Headquarters,
Johnstown Castle Estate,
County Wexford, Ireland

GREENHOUSE GAS EMISSIONS PERMIT

Permit Register Number: IE-GHG013-10343-5

Operator: Irving Oil Whitegate Refinery Limited
70 Sir John Rogerson's Quay
Dublin 2
D02R296

Installation Name: Irving Oil Whitegate Refinery Limited

Site Name: Irving Oil Whitegate Refinery

Location: Whitegate
Midleton
Cork
Ireland

Introductory Note

This introductory note does not form a part of the Greenhouse Gas Emissions Permit.

This Greenhouse Gas Emissions Permit authorises the holder to undertake named activities resulting in emissions of Carbon Dioxide from the listed emission sources. It also contains requirements that must be met in respect of such emissions, including monitoring and reporting requirements. This Greenhouse Gas Emissions Permit places an obligation on the Operator to surrender allowances to the Agency equal to the annual reportable emissions of carbon dioxide equivalent from the installation in each calendar year, no later than four months after the end of each such year.

Contact with Agency:

If you contact the Agency about this Greenhouse Gas Emissions Permit please quote the following reference: Greenhouse Gas Emissions Permit Nº IE-GHG013-10343.

All correspondence in relation to this permit should be addressed to:

Email: help.ets@epa.ie

By Post: Climate Change Unit, Environmental Protection Agency
P.O. Box 3000, Johnstown Castle Estate,
Co. Wexford

Updating of the permit:

This Greenhouse Gas Emissions Permit may be updated by the Agency, subject to compliance with Condition 2. The current Greenhouse Gas Emissions Permit will normally be available on the Agency's website at www.epa.ie and ETSWAP.

Surrender of the permit:

Before this Greenhouse Gas Emissions Permit can be wholly or partially surrendered, a written application must be made to the on-line ETS portal, and written permission received from, the Agency through ETSWAP.

Transfer of the permit or part of the permit:

Before this Greenhouse Gas Emissions Permit can be wholly or partially transferred to another Operator a joint written application to transfer this Greenhouse Gas Emissions Permit must be made (by both the existing and proposed Operators) to, and written permission received from, the Agency through the on-line ETS portal ETSWAP.

Licence held pursuant to the Environmental Protection Agency Act 1992, as amended. (as of the date of this permit)**:**

IPC/IE Licence Register Number
P0266-03

Status Log

Current Permit

Permit number	Date application received	Date Permit issued	Comment
IE-GHG013-10343-5	06 August 2019	07 May 2020	Updated specified uncertainty and flow range for the following meters: FIC 203 at F202BX; GGD7-001 to S9 FIC 204 at F202 CX; GGD7-001 to S9 FIC 207 at F204; GGD7 to S13 FIC 506 at F501; GGD-7 to S16 FT 419 at F401; LP-001 to S1 FT 417 at F402; LP-001 to S3 FI 225 at Compressors; C1-001 (Nat Gas) to S26/27/28 FI 228; C1-001 to Furnace/Flare Pilots

Previous Permits

Permit number	Change Type	Date application received	Date Permit issued	Comment
IE-GHG013-10343-1	GHG Permit Application	06 June 2013	20 June 2013	

Permit number	Change Type	Date application received	Date Permit issued	Comment
IE-GHG013-10343-2	GHG Variation	28 September 2015	08 January 2016	The Calculation Section, measurement devices table and applied tiers table have been updated as follows: Meter range and meter uncertainty values updated for HP-001, LP-001, C1-001, GGD7-001, BH-Gas-001, Non-Permeate Gas, Gas Oil-001. Activity data tier updated for LP-001, Gas Oil-001. LP-001, BH-Gas-001 and HP-002 reclassified as a major source streams and Gas Oil-001 and C1-001 reclassified as a Minor source stream. Method of analysis of Refinery Gases updated to EN 15984.
IE-GHG013-10343-3	GHG Variation	14 July 2016	18 November 2016	Change of Operator name to Irving Oil Whitegate Refinery Limited. Details of the holding Company Irving Oil Whitegate Holdings Limited added. Approach description updated to include additional information on determination of emissions from catalytic cracker regeneration. The applied tiers table updated for overall uncertainty for HP 002 to <7.5 for tier 3. The duplicate entry for C3-001 has been removed. The emission factor for Gasoline has been updated.
IE-GHG013-10343-4	GHG Variation	12 July 2018	05 October 2018	Change of the Measurement Devices Table to update the measurement range and uncertainty for the Sour Flare meter GZ-FI-19. Update of the Operator registered address.

