**LCP 141** HVI (F4101, F4102 and F4901 A and B) and Aromatics (F5901 A and B) and HDS2 (F6301) Multi-fuel firing (RFG & non-commercial liquid fuels) 139.1 MWth	Carbon monoxide	100 mg/Nm^3 Note 6	Monthly mean	Continuous **Note 6**	BS EN 14181
		Nickel (Ni) Antimony (Sb) Vanadium (V)	-	-	Once every six months and after significant changes to the unit **Note 6**	BS EN 14385 or analysis based on metals content in the in the fuel
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
		Water vapour	-	-	Continuous as appropriate to reference	BS EN 14181
		Stack gas temperature	-	-	Continuous as appropriate to reference	Traceable to national standards
		Stack gas pressure	-	-	Continuous as appropriate to reference	Traceable to national standards

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-7 HDT2 (X, Y coordinates 343575, 375350)	HDT-2 (F501) 17.4 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
REF-A-8 HD Select (X, Y coordinates 343825, 375140)	HD Select (F4001) 7.0 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
REF-A-9 Ethyl benzene unit (X, Y coordinates 343500, 375290)	EBU (F6800) 9.45 MWth	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set Subject to refinery bubble Note 12	As monitoring method	By calculation as agreed with the Environment Agency	By calculation as agreed with the Environment Agency
REF-A-10 Sulphur recovery unit (X, Y coordinates 344420, 375320)	SRU	Oxides of sulphur	20,000 mg/Nm^3	As monitoring method	Continuous	BS EN 15267-3

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
REF-A-11 CO Boiler Exhaust (X, Y coordinates 343640, 375110)	CCU CO Boiler Exhaust (F2151)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	400 mg/Nm^3 Subject to refinery bubble Note 12	Calendar monthly mean	Continuous	BS EN 14181
		Oxides of sulphur	1,200 mg/Nm^3 Subject to refinery bubble Note 12	Calendar monthly mean	Continuous	BS EN 14181
		Dust	50 mg/Nm^3	Calendar monthly mean **Note 7**	Continuous	BS EN 14181
		Carbon monoxide	1,300 mg/Nm^3 Note 11	Calendar monthly mean	Continuous	BS EN 14181
		Nickel (Ni) Antimony (Sb) Vanadium (V)	-	-	Once every six months and after significant changes to the unit	BS EN 14385 or analysis based on metals content in the in the fuel
		Oxygen	-	-	Continuous as appropriate to reference	BS EN 14181
REF-A-12 MP Boiler Plant (X, Y coordinates 344260, 375125)	MP Boiler Plant (common stack for two vents)	Oxides of sulphur	35 mg/Nm^3 See Table S2.1 Subject to refinery bubble Note 12	-	-	By calculation as agreed with the Environment Agency
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	150 mg/Nm^3 Subject to refinery bubble Note 12	As monitoring method	Every two years post maintenance	BS EN 14792
		Carbon monoxide	150 mg/Nm^3	As monitoring method	Every two years post maintenance	BS EN 15058
		Dust	100 mg/Nm^3	As monitoring method	Every two years post maintenance	BS EN 13284-1
REF-A-14 Refinery flare (X, Y coordinates 344155, 375360)	Refinery flare (4 flares in common structure)	Sour gas combustion products (sulphur dioxide)	Notification threshold set by condition 4.3.9	As monitoring method	As required by flaring event	By calculation as agreed with the Environment Agency

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
ALC-A-1	Reformer F2102 (main fuel dry gas, standby RFG/ dry gas).	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	350 mg/Nm^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	35 mg/Nm^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
ALC-A-2	Common furnaces (hot oil system) local to A32-S1 (main fuel dry gas, standby RFG/ dry gas).	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	350 mg/Nm^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	35 mg/Nm^3	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
SHO-A-1	SHOP Flare	Sour gas combustion products (sulphur dioxide)	No limit set	As monitoring method	As required by flaring event	By calculation as agreed with the Environment Agency
SHO-A-2	F9460	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
SHO-A-3	F9401	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency
		Oxides of sulphur	No limit set	As monitoring method	Monthly	By calculation as agreed with the Environment Agency

Table S3.1(a) Point source emissions to air – emission limits and monitoring requirements shall apply from 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
SHO-A-4	**LCP 143** F9801 Flexible Multi-fuel firing (RFG & non-commercial liquid fuels) <100MWth	Sulphur dioxide	150 mg/Nm^3 **Note 9**	-	At least every 6 months	BS EN 14791
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	300 - 450 mg/Nm^3 **Note 9**	-	At least every 6 months	BS EN 14792
		Dust	5 - 50 mg/Nm^3 **Note 9**	-	At least every 6 months	BS EN 13284-1
		Carbon monoxide	-	-	At least every 6 months	BS EN 15058
		Oxygen	-	-	Periodic As appropriate to reference	BS EN 14789
		Water vapour	-	-	Periodic As appropriate to reference	BS EN 14790

Note 1 Condition 2.3.5 and Pre-operational Condition to be fulfilled prior to CDU-3 operation following Section 6 III (a) of the MFF Protocol.
Note 2 Section 6 II of the MFF Protocol applies.
Note 2a The lower BAT AEL limit shall apply to furnaces F201 A, B, C following completion of IC43 in Table S1.3 of this permit.
Note 3 These Emission Limit Values apply only when back up liquid fuels are used in accordance with condition 2.3.3 and Section 6 II of the MFF Protocol.
Note 4 Based on representative fuel split which shall be subject to annual review or if there are significant changes to the fuel split in accordance with Section 6 of the MFF Protocol
Note 5 Capacity limited to <500MW by application of software interlock in accordance with RGN2 and guidance provided in Section 4 of the MFF Protocol.
Note 6 Condition 2.3.5 and Pre-operational Condition to be fulfilled prior to operation. Emission Limit Values to be set following Section 5 & 6 of the MFF Protocol.
Note 7 Excluding periods of soot blowing.
Note 8 Section 6 III (a) of the MFF Protocol applies.
Note 9 For existing units < 100 MW firing fuel oil with a nitrogen content higher that 0.5% (w/w) or with liquid firing > 50% or using air preheating values up to 450 mg/Nm^3 may occur.
Note 10 For an existing unit using high air pre-heat (i.e. > 200 C) or with H_2 content in the fuel gas higher that 50% the upper end of the BAT-AEL range is 200 mg/Nm^3.
Note 11 The limit shall be reviewed every 12 months and in accordance with the derogation agreed under BAT Conclusion 27 and as specified by IC42 in Table S1.3 of this permit.
Note 12 Compliance via the site emissions bubble as set out in Table S3.1(d) of this permit, shall be subject to written approval for IC50 & IC51 in Table S1.3 of this permit.
Note 13 The BREF for the Refining of Mineral Oil & Gas sets BAT AELs for individual combustion units. The operator shall demonstrate by calculation that the relevant limits are met by each combustion unit/individual furnace.
Note 14 Compliance with the emission limit value for this unit can be achieved through inclusion of the unit in the BREF air emissions bubble for NOx and SO_2. When complying with the emission limit through the air emissions bubble; the emission concentration from the emission point shall not exceed the monthly mean value specified in the brackets. Demonstration of compliance with the Chapter III IED backstop limits is required.

Table S3.1(b) Point source emissions to air – emission limits and monitoring requirements (Energy Recovery Plant)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
ERP-A-1	Energy Recovery Plant	Particulate matter	10 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3
		Particulate matter	10 mg/m^3	Daily average	Continuous	BS EN 14181 and BS EN 15267-3
		Total organic carbon (TOC)	10 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3
		Total organic carbon (TOC)	10 mg/m^3	Daily average	Continuous	BS EN 14181 and BS EN 15267-3
		Hydrogen chloride	10 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3 Note 1
		Hydrogen chloride	10 mg/m^3	Daily average	Continuous	BS EN 14181 and BS EN 15267-3 Note 1
		Hydrogen fluoride	2 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3
		Hydrogen fluoride	1 mg/m^3	Daily average	Continuous	BS EN 14181 and BS EN 15267-3
		Carbon monoxide	100 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3
		Carbon monoxide	50 mg/m^3	Daily average	Continuous	BS EN 14181 and BS EN 15267-3
		Sulphur dioxide	50 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3 Note 1
		Sulphur dioxide	50 mg/m^3	Daily average	Continuous	BS EN 14181 and BS EN 15267-3
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	400 mg/m^3	Half hourly average	Continuous	BS EN 14181 and BS EN 15267-3
		Oxides of nitrogen (NO and NO_2 expressed as NO_2)	200 mg/m^3	Daily average	Continuous	BS EN 14181

Table S3.1(b) Point source emissions to air – emission limits and monitoring requirements (Energy Recovery Plant)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
ERP-A-1	Energy Recovery Plant	Cadmium and thallium and their compounds (total)	0.05 mg/m^3	Periodic over minimum 30 minute, maximum 8 hour period	Six monthly	BS EN 14385
		Mercury and its compounds	0.05 mg/m^3	Periodic over minimum 30 minute, maximum 8 hour period	Six monthly	BS EN 13211
		Antimony, arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium and their compounds (total)	0.5 mg/m^3	Periodic over minimum 30 minute, maximum 8 hour period	Six monthly	BS EN 14385
		Dioxins / furans (I-TEQ)	0.1 ng/m^3	Periodic over minimum 6 hours, maximum 8 hour period	Six monthly	BS EN 1948 Parts 1, 2 and 3
		Dioxins / furans (WHO-TEQ Humans / Mammals)	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS EN 1948 Parts 1, 2 and 3
		Dioxins / furans (WHO-TEQ Fish)	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS EN 1948 Parts 1, 2 and 3
		Dioxins / furans (WHO-TEQ Birds)	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS EN 1948 Parts 1, 2 and 3
		Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS EN 1948-4
		Dioxin-like PCBs (WHO-TEQ Fish)	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS EN 1948-4
		Dioxin-like PCBs (WHO-TEQ Birds)	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS EN 1948-4
		Specific individual poly-cyclic aromatic hydrocarbons (PAHs), as specified in Schedule 6.	-	periodic over minimum 6 hours, maximum 8 hour period	Annually	BS ISO 11338 Parts 1 and 2
ERP-A-2	Storage tanks cold water condenser	Class B VOC	50 tpa	Annual	Annually	BS EN 12619
Note 1 Sulphur dioxide and hydrogen chloride assume zero S and HCl in support gas. Stack concentrations corrected to account for residual H_2S and HCl in RFG.						

Table S3.1(c) Point source emissions to air during abnormal operation of Energy Recovery Plant – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
ERP-A-1	Energy Recovery Plant	Particulate matter	150 mg/m^3	Half hourly average	Continuous	BS EN 15267-3 during abatement plant failure or alternative surrogate as specified in the Application during failure of the continuous emission monitor
		Total organic carbon (TOC)	20 mg/m^3	Half hourly average	Continuous	
		Carbon monoxide	100 mg/m^3	Half hourly average	Continuous	

Table S3.1(d) Point Source emissions to air – Integrated Emissions Management limits and monitoring requirements (refinery bubble)						
Emission point ref. & location	**Parameter**	**Source**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
Emission limits shall apply until 28 October 2018						
REF-A-1; REF-A-2; REF-A-3; REF-A-4; REF-A-5; REF-A-6; REF-A- 7; REF-A-8; REF-A-9; REF-A-10; REF-A-11	Sulphur dioxide	CDU-3 CDU-4 F-650 HP21-HP26 PF3 Sec proc HDT2 HD Select EBU SRU CO Boiler	1,400 mg/m^3 (from 01/01/09)	Hourly	Continuous	Agreed in response to completion of relevant improvement item IC12 in table S1.3 of the permit

Table S3.1(d) Point Source emissions to air – Integrated Emissions Management limits and monitoring requirements (refinery bubble)						
Emission point ref. & location	**Parameter**	**Source**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
Emission limits shall apply from 28 October 2018						
REF-A-1; REF-A-2; REF-A-3; REF-A-4; REF-A-5; REF-A-6; REF-A- 7; REF-A-8; REF-A-9; REF-A-10; REF-A-11	Sulphur dioxide	Stacks releasing sulphur dioxide as a combustion product: CDU-3 CDU-4 F-650 HP21-HP26 PF3 Sec proc HDT2 HD Select EBU SRU CO Boiler	1,400 mg/Nm^3 Note 1	Hourly average	Continuous	As agreed in writing with the Environment Agency.
The points specified in the Integrated Emissions Management Technique document submitted in accordance with IC51 in Table S1.3 of this permit, or subsequently notified in accordance with condition 4.3.10 and agreed in writing by the Environment Agency	Sulphur dioxide	Stacks releasing sulphur dioxide as a combustion product, CCU and Sulphur Recovery Units	Limit shall be determined in accordance with the methodology approved in writing by the Environment Agency, in accordance with IC51 in Table S1.3 of this permit.	Monthly average	Continuous	Calculation using the method approved in writing by the Environment Agency in accordance with IC51 in Table S1.3 of this permit.
The points specified in the Integrated Emissions Management Technique document submitted in accordance with IC50 in Table S1.3 of this permit, or subsequently notified in accordance with condition 4.3.10 and agreed in writing by the Environment Agency	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	Stacks releasing oxides of nitrogen as a combustion product and CCU	Limit shall be determined in accordance with the methodology approved in writing by the Environment Agency, in accordance with IC50 in Table S1.3 of this permit.	Monthly average	Continuous	Calculation using the method approved in writing by the Environment Agency in accordance with IC50 in Table S1.3 of this permit.
Note 1 The limit shall be reviewed in accordance with IC52 in table S1.3 of this permit.						