End of Introductory Note

Glossary of Terms

For the purposes of this permit the terms listed in the left hand column shall have the meaning given in the right hand column below:

The Agency	Environmental Protection Agency.
Agreement	Agreement in writing.
Allowance	Permission to emit to the atmosphere one tonne of carbon dioxide equivalent during a specified period issued for the purposes of Directive 2003/87/EC by the Agency or by a designated national competent authority of a Member State of the European Union.
Annual Reportable Emissions	Reportable Emissions of carbon dioxide made in any calendar year commencing from 1 January 2005 or the year of commencement of the activity, whichever is the later.
A & V Regulation	Commission Regulation (EU) No 600/2012 of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council and any amendments or revisions thereto.
Category A Installation	As defined in Article 19.2 (a) of the M&R Regulation.
Category B Installation	As defined in Article 19.2 (b) of the M&R Regulation.
Category C Installation	As defined in Article 19.2 (c) of the M&R Regulation.
The Directive	Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.
Emissions	The release of greenhouse gases into the atmosphere from sources in an installation.
EPA	Environmental Protection Agency.
Fall-Back Methodology	As defined in Article 22 of the M&R Regulation.
GHG	Greenhouse gas.
GHG Permit	Greenhouse gas emissions permit.
Greenhouse Gas	Any of the gases in Schedule 2 of the Regulations.
IPC/IE	Integrated Pollution Control/Industrial Emissions.
Installation	Any stationary technical unit where one or more activities listed in Schedule 1 to the Regulations are carried out. Also any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution. References to an installation include references to part of an installation.

Installation with low emissions	As defined in Article 47 of the M&R Regulation.
Major Source Streams	As defined in Article 19.3 (c) of the M&R Regulation.
M&R Regulation	Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and any amendments or revisions thereto.
Mis-statement	An omission, misrepresentation or error in the Operators reported data, not considering the uncertainty permissible pursuant to Article 12(1)(a) of Regulation (EU) no 601/2012.
N/A	Not applicable.
Monitoring Plan	The Plan submitted and approved in accordance with Condition 3.1 of this permit and attached at Appendix 1.
Non-conformity	Any act or omission by the Operator, either intentional or unintentional, that is contrary to the greenhouse gas emissions permit and the requirements of the Monitoring Plan.
The National Administrator	The person so designated in accordance with the requirements of any Regulations adopted as provided for under Article 19.3 of Directive 2003/87/EC.
The Operator (for the purposes of this permit)	Irving Oil Whitegate Refinery Limited
"operator"	Any person who operates or controls an installation or to whom decisive economic power over the functioning of the installation has been delegated.
Person	Any natural or legal person.
Reportable emissions	The total releases to the atmosphere of carbon dioxide (expressed in tonnes of carbon dioxide equivalent) from the emission sources specified in Table 2 and arising from the Schedule 1 activities which are specified in Table 1.
The Regulations	European Communities (Greenhouse Gas Emissions Trading) Regulations 2012 (S.I. No 490 of 2012) and any amendments or revisions thereto.
The Verifier	A legal person or another legal entity carrying out verification activities pursuant to Regulation (EU) No 600/2012 and accredited by a national accreditation body pursuant to Regulation (EC) No 765/2008 and Regulation (EU) No 600/2012 or a natural person otherwise authorised, without prejudice to Article 5(2) of Regulation (EC) No 765/2008, at the time a verification report is issued.
The Registry	The Registry as provided for under Article 19 of Directive 2003/87/EC.

Schedule 1	Schedule 1 to the Regulations.

Reasons for the Decision

The Agency is satisfied, on the basis of the information available, that subject to compliance with the conditions of this permit, the Operator is capable of monitoring and reporting emissions in accordance with the requirements of the Regulations.

Activities Permitted

Pursuant to the Regulations the Agency issues this Greenhouse Gas Emissions Permit, subject to any subsequent revisions, corrections or modifications it deems appropriate, to:

The Operator:

Irving Oil Whitegate Refinery Limited
70 Sir John Rogerson's Quay
Dublin 2
D02R296

Company Registration Number: 16576

to carry out the following

Categories of activity:

Annex 1 Activity
Refining of mineral oil

at the following installation(s):

Irving Oil Whitegate Refinery Limited **Installation number:** 11

located at

Whitegate
Midleton
Cork
Ireland

subject to the five conditions contained herein, with the reasons therefor and associated tables attached thereto.

Conditions

Condition 1. The Permitted Installation

1.1 This permit is being granted in substitution for the previous GHG permit granted to the Operator as listed in the Status Log of this GHG permit.

1.2 The Operator is authorised to undertake the activities and/or the directly associated activities specified in Table 1 below resulting in the emission of carbon dioxide:

Table 1 - Activities which are listed in Schedule 1 of the Regulations and other directly associated activities carried out on the site:

Installation No.: 11

Activity Description
Refining of mineral oil

Directly Associated Activity Description
N/A

1.3 Carbon dioxide from Schedule 1 activities shall be emitted to atmosphere only from the emission sources as listed in Table 2 below:

Table 2 Emission Sources and Capacities:

Emission Source Reference	Emission Source Description	Capacity	Capacity Units
S1	Pipestill Furnace F-401	45.87	MW
S2	Pipestill Furnace F-401 pilots	0.23	MW
S3	Pipestill Furnace F-402	24.8	MW
S4	Pipestill Furnace F-402 pilots	0.23	MW
S5	Powerformer Preheater Furnace F-201X	31.8	MW
S6	Powerformer Preheater Furnace F-201X pilots	0.14	MW
S7	Powerformer Reheater Furnace F-202AN	13.96	MW
S8	Powerformer Reheater Furnace F-202AN pilots	0.18	MW

Emission Source Reference	Emission Source Description	Capacity	Capacity Units
S9	Powerformer Reheater Furnace F-202BX/ F-202 CX	11.47	MW
S10	Powerformer Reheater Furnace F-202BX/ F-202CX pilots	0.49	MW
S11	Flue Gas Heater F-203N	5.15	MW
S12	Flue Gas Heater F-203N pilots	0.1	MW
S13	Stabiliser Reboiler Heater F-204	10.13	MW
S14	Stabiliser Reboiler Heater F-204 pilots	0.07	MW
S15	Hydrofiner Feed/ Reboiler Furnace F-206/ F-207	28.98	MW
S16	Distillate Hydrofiner Heater F-501	11.54	MW
S17	Hydrofiner Feed/ Hot Oil Heater F-801/ F-802	22.75	MW
S18	Boiler Number 4 SG4	11.88	MW
S19	Boiler Number 4 SG4 pilots	1.12	MW
S20	Boiler Number 5 SG5 (CHP bypass stack)	12.8	MW
S21	Boiler Number 5 SG5 pilot (CHP Bypass stack)	1.2	MW
S22	Boiler Number 6 SG6	22.75	MW
S23	Boiler Number 6 SG6 pilots	2.25	MW

Emission Source Reference	Emission Source Description	Capacity	Capacity Units
S24	Distillate Hydrofiner Furnace F-901	12.63	MW
S25	Distillate Hydrofiner Furnace F-901 pilots	0.12	MW
S26	Compressor C-201A	2.19	MW
S27	Compressor C-201B	2.19	MW
S28	Compressor C-202	1.64	MW
S29	ASA Stack (Waste heat Exchanger F-1101)	1.3	MW
S30	Ground Flare	449.94	MW
S31	Ground Flare Pilots	0.06	MW
S32	Hydrocarbon Tall Flare	1050	MW
S33	Hydrocarbon Tall Flare pilots	0	MW
S34	Reactor Regenerator Gas Outlet	6.5	tonnes/day
S35	Diesel Crude Pump Engine Exhaust	0.4	MW
S36	Diesel Fire Pump Engine Exhaust	0.4	MW
S37	Diesel Fire Pump Engine Exhaust	0.4	MW
S38	Emergency Generator Exhaust EGEN-1	0.1	MW

Emission Source Reference	Emission Source Description	Capacity	Capacity Units
S39	Emergency Standby Generator 1 (Admin)	0.22	MW
S40	Emergency Standby Generator 2 (Security)	0.04	MW
S41	Emergency Standby generator 3 (HDS/ Sub 8)	0.12	MW
S42	Emergency Standby Generator 4 (Utilities/ Sub 9)	0.2	MW
S43	Standby Instrument Air Compressor	0.56	MW
S44	Security/ Medical Building Heater	0.1	MW
S45	Laboratory Building Heater	0.2	MW
S46	Laboratory Test Engines	0.1	MW
S47	Laboratory propane Consumption	0.1	MW
S48	Gas Turbine Stack	20.37	MW
S49	Hydrofiner Feed Furnace/ Reboiler F-206/ F-207 pilots	0.33	MW
S50	Distillate Hydrofiner Heater F-501 pilots	0.09	MW
S51	Hydrofiner feed/ Hot Oil Heater F-801/ F-802 pilots	0.1	MW
S52	Sour Gas Tall Flare	0.1	MW
S53	Sour Gas Tall Flare pilot	0	MW

1.4 The activity shall be controlled, operated and maintained so that emissions of carbon dioxide shall take place only as set out in this GHG Emissions Permit. The permit does not control emissions of gases other than carbon dioxide. All agreed plans, programmes and methodologies required to be carried out under the terms of this permit, become part of this permit.