Table S3.1(e) Point source emissions to air during normal operation for which there are no limits	
Emission point ref. & location	**Source**
Refinery Operations	
REF-A-13	VRU ship loading (intermittent)
Vents from Ethyl Benzene Unit (EBU)	E6800 surplus gas vent
	Benzene sewer
Oil Movements	Stanlow Island White Oils Vent
HDS-2	V6327 vent
HVI (FEU)	C4306 vacuum system exhaust
HVI (MDU)	C4406 vacuum system exhaust
ODU (Sour water stripper, SWS)	T4009, T4010
Storage tanks	South site- white oils storage tanks as application table 2.1.5.1 (35 storage tanks)
Storage tanks	South site- black oils as application table 2.1.5.2 a &b (34 & 25 off)
Storage tanks	Hill site- crude oils and slops as application table 2.1.5.3 (11 off)
Storage tanks	North site- white oils as application table 2.1.5.4 (34 off)
Storage tanks	North site- black oils as application table 2.1.5.5 (15 off)
Storage tanks	North site- other materials as application table 2.1.5.5 (4 off)
Alcohols	
ALC-A-3	Linevol evaporators main ejector vent and other associated ejectors
ALC-A-4	Neodol main ejector vent and other associated ejectors
Syngas start-up and shutdown venting	Minor vents as application table 2.2.1.4
Linevol start-up and shutdown venting	Minor vents as application table 2.2.1.4
Neodol start-up and shutdown venting	Minor vents as application table 2.2.1.4

Table S3.1(e) Point source emissions to air during normal operation for which there are no limits	
Emission point ref. & location	**Source**
SHOP	
SHO-A-1	SHOP Flare
Vents from hotwell vessels	NaBH4 decomposition (Unit 93) common vacuum system
	C16 Distillation (C9310) vacuum system
	Heavy I/D Recycle Distillation Vacuum System
Catalyst Bed Systems Pressure Control Vent	Disprop (P) Catalyst Vent
	Purification (P) Catalyst Regeneration Vent

Table S3.1(f) Point source emissions to air during abnormal operation	
Emission point ref. & location	**Source**
REF-A-11 - CO Boiler Exhaust Note 1	CCU CO Boiler Exhaust (F2151)
ODU (amine recovery unit)	S-5801/ S-5802
Secondary processes (aromatics)	Knockout pot to flare
Secondary processes (HVI)	MDU inert gas system pressure control valve T4401
Oil movements	Pressure relief serving V4241-V4248, V4253- V4257
Oil movements	Ship loading purging and line depressurising
Energy Recovery Plant	Fuel gas knock out pot, V7701
Resins	Relief valves: Reactor R7551; Relief valves and bursting discs; Weigh vessels V7551, V7552, V7568 , V7556
SHOP	C4 sphere. V9901 higher pressure relief valves
SHOP	Regeneration 1 and 2 systems relief valves
Alcohols (Linevol and Neodol)	Blowdown vessels V3311 and V4314 relief valves
Alcohols (Syngas)	Fuel gas and compressor relief valves

Table S3.1(f) Point source emissions to air during abnormal operation	
Emission point ref. & location	**Source**
Note 1 In the event of an outage of the CO boiler, releases may be made to air via the by-pass system. In such an event, after 24 hours of operation without combustion via the boiler, the CO concentration of the stack gases will be reduced to a value not greater than 2% by volume. The CO concentrations shall be measured continuously in the regenerator flue gas. The Environment Agency shall be informed of CO boiler outages of greater than 24 hours at the Reporting Address.	

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W1	SDAF Effluent Treatment plant	Flow	350 m^3/h, 7500 m^3/d	Continuous	Daily	MCERTS performance requirements
		Temperature	30°C	Spot sample	Daily	
		pH	6-9	Spot sample	Weekly	ISO 10523
		Suspended solids	45 mg/l (80% not greater than 30 mg/l)	Spot sample	Weekly	BS EN 872
		COD	250 mg/l	For 95% of all measured values of periodic samples taken over one year	Weekly	BS 6068-2.34 Same as ISO 6060 BS ISO 15705
		Hydrocarbon oil	10 mg/ l	Spot sample	Weekly	UKAS accredited method UK1412
		Total N Note 2	5 mg/ l	Spot sample	Weekly	BS EN 12260
		Phenols Note 2	0.5 mg/ l	Spot sample	Weekly	UKAS accredited colormetric method UK 497
W1	SDAF Effluent Treatment plant	**Metals** Note 2				
		As	40 µg/l	Spot sample	Quarterly	BS EN ISO 17294
		Cd	5 µg/l			
		Cr	5 µg/l			
		Cu	5 µg/l			

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
		Hg	0.5 µg/l			
		Pb	10 µg/l			
		Ni	10 µg/l			
		Zn	25 µg/l			
		Cyanide **Note 2**	20 µg/l	Spot sample	Monthly	BS6068-2.18
		Fluoride **Note 2**	10 mg/l	Spot sample	Monthly	BS EN ISO 10304-2
		Sulphide **Note 2**	1 mg/l	Spot sample	Monthly	ISO 10530
W2	NDAF Effluent Treatment plant	Flow	170 m^3/h, 4100 m^3/d	Continuous	Daily	MCERTS performance requirements
		Temperature	30 °C	Flow proportional	Daily	
		pH	6-9	Flow proportional	Daily	ISO 10523:1994
		Suspended solids	45 mg/l (80% not greater than 30 mg/l)	Flow proportional	Weekly	BS EN 872
		COD	250 mg/l	Flow proportional For 95% of all measured values of periodic samples taken over one year	Weekly	UKAS accredited method UK1429
		Hydrocarbon oil	10 mg/ l	Flow proportional	Weekly	UKAS accredited method UK1412
		Total N **Note 2**	20 mg/l	Flow proportional	Weekly	BS EN 12260:2003
		Phenols **Note 2**	0.5 mg/l	Flow proportional	Weekly	UKAS accredited colormetric method UK 497

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
		Metals Note 2				
		As	40 µg/l	Flow proportional	Quarterly	BS EN ISO 17294-2
		Cd	5 µg/l			
		Hg	0.5 µg/l			
		Pb	10 µg/l			
		Ni	10 µg/l			
		Zn	25 µg/l			
		Cr	5 µg/l			
		Cu	50 µg/l			
		Cyanide Note 2	20 µg/l	Flow proportional	Monthly	BS6068-2.18
		Sulphide Note 2	1 mg/l	Flow proportional	Monthly	ISO 10530
W3	PDAF and other systems as section B2.2	Flow	100,000 m^3/d	Continuous	Continuous	MCERTS performance requirements
		Temperature	32.5 °C	Flow proportional	Daily	
		pH	6-9	Flow proportional	Weekly	ISO 10523
		Suspended solids	45 mg/l (80% not greater than 30 mg/l) Note 1	Flow proportional	Weekly	BS EN 872
		COD	250 mg/l Note 1	Flow proportional For 95% of all measured values of periodic samples taken over one year	Weekly	UKAS accredited method UK1429

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
		Hydrocarbon oil	10 mg/l **Note 1**	Flow proportional	Weekly	UKAS accredited method UK1412
		Total N	20 mg/l **Note 1 & 2**	Flow proportional	Weekly	BS EN 12260
		Phenols	0.5 mg/l **Note 1 & 2**	Flow proportional	Weekly	UKAS accredited colormetric method - UK 497
		Metals **Note 1 & 2**				
		As	2 µg/l	Flow proportional	Quarterly	BS EN ISO 17294-2
		Cd	2 µg/l			
		Hg	0.2 µg/l			
		Pb	2 µg/l			
		Ni	20 µg/l			
		Zn	20 µg/l			
		Cr	2 µg/l			
		Cu	2 µg/l			
		Cyanide **Note 1 & 2**	20 µg/l	Flow proportional	Monthly	BS6068-2.18
		Sulphide **Note 1 & 2**	1 mg/l	Flow proportional	Monthly	ISO 10530
W4	North Site interceptors	Flow	No limit set	-	-	Surface water resulting from rainfall over area not exceeding 450,000m^2.
		pH	6-9	Flow proportional	Daily	ISO 10523:1994

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
		Suspended solids	45 mg/l	Flow proportional For 95% of all measured values of periodic samples taken over one year	Weekly	BS EN 872
		COD	250 mg/l	Flow proportional For 95% of all measured values of periodic samples taken over one year	Weekly	UKAS accredited method UK1429
		Hydrocarbon oil	10 mg/l	Flow proportional	Weekly	UKAS accredited method UK1412
		Oil	None visible	-	Daily	-
W5	Cooling water intake screens flush	-	-		-	-
W6	Surface water run-off from former rail loading area	-	-	-	-	-
W7	Surface water ex LPG spheres	-	-	-	-	-
W8	Fire deluge water ex LPG spheres	-	-	-	-	-
W9	Surface water ex SHOP **Notes 3 & 4**	Flow	1000 m^3/d	Continuous	-	-
		Butanediol (BDL)	20 mg/l	Spot sample	Prior to discharge of S9002 to the River Gowy	UKAS accredited method UK1744
W10	Fire deluge water ex LPG storage area	-	No limit set	-	-	-
W12 **Note 5**	Storm overflow ex T1403/4	-	No limit set	-	-	-
W13 **Note 5**	Storm overflow ex T1405 A&B	-	No limit set	-	-	-

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply until 28 October 2018						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W14 **Note 5**	Storm overflow ex T1402 A&B	-	No limit set	-	-	-
W15 **Note 5**	Storm water overflow ex T7801,2	-	No limit set	-	-	-
W16	Surface water ex A track, car parks, old Phenol plant site	-	No limit set	-	-	-

Note 1 Comparison between influent and effluent concentrations.
Note 2 Emission limit value under review subject to completion of IC 38.
Note 3 Compliance is defined as 95% of all results being 20 mg/l BDL with a maximum concentration of 40 mg/l without heavy rain.
Note 4

- SHOP operations to sample S-9002 for BDL content using the plant lab when the basin high alarm activates - as per current procedure.
- If sample result <20mg/l then discharge to River Gowy.
- If sample >20mg/l but <40mg/l then shift production team leader to authorise discharge to River Gowy based if <5% of all results. If >5% of all results then instigate emergency procedures to pump S-9002 contents to Unit 78 via RM/Ashless pit or S-9741.
- If sample >40mg/l then instigate emergency procedures to pump S-9002 contents to Unit 78 via RM/Ashless pit or S-9741

Note 5 Compliance with storm overflow procedures.