1.5 This GHG Permit is for the purposes of GHG emissions permitting under the European Communities (Greenhouse Gas Emissions Trading) Regulations 2012 and any amendments to the same only and nothing in this permit shall be construed as negating the Operator's statutory obligations or requirements under any other enactments or regulations unless specifically amended by the Regulations.

1.6 Any reference in this permit to 'installation' shall mean the installation as described in the Greenhouse Gas Emissions Permit application and any amendments approved by the Agency.

Reason: To describe the installation and clarify the scope of this permit.

Condition 2. Notification

2.1 No alteration to, or reconstruction in respect of, the activity or any part thereof which would, or is likely to, result in a change in:

2.1.1 the nature or functioning of the installation;

2.1.2 the capacity of the installation as detailed in this permit;

2.1.3 the fuels used at the installation;

2.1.4 the range of activities to be carried out at the installation

that may require updating of the GHG permit shall be carried out or commenced without prior notice to and without the prior written agreement of the Agency.

2.2 The Operator shall notify the Agency in writing of the cessation of all or part of any activity listed in Table 1 of this permit no later than one month from the date of cessation or by 31 December of the year of cessation, whichever is sooner.

2.3 The Operator shall apply for an update of this GHG Permit where there is a change to the Operator name and/or registered address of the Operator, within seven days of the change.

2.4 For installations or parts of installations which have not come into operation when the application for this permit was made the Operator shall notify the Agency of the date of commencement of the activity within seven days of commencement.

2.5 The Operator shall notify the Agency in writing within three days of becoming aware of any factors which may prevent compliance with the conditions of this permit.

2.6 The Operator shall submit to the Agency by 21 January of each year a declaration of operability. The declaration submitted shall be in the format required by the Agency.

2.7 All notifications required under Condition 2 above shall be made to the address given in the Explanatory Note included with this permit.

2.8 The Operator shall submit to the Agency by 31 December of each year all relevant information about any planned or effective changes to the capacity, activity level and operation of an installation. The information submitted shall be in the format required by the Agency.

Reason: To provide for the notification of updated information on the activity.

Condition 3. Monitoring and Reporting

3.1 The Operator shall monitor and record greenhouse gas emissions on site in accordance with the M&R Regulation and the approved Monitoring Plan attached at Appendix 1 to this GHG permit and in compliance with any other guidance approved by the Agency for the purposes of implementing the Directive and/or the Regulations.

3.2 The Operator shall modify the monitoring plan in any of the following situations:

3.2.1 new emissions occur due to new activities carried out or due to the use of new fuels or materials not yet contained in the monitoring plan;

3.2.2 the change of availability of data, due to the use of new measurement instrument types, sampling methods or analysis methods, or for other reasons, leads to higher accuracy in the determination of emissions;

3.2.3 data resulting from the previously applied monitoring methodology has been found incorrect;

3.2.4 changing the monitoring plan improves the accuracy of the reported data, unless this is technically not feasible or incurs unreasonable costs;

3.2.5 the monitoring plan is not in conformity with the requirements of the M&R Regulation and the Agency requests a change;

3.2.6 it is necessary to respond to the suggestions for improvement of the monitoring plan contained in the verification report.

The Operator shall notify any proposals for modification of the monitoring plan to the Agency without undue delay. Any significant modifications of the monitoring plan, as defined in Article 15 of the M&R Regulation, shall be subject to approval by the Agency. Where approved these changes shall be implemented within a timeframe agreed by the Agency.

3.3 Temporary changes to the monitoring methodology:

3.3.1 Where it is for technical reasons temporarily not feasible to apply the tier in the monitoring plan for the activity data or each calculation factor of a fuel or material stream as approved by the Agency, the Operator shall apply the highest achievable tier until the conditions for application of the tier approved in the monitoring plan have been restored. The Operator shall take all necessary measures to allow the prompt restoration of the tier in the approved monitoring plan. The Operator shall notify the temporary change to the monitoring methodology without undue delay to the Agency specifying:

(i) The reasons for the deviation from the tier;

(ii) in detail, the interim monitoring methodology applied by the Operator to determine the emissions until the conditions for the application of the tier in the monitoring plan have been restored;

(iii) the measures the Operator is taking to restore the conditions for the application of the tier in the approved monitoring plan;

(iv) the anticipated point in time when application of the approved tier will be resumed.