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** **Note 13**	**Reference Period** **Note 6**	**Monitoring frequency**	**Monitoring standard or method** **Note 12**
W1 Discharge to Thornton Brook Discharge will be via S1 to a third party waste water treatment works following completion of improvements set out in IC41 in Table S1.3 of this permit (BAT 12 derogation)	SDAF Effluent Treatment plant (treating effluent from a number of plant drainage interceptors)	Flow	350 m^3/h, 7500 m^3/d	Continuous	Daily	MCERTS performance requirements
		Temperature	30°C	Spot sample	Daily	
		pH	6-9	Spot sample	Weekly	ISO 10523
		Total suspended solids	25 mg/l	24 hour flow proportional Note 6	Daily	BS EN 872
		COD	125 mg/l	24 hour flow proportional Note 6	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 9

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12
		Hydrocarbon oil	10 mg/ l	24 hour flow proportional Note 6	Daily	UKAS accredited method UK1412 Note 7
		Hydrocarbon oil index	10 mg/l	24 hour flow proportional Note 6	Monthly	BS EN 9377-2 Note 7
		Total Nitrogen expressed as N Note 2	5 mg/ l	24 hour flow proportional Note 6	Weekly	BS EN 12260
		Phenols Note 2	0.5 mg/ l	24 hour flow proportional Note 6	Weekly	UKAS accredited colormetric method UK 497 Note 8
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.05 mg/l	Spot sample	Monthly	ISO 11423-1
		Metals Note 2				
		Cd	0.005 mg/l	24 hour flow proportional Note 6	Quarterly	BS EN ISO 17294
		Hg	0.0005 mg/l			BS EN 12846
		Pb	0.01 mg/l			BS EN ISO 17294
		Ni	0.01 mg/l			BS EN ISO 17294
		V	-			BS EN ISO 17294
		Cyanide Note 2	20 µg/l	24 hour flow proportional Note 6	Monthly	ISO 6703-1
		Fluoride Note 2	10 mg/l	24 hour flow proportional Note 6	Monthly	BS EN ISO 10304-1

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12
		Sulphide Note 2	1 mg/l	24 hour flow proportional Note 6	Monthly	ISO 10530
W2 Discharge to River Gowy Discharge will be via S1 to a third party waste water treatment works following completion of improvements set out in IC41 in Table S1.3 of this permit (BAT 12 derogation)	NDAF Effluent Treatment plant (treating effluent from the road terminal (N44) and Hillsite (N52) & ships cargo slops)	Flow	170 m^3/h, 4100 m^3/d	Continuous	Daily	MCERTS performance requirements
		Temperature	30 °C	Spot sample	Daily	
		pH	6-9	Spot sample	Daily	ISO 10523
		Total suspended solids	45 mg/l (80% not greater than 30 mg/l)	24 hour flow proportional	Daily	BS EN 872
		COD	250 mg/l (For 95% of all measured values of periodic samples taken over one year)	24 hour flow proportional	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 9
		Hydrocarbon oil	10 mg/ l	24 hour flow proportional	Daily	UKAS accredited method UK1412 Note 7
		Hydrocarbon oil index	10 mg/l	24 hour flow proportional	Monthly	BS EN 9377-2 Note 7
		Total Nitrogen expressed as N Note 2	20 mg/l	24 hour flow proportional	Daily	BS EN 12260
		Phenols Note 2	0.5 mg/l	24 hour flow proportional	Weekly	UKAS accredited colormetric method UK 497 Note 8
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.05 mg/l	Spot sample	Monthly	ISO 11423-1

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12
		Metals Note 2				
		Cd	0.005 mg/l	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Hg	0.0005 mg/l			BS EN 12846
		Pb	0.01 mg/l			BS EN ISO 17294
		Ni	0.01 mg/l			BS EN ISO 17294
		V	-			BS EN ISO 17294
		Cyanide Note 2	20 µg/l	24 hour flow proportional	Monthly	ISO 6703-1
		Sulphide Note 2	1 mg/l	24 hour flow proportional	Monthly	ISO 10530
W3 Discharge to Manchester Ship Canal via N38 Discharge of PDAF & T1402A/B will be via S1 to a third party waste water treatment works following completion of improvements set out in IC41 in Table S1.3 of this permit (BAT 12 derogation)	PDAF and other systems as section B2.2 Demin reactivator effluent Demin regenerator effluent Plant drainage interceptors Once through cooling water PDAF Effluent Treatment plant T1402A/B – run-off from plants areas	Flow	100,000 m^3/d	Continuous	Continuous	MCERTS performance requirements
		Temperature	32.5 °C	Spot sample	Daily	
		pH	6-9	Spot sample	Weekly	ISO 10523
		Total suspended solids	45 mg/l (80% not greater than 30 mg/l) Note 1	24 hour flow proportional	Daily	BS EN 872
		COD	125 mg/l Note 1	24 hour flow proportional	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 9
		Hydrocarbon oil	10 mg/l Note 1	24 hour flow proportional	Daily	UKAS accredited method UK1412 Note 7
		Hydrocarbon oil index	10 mg/l Note 1	24 hour flow proportional	Monthly	BS EN 9377-2 Note 7

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12
		Total Nitrogen expressed as N	20 mg/l Note 1 & 2	24 hour flow proportional	Weekly	BS EN 12260
					Daily	
		Phenols	0.5 mg/l Note 1 & 2	24 hour flow proportional	Weekly	UKAS accredited colormetric method - UK 497 Note 8
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.3 mg/l Note 10	Spot sample	Monthly	ISO 11423-1
		Metals Note 1 & 2				
		Cd	0.002 mg/l	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Hg	0.0002 mg/l	24 hour flow proportional		BS EN 12846
		Pb	0.002 mg/l	24 hour flow proportional		BS EN ISO 17294
		Ni	0.02 mg/l	24 hour flow proportional		BS EN ISO 17294
		V	-	24 hour flow proportional		BS EN ISO 17294
		Cyanide Note 1 & 2	20 µg/l	24 hour flow proportional	Monthly	ISO 6703-1
		Sulphide Note 1 & 2	1 mg/l	24 hour flow proportional	Monthly	ISO 10530
W4 Discharge to River Gowy via N19 interceptor	North Site interceptors & surface run-off	Flow	No limit set	-	-	Surface water resulting from rainfall over area not exceeding 450,000m^2.
		pH	6-9	Spot sample	Daily	ISO 10523

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12
Discharge will reduce on diversion of N55 (energy recovery plant interceptor), N56 (toluene gantry interceptor) & N1B to S1 following completion of improvements set out in IC41 in Table S1.3 of this permit (BAT 12 derogation)		Total suspended solids	25 mg/l	24 hour flow proportional	Daily	BS EN 872
		COD	125 mg/l	24 hour flow proportional	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 9
		Hydrocarbon oil	10 mg/l	24 hour flow proportional	Daily	UKAS accredited method UK1412 Note 7
		Hydrocarbon oil index	10 mg/l	24 hour flow proportional	Monthly	BS EN 9377-2 Note 7
		Oil	None visible	-	Daily	-
		Phenols	-	24 hour flow proportional	Monthly	UKAS accredited colormetric method - UK 497 Note 8
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.05 mg/l	Spot sample	Monthly	ISO 11423-1
		Total nitrogen expressed as N	No limit set Note 11	24 hour flow proportional	Daily	BS EN 12260
		Cd	No limit set Note 11	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Hg	No limit set Note 11	24 hour flow proportional	Quarterly	BS EN 12846
		Pb	No limit set Note 11	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Ni	No limit set Note 11	24 hour flow proportional	Quarterly	BS EN ISO 17294
		V	-	24 hour flow proportional	Quarterly	BS EN ISO 17294

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12
W5 Discharge to Manchester Ship Canal	Cooling water intake screens flush	-	-		-	-
W6 Discharge to River Gowy	Surface water run-off from former rail loading area	-	-	-	-	-
W7 Discharge to Mill Brook	Surface water ex LPG spheres	-	-	-	-	-
W8 Discharge to Mill Brook	Fire deluge water ex LPG spheres	-	-	-	-	-
W9 Discharge to River Gowy	Surface water ex SHOP Notes 3 & 4	Flow	1000 m^3/d	Continuous	-	-
		Butanediol (BDL)	20 mg/l	Spot sample	Prior to discharge of S9002 to the River Gowy	UKAS accredited method UK1744
W10 Discharge to River Gowy	Fire deluge water ex LPG storage area	-	No limit set	-	-	-
W12 Note 5 Discharge to Thornton Brook	Storm overflow ex T1403/4	-	No limit set	-	-	-
W13 Note 5 Discharge to River Gowy	Storm overflow ex T1405 A&B	-	No limit set	-	-	-
W14 Note 5 Discharge to Gale Brook	Storm overflow ex T1402 A&B	-	No limit set	-	-	-
W15 Note 5 Discharge to Gale Brook	Storm water overflow ex T7801,2	-	No limit set	-	-	-
W16 Discharge to Gale Brook	Surface water ex A track, car parks, old Phenol plant site	-	No limit set	-	-	-
W17	T4082/T4084 tank overflow	-	No limit set	-	-	-

Table S3.2(a) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply from 28 October 2018 up to the completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit (no later than 30 September 2021)						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 13	**Reference Period** Note 6	**Monitoring frequency**	**Monitoring standard or method** Note 12

Note 1 Comparison between influent (background concentrations at the Ince intake) and effluent concentrations.
Note 2 Emission limit value under review subject to completion of IC 38 in Table S1.3 of this permit.
Note 3 Compliance is defined as 95% of all results being 20 mg/l BDL with a maximum concentration of 40 mg/l without heavy rain.
Note 4

- SHOP operations to sample S-9002 for BDL content using the plant lab when the basin high alarm activates - as per current procedure.
- If sample result <20mg/l then discharge to River Gowy.
- If sample >20mg/l but <40mg/l then shift production team leader to authorise discharge to River Gowy based if <5% of all results. If >5% of all results then instigate emergency procedures to pump S-9002 contents to Unit 78 via RM/Ashless pit or S-9741.
- If sample >40mg/l then instigate emergency procedures to pump S-9002 contents to Unit 78 via RM/Ashless pit or S-9741.

Note 5 Compliance with storm overflow procedures.
Note 6 The sampler to implement 24 hour flow proportional sampling shall be installed as part of the effluent project, in accordance with IC41 in Table S1.3 of this permit. Until this time collection of representative spot samples shall apply.
Note 7 Test method UK1412 shall be run in parallel with test method BS EN ISO 9377-2 for up to 12 months, whilst quality assurance of the methods is undertaken. At the end of the quality assurance period the operator shall confirm in writing the correlation between the two methods and how ongoing validation shall be carried out.
Note 8 The operator shall provide evidence when requested by the Environment Agency of the results of the analytical laboratory aquacheck proficiency scheme. This is required to demonstrate equivalence of the current test method against test method BS EN ISO 14402.
Note 9 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 10 The Environment Agency shall review this limit based on 2017 and 2018 monitoring data.
Note 11 The Environment Agency shall set limits based on a representative set of monitoring data.
Note 12 Or an equivalent method approved in writing by the Environment Agency.
Note 13 The BAT AELs are yearly averages, see Schedule 6 of this permit for the interpretation.

Table S3.2(b) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit – applicable no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 11	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method** Note 10
W1 Note 6 Discharge to Thornton Brook	SDAF Effluent Treatment plant (treating effluent from a number of plant drainage interceptors)	In accordance with approved procedures provided in accordance with IC41 in Table S1.3 of this permit (BAT 12 derogation). Discharge during normal operation via S1 to a third party waste water treatment works.				
W2 Note 6 Discharge to River Gowy	NDAF Effluent Treatment plant (treating effluent from the road terminal (N44) and Hillsite (N52) & ships cargo slops)	In accordance with approved procedures provided in accordance with IC41 in Table S1.3 of this permit (BAT 12 derogation) Discharge during normal operation via S1 to a third party waste water treatment works.				