3.3.2 A record of all non-compliances with the approved monitoring plan shall be maintained on-site and shall be available on-site for inspection by authorised persons of the Agency and/or by the Verifier at all reasonable times.

3.4 The Operator shall appoint a Verifier to ensure that, before their submission, the reports required by Condition 3.5 below are verified in accordance with the criteria set out in Schedule 5 of the Regulations, the A&V Regulation and any more detailed requirements of the Agency.

3.5 The written report of the verified annual reportable emissions and the verification report in respect of each calendar year shall be submitted to the Agency by the Operator no later than 31 March of the following year. The reports shall be in the format required by the Agency and meet the criteria set out in the M&R and A&V Regulations.

3.6 The Operator shall enter the verified annual reportable emissions figure for the preceding year into the Registry no later than 31 March of the following year. This figure shall be electronically approved by the Verifier in the registry no later than 31 March of each year.

3.7 Where an Operator is applying the Fall-Back methodology, the Operator shall assess and quantify each year the uncertainties of all parameters used for the determination of the annual emissions in accordance with the ISO Guide to the Expression of Uncertainty in Measurement or another equivalent internationally accepted standard and include the verified results in the written report of the verified annual reportable emissions to be submitted to the Agency by 31 March each year.

3.8 An Operator shall submit to the Agency for approval a report containing the information detailed in (i) or (ii) below, where appropriate, by the following deadlines:

(a) for a category A installation, by 30 June every four years;

(b) for a category B installation, by 30 June every two years;

(c) for a category C installation, by 30 June every year.

(i) Where the Operator does not apply at least the tiers required pursuant to the first subparagraph of Article 26(1) and to Article 41(1) of the M&R Regulation, the Operator shall provide a justification as to why it is technically not feasible or would incur unreasonable costs to apply the required tiers. Where evidence is found that measures needed for reaching those tiers have become technically feasible and do not incur unreasonable costs, the Operator shall notify the Agency of appropriate modifications to the monitoring plan and submit proposals for implementing appropriate measures and its timing.

(ii) Where the Operator applies a fall-back monitoring methodology, the Operator shall provide a justification as to why it is technically not feasible or would incur unreasonable costs to apply at least tier 1 for one or more major or minor source streams. Where evidence is found that measures needed for reaching at least tier 1 for those source streams have become technically feasible and do not incur unreasonable costs, the Operator shall notify the Agency of appropriate modifications to the monitoring plan, submit proposals and a timeframe for implementing appropriate measures.

3.9 Where the verification report states outstanding non conformities, misstatements or recommendations for improvements the Operator shall submit a report to the Agency for approval by 30 June of the year in which the verification report is issued. This requirement does not apply to the Operator of an installation with low emissions where the verification report contains recommendations for improvements only. The report shall describe how and when the Operator has rectified or plans to rectify the non-conformities identified and to implement recommended improvements. Where recommended improvements would not lead to an improvement of the monitoring methodology this must be justified by the Operator. Where the recommended improvements would incur unreasonable costs the Operator shall provide evidence of the unreasonable nature of the costs. The Operator shall implement the improvements specified by the Agency in response to the report submitted in accordance with this Condition in accordance with a timeframe set by the Agency.

3.10 The Operator shall make available to the Verifier and to the Agency any information and data relating to emissions of carbon dioxide which are required in order to verify the reports referred to in Condition 3.5 above or as required by the Agency to facilitate it in establishing benchmarks and/or best practice guidance.

3.11 Provision shall also be made for the transfer of environmental information, in relation to this permit, to the Agency's computer system, as may be requested by the Agency.

3.12 The Operator shall retain all information as specified in the M&R Regulation for a period of at least 10 years after the submission of the relevant annual report.

3.13 A record of independent confirmation of capacities listed in this permit shall be available on-site for inspection by authorised persons of the Agency at all reasonable times.

3.14 The Operator shall keep records of all modifications of the monitoring plan. The records shall include the information specified in Article 16.3 of the M&R Regulation.

3.15 The Operator shall ensure that members of the public can view a copy of this permit and any reports submitted to the Agency in accordance with this permit at all reasonable times. This requirement shall be integrated with the requirements of any public information programme approved by the Agency in relation to any other permit or licence held by the Operator for the site.

Reason: To provide for monitoring and reporting in accordance with the Regulations.

Condition 4. Allowances

4.1 Surrender of Allowances

4.1.1 The Operator shall, by 30 April in each year, surrender to the Agency, or other appropriate body specified by the Agency, allowances equal to the annual reportable emissions in the preceding calendar year.