Table S3.2(b) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit – applicable no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** **Note 11**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method** **Note 10**
W3 Discharge to Manchester Ship Canal via N38	Demin reactivator effluent Demin regenerator effluent Plant drainage interceptors Once through cooling water	Flow	90,000 m^3/d Normal operation 100,000 m^3/d Other than normal operation, S1 unavailable	Continuous	Continuous	MCERTS performance requirements
		Temperature	32.5 °C	Spot sample	Daily	
		pH	6-9	Spot sample	Weekly	ISO 10523
		Total suspended solids	25 mg/l **Note 1**	24 hour flow proportional	Daily	BS EN 872
		COD	125 mg/l **Note 1**	24 hour flow proportional	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 7
		Total Nitrogen expressed as N	20 mg/l **Notes 1 & 2**	24 hour flow proportional	Daily	BS EN 12260
		Hydrocarbon oil	10 mg/l **Note 1**	24 hour flow proportional	Daily	UKAS accredited method UK1412 Note 8
		Hydrocarbon oil index	2.5 mg/l	24 hour flow proportional	Monthly	BS EN 9377-2 Note 8
		Phenols	-	24 hour flow proportional	Monthly	UKAS accredited colormetric method - UK 497 Note 9
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.05 mg/l	Spot sample	Monthly	ISO 11423-1

Table S3.2(b) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit – applicable no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 11	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method** Note 10
		Metals Note 1 & 2				
		Cd	0.002 mg/l	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Hg	0.0002 mg/l	24 hour flow proportional		BS EN 12846
		Pb	0.002 mg/l	24 hour flow proportional		BS EN ISO 17294
		Ni	0.02 mg/l	24 hour flow proportional		BS EN ISO 17294
		V	-	24 hour flow proportional		BS EN ISO 17294
		Cyanide Note 1 & 2	20 µg/l	24 hour flow proportional	Monthly	ISO 6703-1
		Sulphide Note 1 & 2	1 mg/l	24 hour flow proportional	Monthly	ISO 10530
W4 Discharge to River Gowy via N19 interceptor	Surface water run-off	Flow	No limit set	-	-	Surface water resulting from rainfall over area not exceeding 450,000m^2.
		pH	6-9	Spot sample	Daily	ISO 10523
		Total suspended solids	25 mg/l	24 hour flow proportional	Daily	BS EN 872
		COD	125 mg/l	24 hour flow proportional	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 7
		Total nitrogen expressed as N	25 mg/l	24 hour flow proportional	Daily	BS EN 12260

Table S3.2(b) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit – applicable no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 11	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method** Note 10
		Hydrocarbon oil	10 mg/l Note 1	24 hour flow proportional	Daily	UKAS accredited method UK1412 Note 8
		Hydrocarbon oil index	2.5 mg/l	24 hour flow proportional	Monthly	BS EN 9377-2 Note 8
		Phenols	-	24 hour flow proportional	Monthly	UKAS accredited colormetric method - UK 497 Note 9
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene 0.05 mg/l	Spot sample	Monthly	ISO 11423-1
		Cd	0.008 mg/l	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Hg	0.001 mg/l	24 hour flow proportional	Quarterly	BS EN 12846
		Pb	0.03 mg/l	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Ni	0.1 mg/l	24 hour flow proportional	Quarterly	BS EN ISO 17294
		V	-	24 hour flow proportional	Quarterly	BS EN ISO 17294
W5 Discharge to Manchester Ship Canal	Cooling water intake screens flush	-	-		-	-
W6 Discharge to River Gowy	Surface water run-off from former rail loading area	-	-	-	-	-
W7 Discharge to Mill Brook	Surface water ex LPG spheres	-	-	-	-	-

Table S3.2(b) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit – applicable no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 11	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method** Note 10
W8 Discharge to Mill Brook	Fire deluge water ex LPG spheres	-	-	-	-	-
W9 Discharge to River Gowy	Surface water ex SHOP Notes 3 & 4	Flow	1000 m^3/d	Continuous	-	-
		Butanediol (BDL)	20 mg/l	Spot sample	Prior to discharge of S9002 to the River Gowy	UKAS accredited method UK1744
W10 Discharge to River Gowy	Fire deluge water ex LPG storage area	-	No limit set	-	-	-
W12 Note 5 Discharge to Thornton Brook	Storm overflow ex T1403/4	-	No limit set	-	-	-
W13 Note 5 Discharge to River Gowy	Storm overflow ex T1405 A&B	-	No limit set	-	-	-
W14 Note 5 Discharge to Gale Brook	Storm overflow ex T1402 A&B	-	No limit set	-	-	-
W15 Note 5 Discharge to Gale Brook	Storm water overflow ex T7801,2	-	No limit set	-	-	-
W16 Discharge to Gale Brook	Surface water ex A track, car parks, old Phenol plant site	-	No limit set	-	-	-
W17	T4082/T4084 tank overflow	-	No limit set	-	-	-

Table S3.2(b) Point Source emissions to water (other than sewer) – emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit – applicable no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)** Note 11	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method** Note 10

Note 1 Comparison between influent (background concentrations at the Ince intake) and effluent concentrations
Note 2 Emission limit value under review subject to completion of IC38 in Table S1.3 of this permit.
Note 3 Compliance is defined as 95% of all results being 20 mg/l BDL with a maximum concentration of 40 mg/l without heavy rain.
Note 4

- SHOP operations to sample S-9002 for BDL content using the plant lab when the basin high alarm activates - as per current procedure.
- If sample result <20mg/l then discharge to R. Gowy.
- If sample >20mg/l but <40mg/l then shift production team leader to authorise discharge to R. Gowy based if <5% of all results. If >5% of all results then instigate emergency procedures to pump S-9002 contents to Unit 78 via RM/Ashless pit or S-9741.
- If sample >40mg/l then instigate emergency procedures to pump S-9002 contents to Unit 78 via RM/Ashless pit or S-9741

Note 5 Compliance with storm overflow procedures
Note 6 Emission points W1 and W2 will remain in place after the completion of improvements set out in IC41 in Table S1.3 of this permit (agreed under the derogation from BAT 12 AELs). They will be authorised for non-routine operation following written approval from the Environment Agency and the previous limits and monitoring requirements shall no longer apply.
Note 7 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 8 Test method UK1412 shall be run in parallel with test method BS EN ISO 9377-2 for up to 12 months, whilst quality assurance of the methods is undertaken. At the end of the quality assurance period the operator shall confirm in writing the correlation between the two methods and how ongoing validation shall be carried out.
Note 9 The operator shall provide evidence when requested by the Environment Agency of the results of the analytical laboratory aquacheck proficiency scheme. This is required to demonstrate equivalence of the current test method against test method BS EN ISO 14402.
Note 10 Or an equivalent method approved in writing by the Environment Agency.
Note 11 The BAT AELs are yearly averages, see Schedule 6 of this permit for the interpretation.

Table S3.3 Point source emissions to sewer, effluent treatment plant or other transfers off-site– emission limits and monitoring requirements – shall apply until completion of the BAT 12 derogation set out in IC41 in Table S1.3 of this permit - no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. Unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
S1	Unit 7800, Chemicals (SHOP, Alcs, resins, Sulfolane, surface water ex Solvents, process effluent ex Argent Biodiesel Stanlow Plant (EPR/LP3233DK))	Subject to contractual agreement between United Utilities and operator October 2004.	-	-	As application	As application

Table S3.3(a) Point source emissions to sewer, effluent treatment plant or other transfers off-site– emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit - no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. Unit)** Note 1	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
S1	Unit 7800, Chemicals (SHOP, Alcs, resins, Sulfolane, surface water ex Solvents, process effluent ex Argent Biodiesel Stanlow Plant (EPR/LP3233DK)) Refinery operations, SDAF, NDAF, PDAF, T1402A/B	Flow	Note 1	Continuous	Continuous	MCERTS performance requirements
		Temperature	Note 1	24 hour flow proportional	Daily	
		pH	6-9	24 hour flow proportional	Daily	ISO 10523
		Total suspended solids	**Note 1**	24 hour flow proportional	Daily	BS EN 872
		COD	**Note 1**	24 hour flow proportional	Daily	BS 6068-2.34 Same as ISO 6060 BS ISO 15705 Note 4
		Total Nitrogen expressed as N	**Note 1**	24 hour flow proportional	Daily	BS EN 12260
		Hydrocarbon oil	Note 1	24 hour flow proportional	Daily	UKAS accredited method UK1412 Note 3
		Hydrocarbon oil index	Note 1	24 hour flow proportional	Daily	BS EN 9377-2 Note 3
		Phenols	-	24 hour flow proportional	Monthly	UKAS accredited colormetric method - UK 497 Note 2
		Benzene, toluene, ethyl benzene, xylene (BTEX)	Benzene Note 1	Spot sample	Monthly	ISO 11423-1
		Metals				
		Cd	Note 1	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Hg	Note 1	24 hour flow proportional		BS EN 12846

Table S3.3(a) Point source emissions to sewer, effluent treatment plant or other transfers off-site– emission limits and monitoring requirements shall apply following completion of the BAT 12 derogation set out in IC 41 in Table S1.3 of this permit - no later than the 30 September 2021						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. Unit)** Note 1	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
S1	Unit 7800, Chemicals (SHOP, Alcs, resins, Sulfolane, surface water ex Solvents, process effluent ex Argent Biodiesel Stanlow Plant (EPR/LP3233DK)) Refinery operations, SDAF, NDAF, PDAF, T1402A/B & North Site Interceptors N55 (energy recovery plant), N56 (toluene gantry) & N1B	Pb	Note 1	24 hour flow proportional	Quarterly	BS EN ISO 17294
		Ni	Note 1	24 hour flow proportional	Quarterly	BS EN ISO 17294
		V	Note 1	24 hour flow proportional	Quarterly	BS EN ISO 17294

Note 1 Parameter limits shall be set based on the outcome of improvement condition IC53 in Table S1.3 of this permit.
Note 2 The operator shall provide evidence when requested by the Environment Agency of the results of the analytical laboratory aquacheck proficiency scheme. This is required to demonstrate equivalence of the current test method against test method BS EN ISO 14402.
Note 3 Test method UK1412 shall be run in parallel with test method BS EN ISO 9377-2 for up to 12 months, whilst quality assurance of the methods is undertaken. At the end of the quality assurance period the operator shall confirm in writing the correlation between the two methods and how ongoing validation shall be carried out.
Note 4 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.

Table S3.4 Annual Limits		
Parameter	**Medium**	**Limit (including unit)**
Sulphur dioxide	Air	7,400 tonnes
Oxides of nitrogen from emission point REF-A-4	Air	1,311 tonnes
Oil in water (total)	Water	3g / tonne crude oil processed Notes 1 & 2

Note 1 Comparison between influent and effluent concentrations.
Note 2 Emission limit value under review subject to completion of IC38 in this permit.

Table S3.5 Process monitoring requirements				
Emission point reference or source or description of point of measurement	**Parameter**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
REF-A-1 CDU-3	PM_{10}	Annual	Calculated from mass of measured particulates	Calculated as 5% of total PM by mass
REF-A-2 CDU-4	PM_{10}	Annual	Calculated from mass of measured particulates	Calculated as 5% of total PM by mass
REF-A-4 HPBH	PM_{10}	Annual	Calculated from mass of measured particulates	Calculated as 25% of total PM by mass
REF-A-6 Secondary processes	PM_{10}	Annual	Calculated from mass of measured particulates	Calculated as 5% of total PM by mass
RLFS sulphur monitoring	Heavy fuel oil surge vessel, V1802; Light fuel tank, T4027	As required by emission limit value calculation and hourly refinery bubble Periodic (i.e. by tank)	ISO method 8754 (1992), PrEN ISO 14596	
RFG mercury (Hg) monitoring	Mercury (Hg)	Every 6 months	BS ISO 6978 Part 2	Sampling to be undertaken at locations within the RFG system that are representative of the RFG composition burnt in major combustion units
ERP-A-1	water vapour content *(unless gas is dried before analysis of emissions)*	continuous	BS EN 14181 and BS EN 15267-3	
ERP-A-1	Exhaust gas temperature	Continuous	Traceable to national standards	As agreed in writing with the Environment Agency.
ERP-A-1	Exhaust gas pressure	Continuous	Traceable to national standards	As agreed in writing with the Environment Agency.
ERP-A-1	Exhaust gas oxygen content	Continuous	BS EN 15267-3 BS EN 14181	
Energy Recovery Plant Location close to the Combustion Chamber inner wall or as identified and justified in Application.	Temperature (° C)	Continuous	Traceable to national standards	As agreed in writing with the Environment Agency.

Table S3.5 Process monitoring requirements				
Emission point reference or source or description of point of measurement	**Parameter**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
Refinery Fuel Gas (RFG) Monitoring	Sulphur content	Continuously, or as agreed in writing with the Environment Agency	Continuously sampling chromatographic S gas analyser or Electrochemical cell or as approved in writing 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 a method that identifies the sources of the data used, to be approved in writing by the Environment Agency.	A mass balance shall be undertaken of incoming sources of sulphur to the refinery versus sulphur outputs.
A10 Sulphur Recovery Unit (SRU)	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 shall be ≥ 98.5 % (BAT AEPL for an existing unit). All streams containing H_2S are treated to the BAT AEPL.
A14 Flaring events	Duration of event Total mass of gas flared Mass of SO_2 released Calorific value of the gas flared	When the rate of gas flared exceeds 2.9 tonnes/hour	SO_2 may be determined by analysis of the flare gas or by application of emission factors.	The operator shall identify the root cause of the flaring event and consider ways to prevent or reduce the frequency and duration of reoccurrence.
Ince Coaster Berth VRU BAT Conclusion 52	The Operator shall carry out monitoring in accordance with the monitoring programme for measuring point source emissions of non-methane volatile organic compounds and benzene from the loading and unloading of liquid hydrocarbons, developed in response to IC48.			

Table S3.6 Residue quality					
Emission point reference or source or description of point of measurement	**Parameter**	**Limit**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
Bottom Ash	Total Organic Content (TOC) Loss On Ignition (LOI)	3% (TOC) or 5% (LOI) of the dry weight of the bottom ash	Quarterly	Environment Agency Guidance, 'TGN M4 – Guidelines for Ash Sampling and Analysis'	
Bottom Ash	Metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) and their compounds, dioxins/furans and dioxin-like PCBs.		Quarterly	Environment Agency Guidance, 'TGN M4 – Guidelines for Ash Sampling and Analysis'	
Bottom Ash	Total soluble fraction and metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) soluble fractions		Before use of a new disposal or recycling route	Environment Agency Guidance, 'TGN M4 – Guidelines for Ash Sampling and Analysis'	
APC Residues	Metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) and their compounds, dioxins/furans and dioxin-like PCBs.		Quarterly	Environment Agency Guidance, 'TGN M4 – Guidelines for Ash Sampling and Analysis'	
APC Residues	Total soluble fraction and metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) soluble fractions		Before use of a new disposal or recycling route	Environment Agency Guidance, 'TGN M4 – Guidelines for Ash Sampling and Analysis'	

Schedule 4 - Reporting

Table S4.1 Reporting of monitoring data			
Parameter	**Emission or monitoring point/reference**	**Reporting period**	**Period begins**
Air			
Emissions to air Parameters as required by condition 3.5.1.	REF-A-1,REF-A-2, REF-A-3, REF-A-4, REF-A-5, REF-A-6, REF-A-7, REF-A-8, REF-A-9, REF-A-10, REF-A-11, REF-A-14 SHO-A-1, SHO-A-2, SHO-A-3, SHO-A-4, ALC-A-1. ALC-A-2 ERP-A-1	Quarterly 1 Jan, 1 Apr, 1 Jul and 1 Oct	01/04/17
Emissions to air – Oxides of nitrogen	REF-A-4	Annually	1 January
Emissions to air – PM_{10}	REF-A-1, REF-A-2, REF-A-4, REF-A-6	Annually	1 January
Emissions to air Parameters as required by condition 3.5.1.	REF-A-12	Every two years (on maintenance turnaround)	01/01/2008
Emissions to air – Dioxins / furans (I-TEQ), Cd, Tl, Hg, metals Parameters as required by condition 3.5.1.	ERP-A-1	Every 6 months	01/01/2008
Emissions to air – Dioxins / furans, dioxin-like PCBs & PAH & Class B VOC Parameters as required by condition 3.5.1.	ERP-A-1, ERP-A-2	Annually	1 January
Temperature	ERP-A-1	Quarterly	1 January
Emissions to air – Sulphur dioxide	Installation	Annually	1 January
Emissions to air – sulphur dioxide Parameters as required by condition 3.5.1, refinery bubble.	Refinery bubble as table S3.1(d)	Quarterly 1 Jan, 1 Apr, 1 Jul and 1 Oct	01/04/2017 Applicable to 28/10/2018
Emissions to air – sulphur dioxide Parameters as required by condition 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 (Refinery bubble as table S3.1(d))	Quarterly 1 Jan, 1 Apr, 1 Jul and 1 Oct	Applicable from 28/10/2018
Emissions to air – oxides of nitrogen Parameters as required by condition 3.7.1, refinery bubble.	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 (Refinery bubble as table S3.1(d))	Quarterly 1 Jan, 1 Apr, 1 Jul and 1 Oct	Applicable from 28/10/2018
Residues			
TOC or LOI Parameters as required by condition 3.5.1	Bottom Ash	Quarterly	1 Jan, 1 Apr, 1 Jul and 1 Oct

Table S4.1 Reporting of monitoring data			
Parameter	**Emission or monitoring point/reference**	**Reporting period**	**Period begins**
Metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) and their compounds, dioxins/furans and dioxin-like PCBs Parameters as required by condition 3.5.1	Bottom Ash	Quarterly	1 Jan, 1 Apr, 1 Jul and 1 Oct
Total soluble fraction and metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) soluble fractions Parameters as required by condition 3.5.1	Bottom Ash	Before use of a new disposal or recycling route	
Metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) and their compounds, dioxins/furans and dioxin-like PCBs Parameters as required by condition 3.5.1	APC Residues	Quarterly	1 Jan, 1 Apr, 1 Jul and 1 Oct
Total soluble fraction and metals (Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc) soluble fractions Parameters as required by condition 3.5.1	APC Residues	Before use of a new disposal or recycling route	
Functioning and monitoring of the incineration plant as required by condition 4.2.2		Annually	1 January
Water			
Emissions to water Parameters as required by condition 3.5.1	W1, W2, W3, W4 W9 (prior to discharge to the River Gowy)	Quarterly	01/04/2017
Emissions to water Parameters as required by condition 3.5.1 – Oil in water	Installation	Annually	1 January
Sewer			
Emissions to sewer Parameters as required by condition 3.5.1	S1	Quarterly	In accordance with table S3.3(a) of this permit
Other			
LDAR	Installation wide	Annual	01/01/2008 up to 28/10/2018
Diffuse VOCs in accordance with BAT Conclusion 6	Installation wide	Annual	From 28/10/2018
Sulphur monitoring for refinery liquid fuel system Parameters as required by condition 3.5.1	Heavy fuel oil surge vessel, V1802; Light fuel tank, T4027	Quarterly	01/04/2017

Table S4.1 Reporting of monitoring data			
Parameter	**Emission or monitoring point/reference**	**Reporting period**	**Period begins**
Sulphur monitoring for refinery fuel gas Parameters as required by condition 3.5.1	RFG fuel drums, V4808 and V4809	Quarterly	01/04/2017
Mercury monitoring for refinery fuel gas Parameters as required by condition 3.5.1	RFG	Every 6 months	28/10/2018
Sulphur recovery unit Parameters as required by condition 3.5.1	SRU percentage recovery	Quarterly	01/04/2017
Sulphur Recovery Unit	Refinery sulphur balance and SRU availability	Quarterly	01/01/2008
Emissions to air – Refinery Flare Sour gas and hydrogen sulphide	REF-A-14	Quarterly	01/04/2017
Review of NOx factors	Emission points identified in response to IC10 in table S1.3 of the permit	Annual	01/04/2017
Non-methane VOCs and benzene	Ince Coaster Berth VRU	In accordance with table S3.5 of this permit	In accordance with table S3.5 of this permit

Table S4.2 Annual production/treatment (Energy Recovery Plant)	
Parameter	**Units**
Hazardous waste incinerated	tonnes
Waste heat utilised by the installation	KWh

Table S4.3 Performance parameters		
Parameter	**Frequency of assessment**	**Units**
Crude oil and other oil import (i.e. feedstocks)	Annually	tonnes
Water usage	Annually	Tonnes/ tonne feedstock
Energy usage (electrical)	Annually	MWh/ tonne feedstock
Energy usage (all fuels)	Annually	MJ/ tonne feedstock
Total release of oil to water per tonne of feedstock	Annually	g oil/ 1000 tonnes feedstock
Energy Recovery Plant		
Fuel oil consumption	Annually	Kg / tonne of waste incinerated
Mass of Bottom Ash produced	Annually	Kg / tonne of waste incinerated
Mass of APC residues produced	Annually	Kg / tonne of waste incinerated
Activated Carbon consumption	Annually	Kg / tonne of waste incinerated
[Lime / Sodium Bicarbonate] consumption	Annually	Kg / tonne of waste incinerated

Table S4.3 Performance parameters		
Parameter	**Frequency of assessment**	**Units**
Periods of abnormal operation	Annually	No of occasions and cumulative hours for current calendar year for each line.

Table S4.4 IED Chapter III Performance parameters		
Parameter	**Frequency of assessment**	**Units**
Annual fuel usage for each LCP	Annually	tJ
Total emission to air of NO_X for each LCP	Annually	Tonnes
Total emission to air of SO_2 for each LCP	Annually	Tonnes
Total emission to air of CO for each LCP	Annually	Tonnes
Total emission to air of dust for each LCP	Annually	Tonnes
Operating hours for each LCP	Annually	hour

Table S4.5 Reporting forms or other form as agreed in writing by the Agency			
Media/parameter	**Reporting format**	**Frequency**	**Date of form**
Chapter III of the IED			
Air and Energy - LCP	Form IED AR1 – energy usage and emissions for the year (Table S4.4)	quarterly	31/12/2015
Air – LCP	Form IED CON1 (LCP boilers) - continuous monitoring or other form as agreed in writing by the Agency	quarterly	31/12/2015
Air – LCP	Form IED PM1 - discontinuous monitoring or other form as agreed in writing by the Agency	6 monthly	31/12/2015
Air – LCP	Form IEM CEM1 - continuous measurement systems invalidation log or other form as agreed in writing by the Agency	quarterly	31/12/2015
Air – LCP	Form IEM REM1 - installation resource efficiency metrics for Electricity Supply Industry sub-sector	annually	31/12/2015
Refinery			
Air	Form Air 1 – CO boiler	quarterly	2018
Air	Form Air 2 – periodic NOx and SO_2	quarterly	2018
Air	Form Air 3 – periodic Ni, Sb, V	6 monthly	2018
Air	Form Air 4 – dioxins/furans A-5	annually	2018
Air	Form Air 5 – MPBH A-12	Every two years post maintenance	2018
Air	Form Air 6 - refinery sulphur balance, SRU availability and efficiency and fuel analysis	Quarterly	2018
Air	Form Air 7 – SHOP flare	Quarterly	2018

Table S4.5 Reporting forms or other form as agreed in writing by the Agency			
Media/parameter	**Reporting format**	**Frequency**	**Date of form**
Air - Flares	Form Air F1: reporting form for Non-Routine Flaring	Quarterly	2018
Air - Flares	Form Air F2: reporting form for total quarterly flaring	Quarterly	2018
Air – NOx bubble	Form BREF NOx IEM: reporting form for compliance with the monthly NOx bubble	Quarterly	2018
Air – SO_2 bubble	Form BREF SO_2 IEM – reporting form for compliance with the monthly SO_2 bubble	Quarterly	2018
EfW			
Air	Forms EfW 1 to 7	Quarterly	2018
Air	Forms EfW 8	Annually	2018
Waste	Form EfW R1	Quarterly	2018
Raw materials	Form EfW WU/RM1	Quarterly	2018
Residues	Forms EfW Residues 1 and 2	Quarterly	2018
Performance	Forms EfW Performance 1	Annually	2018
Effluent			
Water	Form Water – 1 or other form as agreed in writing by the Agency	Quarterly	2018
Sewer	Form Sewer – 1 or other form as agreed in writing by the Agency	Quarterly	2018
Annual limits			
Air/water	Form Annual limits	Annually	2018
Process/performance			
Air	Form Process 1 (particulate)	Annually	2018
Fuel	Form Process 2 (mercury in RFG)	6 monthly	2018
-	Form Performance 1	Annually	2018
Water usage	Form Water usage1 or other form as agreed in writing by the Agency		01/01/2008
Energy usage	Form Energy 1 or other form as agreed in writing by the Agency		01/01/2008
Waste return	Form Waste 1 or other form as agreed in writing by the Agency		01/01/2008

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	**EPR/FP3139FN**
Name of operator	**Essar Oil (UK) Limited**
Location of Facility	**Stanlow Manufacturing Complex** **PO Box 3** **Ellesmere Port** **Cheshire CH65 4HB**
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

"abatement equipment" means that equipment dedicated to the removal of polluting substances from releases from the installation to air or water media.

"abnormal operation", when applied to the incinerator, means any technically unavoidable stoppages, disturbances, or failures of the abatement plant or the measurement devices [other than continuous emission monitors] for releases to air of particulates, TOC and/or CO, during which the concentrations in the discharges into air and the purified waste water of the regulated substances may exceed the normal emission limit values.

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

"*Acid gas*" (or "*sour gas*") means an off-gas that contains high levels of hydrogen sulphide (H_2S).

"annually" means once every year.

"*annual average*" means average of all daily averages within a calendar year.

"APC residues" means air pollution control residues.

"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.

"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.