4.1.2 The number of allowances to be surrendered shall be the annual reportable emissions for the preceding calendar year plus such allowances as may be necessary to cover any earlier calendar year in respect of which allowances remain outstanding and due. This includes allowances to cover the amount of any annual reportable emissions in respect of which allowances were not surrendered in accordance with Condition 4.1.1 in the previous year, and the amount of any reportable emissions which were discovered during the previous year to have been unreported in reports submitted under Condition 3 in that or in earlier years.

4.1.3 In relation to activities or parts of activities which have ceased to take place and have been notified to the Agency in accordance with Condition 2.2 above, the Operator shall surrender to the Agency allowances equal to the annual reportable emissions from such activities in the preceding calendar year or part thereof, together with such allowances as may be necessary to cover any earlier calendar year in respect of which allowances remain outstanding and due as described in Condition 4.1.2 above.

4.1.4 The Operator may, from 2008 onwards, subject to the provisions of the Regulations and the relevant National Allocation Plan for that compliance year, surrender emission reduction units (ERUs) and certified emission reduction units (CERs) in place of allowances.

4.2 The holding, transfer, surrender and cancellation of allowances shall be in accordance with the requirements of any Regulations adopted as provided for under Article 19.3 of Directive 2003/87/EC, any amendment or revision to the same and any guidance issued by the Agency or the National Administrator.

4.3 The Operator shall provide the National Administrator with all the necessary information for the opening of an Operator holding account for the installation described in Condition 1 of this permit within twenty working days of the issue of this permit, unless such an account is already open.

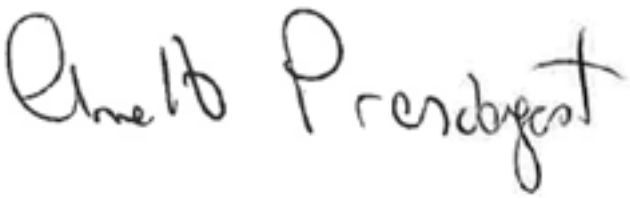
Reason: *To provide for the surrendering, holding, transfer and cancellation of allowances in respect of reported emissions.*

Condition 5. Penalties

5.1 Any Operator who fails to comply with Condition 4.1 above shall be subject to the provisions of the Regulations, including, but not limited to the payment of penalties.

Reason: To provide for the payment of excess emissions penalties as required under the Regulations.

Signed by the Authorised Person on this the 07 May 2020:



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Ms. Annette Prendergast
Inspector/ Authorised Person

Appendix 1 to Greenhouse Gas Emissions Permit Number IE-GHG013-10343

Monitoring Plan

1. Guidelines & Conditions

1. Directive 2003/87/EC as amended by Directive 2009/29/EC (hereinafter "the (revised) EU ETS Directive") requires operators of installations which are included in the European Greenhouse Gas Emission Trading Scheme (the EU ETS) to hold a valid GHG emission permit issued by the relevant Competent Authority and to monitor and report their emissions and have the reports verified by an independent and accredited verifier.

The Directive can be downloaded from:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2003L0087:20090625:EN:PDF

2. The Monitoring and Reporting Regulation (Commission Regulation (EU) No 601/2012) (hereinafter the "MRR") defines further requirements for monitoring and reporting.

The MRR can be downloaded from:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:181:0030:0104:EN:PDF

Article 12 of the MRR sets out specific requirements for the content and submission of the monitoring plan and its updates. Article 12 outlines the importance of the Monitoring plan as follows:

The monitoring plan shall consist of a detailed complete and transparent documentation of the monitoring methodology of a specific installation [or aircraft operator] and shall contain at least the elements laid down in Annex I.

Furthermore Article 74(1) states:

Member States may require the operator and aircraft operator to use electronic templates or specific file formats for submission of monitoring plans and changes to the monitoring plan as well as for submission of annual emissions reports tonne-kilometre data reports verification reports and improvement reports. Those templates or file format specifications established by the Member States shall at least contain the information contained in electronic templates or file format specifications published by the Commission

3. All Commission guidance documents on the Monitoring and Reporting Regulation will be published at the link below as they become available:

http://ec.europa.eu/clima/policies/ets/monitoring/index_en.htm

(a) Information sources:

EU Websites:

EU-Legislation: http://eur-lex.europa.eu/en/index.htm
EU ETS general: http://ec.europa.eu/clima/policies/ets/index_en.htm

Monitoring and Reporting in the EU ETS: http://ec.europa.eu/clima/policies/ets/monitoring/index_en.htm

Environmental Protection Agency Website:

http://www.epa.ie

Environmental Protection Agency Contact:

GHGpermit@epa.ie

2. Application Details

The Installation Name, Site Name and the address of the site of the installation are detailed below. The Site Name and address can be updated from the Organisation Details Page on the ETSWAP website. The Installation Name can only be updated by your Competent Authority.