"back up fuel" means alternative liquid fuels that are used as back-up only to provide for exceptional periods as described in section 6 II of the "MFF Protocol"

"background concentration" means such concentration of that substance as is present in:

- for emissions to surface water, the surface water quality up-gradient of the site; or
- for emissions to sewer, the surface water quality up-gradient of the sewage treatment works discharge.

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

"*BAT AEL*" means the range of achievable emission levels associated with application of the best available techniques.

"*BAT AEPL*" means BAT-associated environmental performance levels.

"*bi-annual"* means twice per year with at least five months between tests.

"bottom ash" means ash from the incinerator.

"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 value, which when complied with will result in equivalent emission levels to those that would have been released when complying with each BREF BATAEL separately.

"calendar monthly mean" means the value across a calendar month of all hourly means.

"CEM" continuous emission monitor.

"CEN" means Commité Européen de Normalisation.

"daily average" for releases of substances to air means the average of half-hourly averages over a calendar day during normal operation. Where any of abnormal operation, start up or shut down occur during the day

in such a way that there are less than 43 half-hourly averages recorded during normal operation, no daily average shall be recorded for that day.

"disposal" means any of the operations provided for in Annex I to Directive 2008/98/EC of the European Parliament and of the Council on waste.

"*dioxin and furans*" means polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans.

"DLN" means dry, low NOx burners*.*

"DSD" means Dangerous Substances Directive.

"Duty of Care" shall have the meaning given to it in the Environmental Protection Act 1990.

"ELV" means Emission Limit Value.

"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 or background concentration 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.

"fugitive emission" means an emission to air, water or land from the activities which is not controlled by an emission limit.

"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.

"*hazardous property*" has the meaning in Annex lll of the Waste Framework Directive.

"incineration line" means all of the incineration equipment related to a common discharge to air location.

"Industrial Emissions Directive" means DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions.

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

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

"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.

"ISO" means International Standards Organisation*.*

"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 MWth or more, based on gross calorific value.

"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.

'List of Wastes' means the list of wastes established by Commission Decision 2000/532/EC replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste, as amended from time to time.

"LOI" means loss on ignition a technique used to determine the combustible material by heating the ash residue to a high temperature.

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

"mcr" means maximum continuous rating.

"MFF Protocol" means 'IED Chapter III Protocol for Multi-fuel Firing Refinery Combustion Plants granted a Permit prior to 7th January 2013'. Version 5 or any later version unless otherwise agreed in writing by the Environment Agency.

"*monthly average*" for emissions to air, the BAT AELs refer to monthly average values, for continuous measurements. This means the averages of all valid hourly average values measured over a period of one month.

"*monthly/yearly average*" for emissions to water, the BAT AELs refer to yearly averages. This means, the average of all daily averages obtained within a year/month, weighted according to the daily flows.

"Multi-fuel firing" or "MFF" means the capability of burning more than one type of fuel.

"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.

"notify without delay" and "notified without delay" means that a telephone call can be used, whereas all other reports and notifications must be supplied in writing, either electronically or on paper.

"*off-gas*" 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.

"PAH" means poly-cyclic aromatic hydrocarbon, and comprises anthanthrene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[b]naph(2,1-d)thiophene, benzo[c]phenanthrene, benzo[ghi]perylene, benzo[a]pyrene, cholanthrene, chrysene, cyclopenta[c,d]pyrene, dibenzo[ah]anthracene, dibenzo[a,i]pyrene fluoranthene, Indo[1,2,3-cd]pyrene, naphthalene.

"PCB" means polychlorinated biphenyl dioxin-like PCBs are the non-ortho and mono-ortho PCBs listed in the table below.

"quarterly" for reporting/sampling means after/during each 3 month period, January to March; April to June; July to September and October to December and, when sampling, with at least 2 months between each sampling date.

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

"recovery" means any of the operations provided for in Annex II to Directive 2008/98/EC of the European Parliament and of the Council on waste.

"*RFG-refinery fuel gas*" means 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.

"shut-down", when applied to the incinerator, is any period where the plant is being returned to a non-operational state and there is no waste being burned.

"SRU" means sulphur recovery unit.

"*standard contribution value*" means the typical flue gas flow-rate, multiplied by the typical emission concentration, produced by a unit during normal operation, which is specified for the purpose of defining the contribution of that unit to the "*bubble emission limit*".

"start-up", when applied to the incinerator, is any period where the plant has been non-operational, after igniting the auxiliary burner until waste has been fed to the incinerator in sufficient quantity to initiate steady-state conditions.

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

"TOC" means *Total Organic Carbon.* In respect of releases to air, this means the gaseous and vaporous organic substances, expressed as TOC. In respect of bottom ash, this means the total carbon content of all organic species present in the ash (excluding carbon in elemental form).

"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.

"Waste Framework Directive" or "WFD" means Waste Framework Directive 2008/98/EC of the European Parliament and of the Council on waste.

"*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, the concentration at a temperature of 273K and at a pressure of 101.3 kPa, with no correction for water vapour content.

(d) in relation to gases from incineration plants other than those burning waste oil, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 11% dry.

(e) where hazardous wastes are burned in an incineration or co-incineration plant and the emissions of pollutants are reduced by gas treatment, standardisation of the gas with respect to oxygen content shall be carried out only if the oxygen concentration measured over the same period exceeds the relevant oxygen content defined in conditions [(a) – (c)] above. In other cases, the measured emissions shall be standardised only for moisture, pressure and temperature.

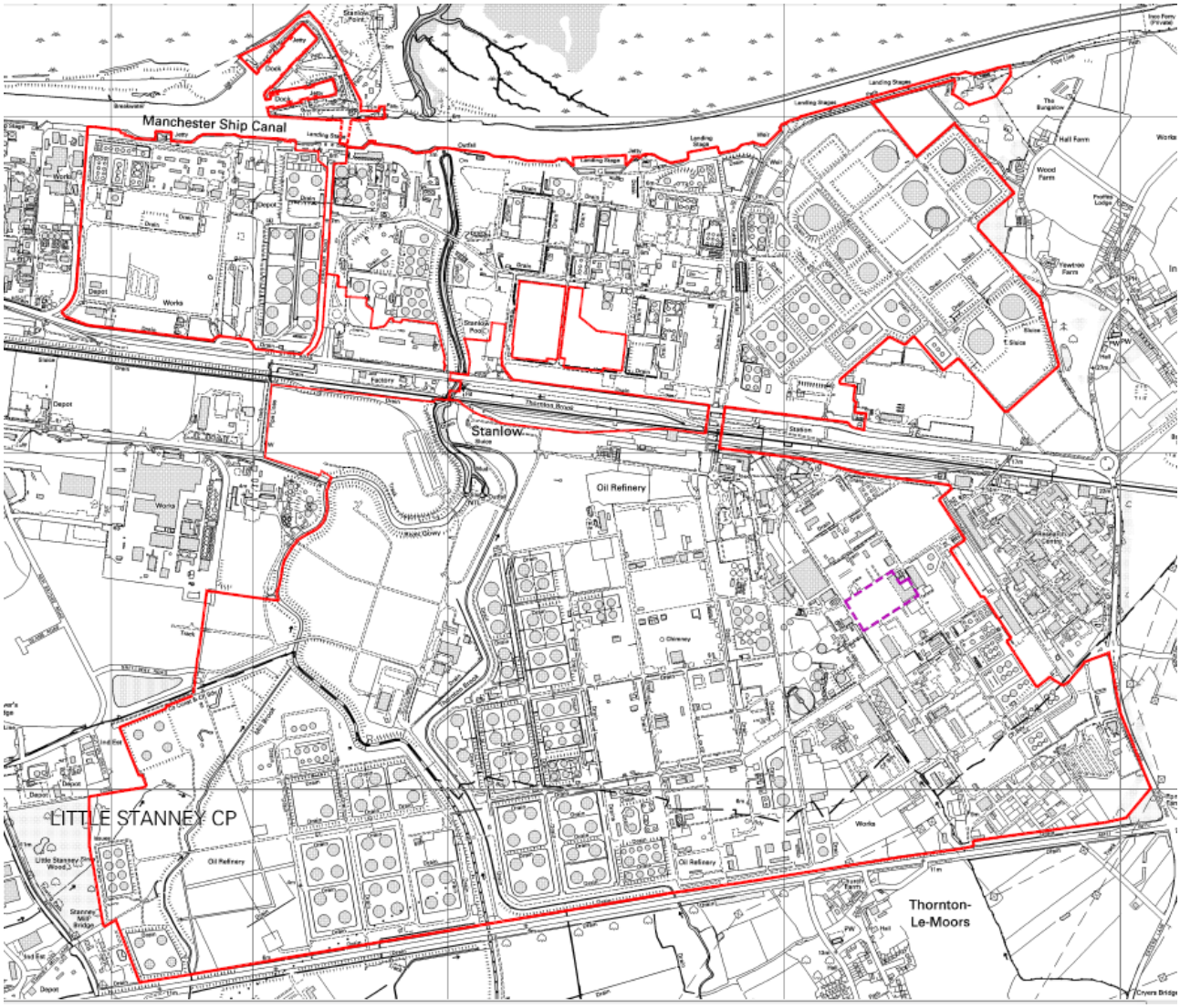
For dioxins/furans and dioxin-like PCBs the determination of the toxic equivalence concentration (I-TEQ, & WHO-TEQ for dioxins/furans, WHO-TEQ for dioxin-like PCBs) stated as a release limit and/ or reporting requirement, the mass concentrations of the following congeners have to be multiplied with their respective toxic equivalence factors before summing. When reporting on measurements of dioxins/furans and dioxin-like PCBs, the toxic equivalence concentrations should be reported as a range based on: all congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum.

TEF schemes for dioxins and furans				
Congener	***I-TEF(1990)***	***WHO-TEF (1997/8)***		
		Humans / Mammals	***Fish***	***Birds***
Dioxins				
2,3,7,8-TCDD	*1*	*1*	*1*	*1*
1,2,3,7,8-PeCDD	*0.5*	*1*	*1*	*1*
1,2,3,4,7,8-HxCDD	*0.1*	*0.1*	*0.5*	*0.05*
1,2,3,6,7,8-HxCDD	*0.1*	*0.1*	*0.01*	*0.01*
1,2,3,7,8,9-HxCDD	*0.1*	*0.1*	*0.01*	*0.1*
1,2,3,4,6,7,8-HpCDD	*0.01*	*0.01*	*0.001*	*<0.001*
OCDD	*0.001*	*0.0001*	*-*	*-*
Furans				
2,3,7,8-TCDF	*0.1*	*0.1*	*0.05*	*1*
1,2,3,7,8-PeCDF	*0.05*	*0.05*	*0.05*	*0.1*
2,3,4,7,8-PeCDF	*0.5*	*0.5*	*0.5*	*1*
1,2,3,4,7,8-HxCDF	*0.1*	*0.1*	*0.1*	*0.1*
1,2,3,7,8,9-HxCDF	*0.1*	*0.1*	*0.1*	*0.1*
1,2,3,6,7,8-HxCDF	*0.1*	*0.1*	*0.1*	*0.1*
2,3,4,6,7,8-HxCDF	*0.1*	*0.1*	*0.1*	*0.1*
1,2,3,4,6,7,8_HpCDF	*0.01*	*0.01*	*0.01*	*0.01*
1,2,3,4,7,8,9-HpCDF	*0.01*	*0.01*	*0.01*	*0.01*
OCDF	*0.001*	*0.0001*	*0.0001*	*0.0001*

TEF schemes for dioxin-like PCBs			
Congener	***WHO-TEF (1997/8)***		
	Humans / mammals	***Fish***	***Birds***
Non-ortho PCBs			
3,4,4',5-TCB (81)	*0.0001*	*0.0005*	*0.1*
3,3',4,4'-TCB (77)	*0.0001*	*0.0001*	*0.05*
3,3',4,4',5 - PeCB (126)	*0.1*	*0.005*	*0.1*
3,3',4,4',5,5'-HxCB(169)	*0.01*	*0.00005*	*0.001*
Mono-ortho PCBs			
2,3,3',4,4'-PeCB (105)	*0.0001*	*<0.000005*	*0.0001*
2,3,4,4',5-PeCB (114)	*0.0005*	*<0.000005*	*0.0001*
2,3',4,4',5-PeCB (118)	*0.0001*	*<0.000005*	*0.00001*
2',3,4,4',5-PeCB (123)	*0.0001*	*<0.000005*	*0.00001*
2,3,3',4,4',5-HxCB (156)	*0.0005*	*<0.000005*	*0.0001*
2,3,3',4,4',5'-HxCB (157)	*0.0005*	*<0.000005*	*0.0001*
2,3',4,4',5,5'-HxCB (167)	*0.00001*	*<0.000005*	*0.00001*
2,3,3',4,4',5,5'-HpCB (189)	*0.0001*	*<0.000005*	*0.00001*

Schedule 7 - Site plan

Installation boundary

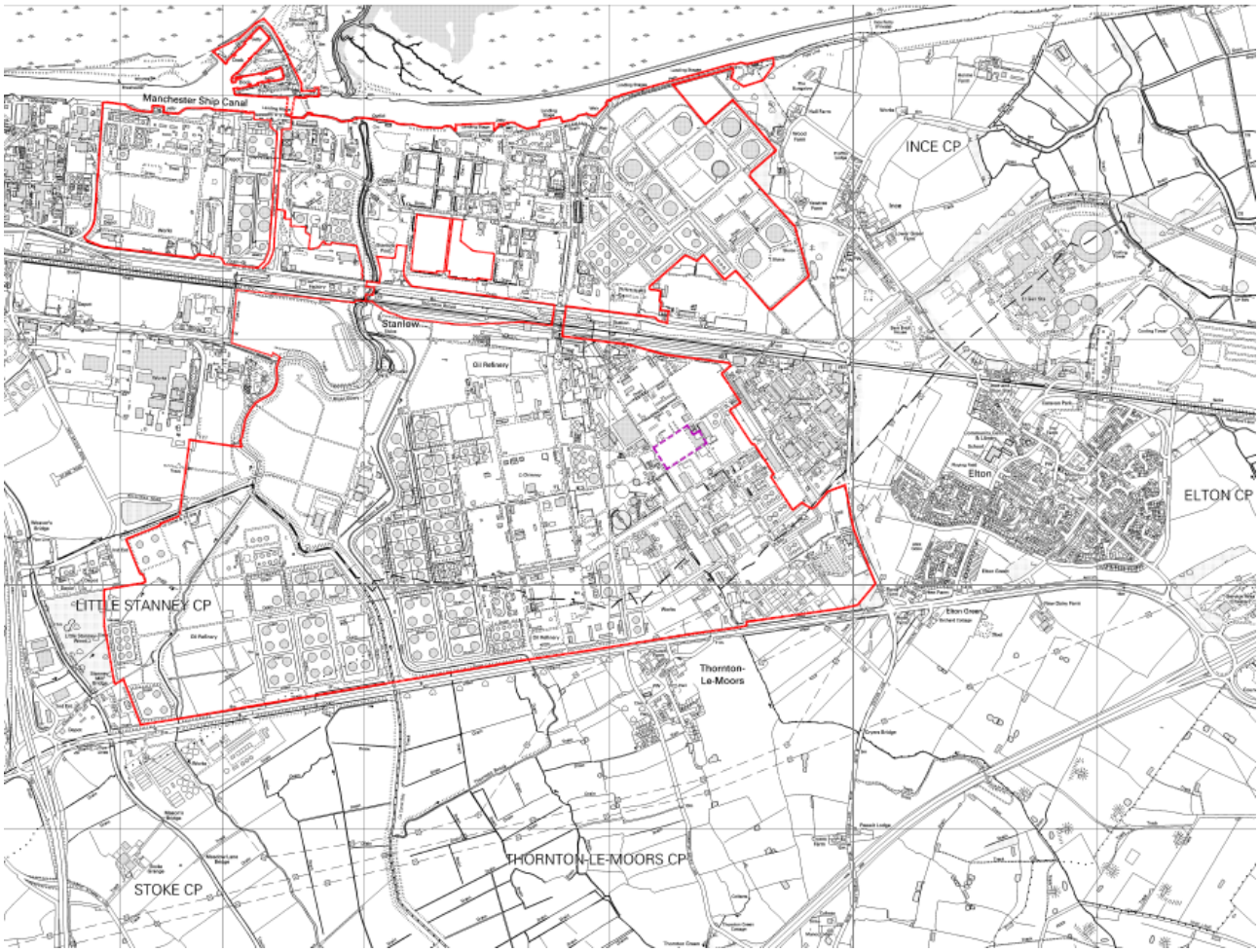


KEY

EPR INSTALLATION BOUNDARY

LAND TO BE SURRENDERED (Ex. RESINS PLANT)

Site location



END OF PERMIT

Annex to conditions – Derogation under Industrial Emissions Directive

Derogation under Article 15(4) of Industrial Emissions Directive

DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions

Operating Techniques

We have considered the Operator's proposed techniques and its comparison against other relevant techniques as described in the BAT Conclusions in the Commission Implementing Decision 2014/738/EU for the Refining of Mineral Oil and Gas. Our full reasoning is given in our decision document that accompanies this permit determination.

The BAT Conclusions for the Refining of Mineral Oil and Gas were published on 28 October 2014. Permits must be reviewed and Operators must comply with BAT (Associated Emission Levels) AELs by 28 October 2018.

The Operator has requested derogations from BAT AELs for four of the BAT conclusions, based on the technical characteristics of the Installation. The proposed techniques will result in emissions for which the appropriate emissions limits are less stringent than those associated with the best available techniques as described in the BAT Conclusions.

The relevant BAT Conclusions and the duration of the derogation requests are as follows:

BAT Conclusion	**Derogation request**
BAT 12	Time limited to 30 September 2021.
BAT 27	Non time limited until review of the permit is triggered by an event stipulated in article 21 of the Industrial Emissions Directive 2010.
BAT 34 (CDU-4)	Time limited to 31 December 2022.
BAT 52	Time limited to 31 December 2020.

A summary of each derogation request is provided below.

BAT 12 – Reduce pollutants in waste water discharge

To reduce emission loads of pollutants in the waste water discharge to the receiving water body, BAT is to remove insoluble substances by recovering oil, suspended solids and dispersed oil and to remove soluble substances using biological treatment and clarification.

Technical characteristics

Due to the size of site and the range of activities, the Installation has a range of existing effluent management systems and technologies in place.

The previous permit authorised 16 discharges to surface water (mostly to the River Gowy & its tributaries and the Manchester Ship Canal (MSC)) which all eventually flow into the River Mersey.

The Operator has had a longstanding commitment to improve effluent treatment across the Installation.

Derogations were sought from the BAT AELs for a number of parameters at emission points W1 to W4 until 30 September 2021, based on the technical characteristics of the Installation.

Parameter mg/l	BAT AEL (yearly average)	W1		W2		W3		W4	
		Current mg/l	Proposed mg/l	Current mg/l	Proposed mg/l	Current mg/l	Proposed mg/l	Current mg/l	Proposed mg/l
Hydrocarbon oil index (HOI)	0.1 – 2.5	10	10	10	10	10	10	10	10
Total suspended solids (TSS)	5 – 25	-	-	45	45	45	45	-	-
Chemical oxygen demand (COD)	30 – 125	-	-	250	250	-	-	-	-
Total nitrogen expressed as N	1 – 25	-	-	-	-	-	-	No limit	No limit
Lead expressed as Pb	0.005 – 0.03	-	-	-	-	-	-	No limit	No limit
Cadmium expressed as Cd	0.002 – 0.008	-	-	-	-	-	-	No limit	No limit
Nickel expressed as Ni	0.005 – 0.1	-	-	-	-	-	-	No limit	No limit
Mercury expressed as Hg	0.0001 – 0.001	-	-	-	-	-	-	No limit	No limit
Benzene	0.001 – 0.05	-	-	-	-	No limit	No limit	-	-

Their proposed solution for compliance requires the use of a third party to treat their effluent at a local waste water treatment works (WwTW). This will still require significant on site works which will not be completed until December 2020. Allowing nine months for commissioning of the third party facilities gives an overall project completion date of 30 September 2021. The WWTW has committed to treating this effluent, with their project anticipated to be complete by 31 March 2020.

Details of the additional treatment are provided below in the 'proposed derogation'.

The project for the proposed derogation has been underway for a number of years already with commitment and buy in from both parties. Given the scale and nature of the works, and the progress to date, there is no other clear alternative, other than tankering the effluent off-site for disposal.

The Installation is unique because the age and configuration of the refinery's effluent management systems makes it more technically difficult and costly to comply.

The Operator has supplied a valid derogation request against the BAT conclusion, BAT 12 based on the technical characteristics of the Installation.

Options

The Operator has described two relevant options for achieving the BAT AELs and justified the screening out of seven other options. The two options for meeting the BAT AEL are:

1) BAT AELs – Dispose of effluent from SDAF, NDAF, PDAF units and T1402 off-site by road tanker by 2018. This is a temporary solution to dispose of effluent in the interim period until the WwTW can accept effluent by no later than 30 September 2021. BAT achieved by 28 October 2018.

2) Proposed derogation - bio-treatment process located at off-site, WwTW by 30 September 2021. Transfer of effluent from SDAF, NDAF, PDAF and T1402 to the WwTW for biological treatment with BAT achieved no later than 30 September 2021.

The proposed derogation and BAT AEL option were taken forward to conduct a cost benefit analysis (CBA).

Permit conditions

We have set the following requirements:

- Table S1.3 of this permit sets an improvement condition:
  To address any potential uncertainties about the quality of the remaining surface water within the intermittent discharges, which will no longer receive DAF treatment. This will include a review of these releases to confirm the requirement for any future monitoring that may be required to determine the significance of any residual impacts.

  That delivers the requirements of the Water Framework Directive (WFD).

  That tracks progress of upgrades and new plant fitting as proposed. The Operator will be required to provide regular updates on progress for achieving the BAT AELs by 30 September 2021.

- Table S3.2(a) of this permit maintains the current permit limits for a number of parameters at emission points W1 to W4 in the interim period. This means that there will be no backsliding / deterioration.

- Table S3.2(b) of this permit sets the BAT AELs for all relevant parameters at all relevant emission points, effective no later than 30 September 2021.

Conclusion

The Environment Agency has reviewed the derogation request and concluded that:

We are satisfied that the Operator has demonstrated that the cost of complying with the BAT AELs by 28 October 2018 by tankering effluent off-site, is disproportionate to the value of damage to the environment caused by allowing the current emissions for a number of parameters to continue until 30 September 2021.

That allowing the proposed derogation would not cause any deterioration from the current situation, by maintaining the current permit limits i.e. no backsliding / deterioration.

It is anticipated that the on-site “upstream” and “downstream” improvements will be completed by December 2020. This will result in improvements in the quality of some effluents prior to 30 September 2021.

A contractual commitment has also been made by the third party to completing the work by 31 March 2020.

BAT 27 – Reduce CO emissions to air from catalytic cracking

To reduce CO emissions to air from the catalytic cracking process (regenerator) at emission point A-11 which operates in the partial combustion mode, using one or a combination of techniques as described in the BAT Conclusions.

The catalytic cracking unit (CCU) is a Long Residue Catalytic Cracker consisting of the reactor and regenerator section, the main fractionator distillation column and a CO boiler.

The primary purpose of the CO boiler is to reduce CO emissions. A derogation is sought from the CO BAT AEL from emission point A-11 based on the technical characteristics of the Installation until a review of the permit is triggered by an event stipulated in article 21 of the Industrial Emissions Directive 2010.

Technical characteristics

The Installation is unique because of the age and throughput of the catalytic cracker and CO boiler; specifically there is a play off between CO emissions and NOx emissions from the catalytic cracker due to operation at high throughput and high temperatures which means that any reduction in CO emissions results in an increase in NOx emissions.

The operation at a high throughput generates a large quantity of CO. Increased CO destruction would further raise the operating temperature, generating more thermal NOx. For this reason the derogation is requested until the next permit review i.e. for the life-time of the BREF.

A derogation from the BAT AEL for the life-time of the BREF is sought as follows:

BAT AEL (mg/Nm^3) **Monthly average**	**Proposed limit (mg/Nm^3)** **Monthly average**
≤ 100	1,300

The Operator has supplied a valid derogation request against the BAT conclusion, BAT 27 based on the technical characteristics of the Installation.

Options

The Operator has described three relevant options for achieving the BAT AEL and justified the screening out of one of those options. The BAT AEL options and proposed derogation are:

1) BAT AEL - BAT for CO achieved 2018

   Reduce CO emissions at the expense of increasing NOx emissions up to the BAT AEL of 400 mg/Nm^3; however it may not be practical or possible to meet both BAT AELs consistently.