Installation name	Irving Oil Whitegate Refinery Limited
Site name	Irving Oil Whitegate Refinery
Address	Whitegate Midleton Cork Ireland
Grid reference of site main entrance	183516E, 063130N
Licence held pursuant to the Environmental Protection Agency Act 1992, as amended.	Yes

IPC/IE Licence Register Number	Licence holder	Competent body
P0266-03	Irving Oil Whitegate Refinery limited	EPA

Has the regulated activity commenced at the Installation? Yes

Date of Regulated Activity commencement 01 January 2008

This information is only required to identify the first relevant reporting year of an installation. If the installation was in operation from the beginning of 2008 and held a Greenhouse Gas Emissions Permit from this point, 1 January 2008 will be used where the actual date of commencement is not readily known.

3. About the Operator

The information about the "Operator" is listed below. The "Operator" is defined as the person who it is proposed will have control over the relevant Regulated Activities in the installation in respect of which this application is being made.

(b) Operator Details

The name of the operator and where applicable the company registration number are detailed below. These details can only be updated by the Environmental Protection Agency.

Operator name	Irving Oil Whitegate Refinery Limited
Company Registration Number	16576

Operator Legal status

The legal status of the operator is:	Company / Corporate Body

(c) Company / Corporate Body

Is the trading / business name different to the operator name?	No

Registered office address

Address Line 1	70 Sir John Rogerson's Quay
Address Line 2	N/A
City/Town	Dublin 2
County	N/A
Postcode	D02R296

Principal office address

Is the principal office address different to the registered office address?	Yes

Address Line 1	Irving Oil Whitegate Refinery Ltd
Address Line 2	Whitegate
City/Town	Midleton
County	Cork
Postcode	P25HD93
Company registration number	16576

Holding company

Does the company belong to a holding company?	Yes

Holding company name	IRVING OIL WHITEGATE HOLDINGS LIMITED

Holding company address

Address Line 1	Whitegate Refinery
Address Line 2	N/A
City/Town	Whitegate
County	Cork
Postcode	N/A
Company registration number	341156
Is the holding company principal address different to the	No

holding company address?

(d) Operator Authority

Does the operator named above have the authority and ability to:

a.	manage site operations through having day-to-day control of plant operation including the manner and rate of operation	Yes
b.	ensure that permit conditions are effectively complied with	Yes
c.	control monitor and report specified emissions	Yes
d.	be responsible for trading in Allowances so that at the end of a reporting period allowances can be balanced against reported emissions.	Yes

4. Service Contact

e. Service Contact

Address	Irving Oil Whitegate Refinery Limited Whitegate Midleton Co. Cork Ireland

5. Installation Activities

f. Installation Description

Below is a description of the installation and its activities, a brief outline description of the site and the installation and the location of the installation on the site. The description also includes a non-technical summary of the activities carried out at the installation briefly describing each activity performed and the technical units used within each activity.

The Irving Oil Whitegate refinery is located on the approach to Cork Harbour and has a processing capacity of 75000 barrels of oil per day. The crude oil processed at the refinery is a mainly a mixture of light sweet crude from the North

Sea and heavier crude from the Middle East, Mediterranean & West Africa. The refinery is situated on a 330 acre site on the outskirts of Whitegate village, Co. Cork. Whitegate is approximately 25 miles east of Cork City and nine miles from Midleton Town.

There are four main activities carried out on site:

1.Distillation of the crude oil by boiling the liquid in a high tower called a fractionating column. The crude oil is boiled in the tower and the resulting vapours are separated into more useful components depending on their boiling points. The vapours are cooled and collected: gas oil first followed by diesel, then kerosene, naptha and finallly propane and butane. The heavy bituminous compouns which are not vapourised in the column are piped off the bottom of the tower. Whitegate uses further conversion processes to improve the chemical structure of the feedstock for sale. These include desulphurisation, reforming and isomerisation.

2.Desulphurisation is used on site to remove sulphur compounds and other impurities from the oil feedstock and petroleum products. Hydrosulphurisation uses hydrogen to remove sulphur compunds by converting them into hydrogen sulphide in the presence of a catalyst. The hydrogen sulphide produced is removed from the product gas using a membrane system and converted into sulphuric acid for sale.

3.Heavy naptha produced by crude distillation does not have a high enough octane rating for immediate sale. Octane rating is a measure of petrol's ignition characteristics. Heavy naptha can be modified in a catalytic reformer to convert low octane molecules into high octane molecules. Reformers use a platinum based catalyst to promote the desired reaction. In the Whitegate reformer, the catalyst becomes covered in coke over time and has to be periodically regenerated resulting in an emission of CO2.