2) Install a new CO boiler - BAT achieved 2022 (earliest)

   A CO boiler is designed to meet BAT AELs for CO and NOx. This option assumes that the new CO boiler is installed during periodic maintenance in 2022, which is likely to involve an extended shut-down.

3) Proposed derogation, no change - Continue operation of the existing CO boiler, with CO emissions exceeding the BAT AEL.

The derogation request includes a proposed non time limited ELV of 1,300 mg/Nm^3 for CO. The Operator are not proposing to make any modifications to reduce CO emissions at this time, however they commit to completing further work to investigate the impact on CO and NOx emissions of modifications to the air flow within the CO Boiler. Practicality of making changes (i.e. internal changes to

combustion chamber) was assessed during the first quarter of 2018. Any modifications based on the findings would need to be designed for implementation in a later refinery maintenance window. This will form an important part of ongoing improvements at the site.

The proposed derogation and BAT AEL options were taken forward to conduct a CBA.

Permit conditions

We have set the following requirements:

- Table S1.3 of this permit sets an improvement condition:

  Requiring the Operator to complete further work to investigate the impact on CO and NOx emissions of modifications to the air flow within the CO Boiler. The practicality of making changes (i.e. internal changes to combustion chamber) was assessed during periodic maintenance in the first quarter of 2018. Modifications based on the findings need to then be designed for implementation in a later refinery maintenance window.

- Table S3.1(a) of this permit sets a CO limit of 1,300 mg/Nm^3 from 28 October 2018. Previously no limit was set which is reflected in Table S3.1 of this permit, and is applicable until 28 October 2018.

Conclusion

The Environment Agency has reviewed the derogation request and concluded that:

We are satisfied that the Operator has demonstrated that the cost of complying with the BAT AEL by 28 October 2018 (which will result in an increase in NOx emissions) or by 2022 (by replacing the CO boiler during an extended shut-down) is disproportionate to the damage to the environment caused by allowing emissions of CO to continue at their current concentration of 1,300 mg/Nm^3 until the next permit review.

There are no local issues with CO and the impact from CO emissions at their current level screen out as insignificant.

Allowing the proposed derogation would not cause any significant pollution or prevent a high level of protection of the environment as a whole to be achieved.

The impact of increasing NOx emissions as a result of a reduction in CO is more significant. The UK is committed to achieving reductions in NOx emissions and therefore it is difficult to justify a reduction in CO at the expense of an increase in NOx emissions.

BAT 24 also requires the operator to reduce NOx emissions to air from the same emission point and sets a BAT AEL of 100 to 400 mg/Nm^3, a level the plant can meet without the need for a derogation.

BAT 34 (CDU-4) – Reduce NOx emissions from combustion

BAT Conclusion 34 requires a reduction in oxides of nitrogen (NOx) emissions to air from combustion units to meet the NOx BAT AELs set out in Tables 10 and 11 of the BAT Conclusion.

A derogation from the BAT Conclusion 34 NOx AELs is requested for three of the four furnaces (combustion units) on the crude distillation unit (CDU-4) using one or a combination of primary and secondary techniques as described by the BAT Conclusion.

The combustion units requiring a derogation are identified as F201 A (58.9 MW), F201 B (58.9 MW) and F201 C (49 MW).

Combustion unit F202 is not part of this derogation and will achieve compliance with BAT through BAT Conclusion 57.

All four combustion units are fitted with conventional burners i.e. not low NOx and all discharge through a common stack at emission point reference A-2.

Fractional distillation or “fractionation” is the key unit operation within a CDU, where the crude oil is distilled into different fractions or components. This takes a significant amount of heat, supplied by the four combustion units.

BAT Conclusion 57

In order to achieve an overall reduction of NOx emissions to air from combustion units (and other applicable units), BAT is to use an integrated emission management technique as an **alternative to applying BAT 34**.

The technique consists of managing NOx emissions from several or all combustion units (and other units) on a refinery site in an integrated manner, by implementing and operating the most appropriate combination of BAT across the different units concerned and monitoring the effectiveness thereof, in such a way that the resulting total emissions are equal to or lower than the emissions that would be achieved through a unit-by-unit application of the BAT AELs referred to in BAT 34.

Technical characteristics

CDU-4 combustion units were commissioned in 1973 at which time they were not designed to meet current emission limits. The four combustion units are equipped with conventional burners i.e. not low NOx and the Operator is required to upgrade three of the combustion units. The most cost-effective solution is to upgrade them during their normal maintenance times. Upgrading them all during the next planned maintenance event in 2022 is considered a valid technical characteristic for seeking a derogation that will deliver compliance in 2022.

It is not possible to shut down CDU-4 independent of the rest of the refinery as it is the primary unit which supplies feed-stocks to the other units.

The high hydrogen content of the RFG and the high air pre-heating also increases NOx emissions. The BAT Conclusion makes an allowance for this, see Note 1 to the tables below.

Derogations from the BAT AELs are sought as follows:

Gas firing

BAT AEL (mg/Nm^3) Monthly average	**Applicable BAT AEL (mg/Nm^3) Monthly average**	**Proposed limit (mg/Nm^3) Monthly average**
150 Note 1	200	300

Note 1: For an existing unit using high air pre-heat (i.e. > 200 ^oC) or with H_2 content in the fuel gas higher than 50 %, the upper end of the BAT-AEL range is 200 mg/Nm^3.

Multi-fuel firing

BAT AEL (mg/Nm^3) Monthly average	**Applicable BAT AEL (mg/Nm^3) Monthly average**	**Proposed limit (mg/Nm^3) Monthly average**
300 Note 1	Up to 450	450

Note 1: For existing units < 100 MW firing fuel oil with a nitrogen content higher than 0,5 % (w/w) or with liquid firing > 50 % or using air preheating, values up to 450 mg/Nm^3 may occur.

The Operator has supplied a valid derogation request against the BAT conclusion, BAT 34 based on the technical characteristics of the Installation.

Options

The Operator has described three relevant options for achieving the BAT AEL with all options taken forward to conduct a CBA.

1) BAT AEL option - Shut-down refinery to install low NOx burners
   This option is based on shutting the refinery down in October 2018 to install low NOx burners on three of the four combustion units. The Operator estimated that a 12 month shut-down would be required.

   We also carried out the CBA assessment with a three month refinery shut-down.

2) Proposed option – Low NO_x burners on three combustion units

   The proposed solution is to install low NO_x burners on three of the CDU-4 combustion units during the next planned maintenance event in 2022. This date is the earliest date by which the three combustion units can be modified.

3) Low NOx burners on two combustion units
   Installing low NOx burners on two of the combustion units to achieve lower NOx emissions. Low NOx burners would be installed during the next planned maintenance event in 2022. It is unlikely that this option will be able to consistently meet the BAT AELs.

Permit conditions

We have set the following requirements:

- Table S1.3 of this permit sets an improvement condition requiring periodic updates on the modification programme to ensure that the project proposal for delivery of the improvements are on track for 2022.
- Table S3.1 of this permit retains the current NOx limits on the basis of no backsliding / deterioration.
- Table S3.1(a) of this permit sets the BAT AELs following completion of the improvements in 2022. It also requires demonstration by calculation that the relevant BAT AELs are met by each combustion unit.

Conclusion

The Environment Agency has reviewed the derogation request and concluded that:

We are satisfied that the Operator has demonstrated that the cost of complying with the BAT AELs for gas and liquid fuel firing by 28 October 2018 by shutting down the refinery (for a three month or a 12 month period), is disproportionate to the value of damage to the environment caused by allowing NOx emissions to continue at their current levels (of 300 mg/Nm^3 for gas firing and 450 mg/Nm^3 for liquid fuel firing) until completion of the improvements in 2022.

That allowing the proposed derogation would not cause any deterioration from the current situation, by maintaining the current permit limits i.e. no backsliding / deterioration.

BAT 52 - Reduce emissions of VOCs from loading/unloading operations

To reduce emissions of Volatile Organic Compounds (VOCs) to air from loading and unloading operations for sea going vessels, BAT is to use vapour recovery. The applicability limit is relevant to facilities transferring more than 1 million m^3 / annum from sea going vessels.

Crude oil is received from a separate EPR installation (EPR/YP3238FT) at the Tranmere Oil Terminal on the Mersey, 13.5 km to the north west of the Stanlow Manufacturing complex. The Tranmere Oil Terminal, is more accessible to ships and road vehicles and used for the storage of hydrocarbon based

liquids which are loaded and unloaded from ships. These liquids are transferred by pipelines to and from Stanlow. Tranmere is covered under a separate permit, which is not part of the review of this derogation.

Throughput at the White Oil Docks berth on the Manchester Ship Canal (MSC) is currently above the threshold. The Operator is implementing a project independent of this derogation to provide more resilience & flexibility within all the berths Stanlow use. This will move some loading operations from White Oil Docks on the MSC to the Tranmere Terminal by the end of 2020. At that point, throughput at White Oil Docks will fall below threshold. The project includes the construction of a BAT 52 compliant vapour recovery unit (VRU) at Tranmere.

Technical characteristics

The construction cost of a VRU at White Oil Docks would be higher than normally encountered due to the complex location of the Dock on Stanlow Island, located on the opposite side of the MSC to the refinery. There is no road access to Stanlow Island, therefore all equipment & resources would have to be moved using floating cranes & barges. This significantly increases the cost of the project compared with the proposed installation of a VRU at Tranmere in 2020, a much less complex location.

The BAT AELs for emissions to air of non-methane VOCs (NMVOCs) and benzene will not apply after 31 December 2020 following completion of the VRU at Tranmere. The duration that emissions would be above the BAT AELs would be 27 months i.e. October 2018 to December 2020.

Derogations from the BAT AELs are sought as follows:

Parameter	**BAT AEL Monthly average**	**Current limit**	**Proposed limit**
NMVOCs	0.15 – 10 g/Nm^3	No limit	No limit
Benzene	<1 mg/Nm^3	No limit	No limit

The Operator has supplied a valid derogation request against the BAT conclusion, BAT 52 based on the technical characteristics of the Installation.

Options

The Operator has described three relevant options for achieving the BAT AEL as follows:

1) BAT AEL option - Limit loading / unloading rates
   The BAT AELs are not applicable to loading / unloading operations for sea-going vessels with an annual throughput < 1 million m^3/annum. The cost of capping imports and exports has been included. BAT achieved 2018.

2) Install VRU at White Oil Docks
   An option to install a VRU at this location has been considered. It would take approximately two years to progress a project to install a VRU. Thus a VRU could not be installed until the end of 2019, which is later than the date required by the BREF. The BAT AELs would not be applicable after 31 December 2020 once the loading / unloading operations fall below the 1 million m^3 / annum threshold. Whilst this is the case, the assessment is based on the VRU being in operation at White Oil Docks for the life-time of the plant i.e. 20 years. BAT achieved 1 January 2020

3) Proposed derogation
   To move some loading / unloading operations to Tranmere by the end of 2020. This would result in loading/unloading rates falling below the 1 million m^3 / annum at White Oil Docks, therefore BAT AELs would not be applicable. Emissions during the period October 2018 to December 2020 would not meet the BAT AELs. BAT achieved 1 January 2021.

The proposed derogation and the other two options were taken forward to conduct a CBA.

Permit conditions

We have set the following requirements:

- Table S1.3 of this permit sets an improvement condition requiring a regular review of the progress towards achieving compliance with BAT 52.
- Table S1.1 of this permit limits the loading / unloading at White Oil Docks to <1 million m^3/annum from 1 January 2021.
- The proposed derogation will require a variation to the Tranmere permit to include the installation of VRU in accordance with BAT 52.
- The increased loading / unloading at Tranmere cannot take place until a variation has been issued which authorises this change.
- The Operator will be unable to transfer loading / unloading movements to Tranmere until the Tranmere permit is varied.

Conclusion

The Environment Agency has reviewed the derogation request and concluded that:

We are satisfied that the Operator has demonstrated that the cost of complying with the BAT AEL by limiting loading / unloading or installing VRU at White Oil Docks is disproportionate to the value of damage to the environment caused by allowing VOC emissions to continue at their current levels until 31 December 2020.

Emissions will reduce significantly from 01 January 2021 when some of the loading / unloading operations move to the Tranmere Terminal. The impact from current operations is low and will be reduced from 01 January 2021.