4.Similar to heavy naptha, light naptha produced during the distillation process does not have a high enough octane rating for gasoline blending. The octane rating of light naptha can similarly be modified (isomerised) in a dual reactor system to convert the low octane molecules into high octane molecules. Isomerisation units also use a platinum based catalyst to promote the desired reactions.

g. Annex 1 Activities

The table below lists the technical details for each Annex 1 activity carried out at the installation.

Note that 'capacity' in this context means:

- Rated thermal input (for combustion installations) which is defined as the rate at which fuel can be burned at the maximum continuous rating of the installation multiplied by the calorific value of the fuel and expressed as megawatts thermal.
- Production capacity for those specified Annex I activities for which production capacity determines ETS eligibility.

Annex 1 Activity	Total Capacity	Capacity units	Specified Emissions
Refining of mineral oil	10000	tonnes/day	Carbon Dioxide

h. Site Diagram

The table below lists attachments (if available) that provide a simple diagram showing emissions sources source streams sampling points and metering/measurement equipment.

Attachment	Description
Refinery schematic.docx	Refinery Schematic
Refinery_Fuel_System-Block_Flow_Diagram.pdf	Refinery Fuel System Diagram

i. Estimated Annual Emissions

Detail of the estimated annual emission of CO_2 equivalent. This information enables categorisation of the installation in accordance with Article 19 of the MRR and is based on the average verified annual emissions of the previous trading period data OR if this data is not available or is inappropriate a conservative estimate of annual average emissions including transferred CO_2 excluding CO_2 from biomass.

Estimated Annual Emissions (tonnes $CO_{2(e)}$)	370000
Justification for the use of a conservative estimate of CO_2 emissions.	Capacity of the refinery is 10000 tonnes per day. Recent market conditions mandated that we operated at reduced capacity. Therefore, historical averaged verified emissions are lower than they would be if the refinery was to run at full capacity.

6. Emissions Details

j. About your emissions

Annex I of the Monitoring and Reporting Regulations (MRR) requires that monitoring plans include a description of "the installation" and activities to be carried out and monitored including a list of emission sources and source streams. The information provided in this template relates to the Annex I activity(ies) comprised in the installation in question and should relate to a single installation. It includes any activities carried out by the operator and does not include related activities carried out by other operators.

k. Emission Sources

The table below lists all the emission sources at the installation, which may include directly associated activities/excluded activities.

Emission Source Reference	Emission Source Description
S1	Pipestill Furnace F-401
S2	Pipestill Furnace F-401 pilots
S3	Pipestill Furnace F-402

Emission Source Reference	**Emission Source Description**
S4	Pipestill Furnace F-402 pilots
S5	Powerformer Preheater Furnace F-201X
S6	Powerformer Preheater Furnace F-201X pilots
S7	Powerformer Reheater Furnace F-202AN
S8	Powerformer Reheater Furnace F-202AN pilots
S9	Powerformer Reheater Furnace F-202BX/ F-202 CX
S10	Powerformer Reheater Furnace F-202BX/ F-202CX pilots
S11	Flue Gas Heater F-203N
S12	Flue Gas Heater F-203N pilots
S13	Stabiliser Reboiler Heater F-204
S14	Stabiliser Reboiler Heater F-204 pilots
S15	Hydrofiner Feed/ Reboiler Furnace F-206/ F-207
S16	Distillate Hydrofiner Heater F-501
S17	Hydrofiner Feed/ Hot Oil Heater F-801/ F-802
S18	Boiler Number 4 SG4
S19	Boiler Number 4 SG4 pilots
S20	Boiler Number 5 SG5 (CHP bypass stack)
S21	Boiler Number 5 SG5 pilot (CHP Bypass stack)
S22	Boiler Number 6 SG6
S23	Boiler Number 6 SG6 pilots
S24	Distillate Hydrofiner Furnace F-901
S25	Distillate Hydrofiner Furnace F-901 pilots
S26	Compressor C-201A
S27	Compressor C-201B
S28	Compressor C-202
S29	ASA Stack (Waste heat Exchanger F-1101)
S30	Ground Flare
S31	Ground Flare Pilots
S32	Hydrocarbon Tall Flare
S33	Hydrocarbon Tall Flare pilots
S34	Reactor Regenerator Gas Outlet
S35	Diesel Crude Pump Engine Exhaust
S36	Diesel Fire Pump Engine Exhaust
S37	Diesel Fire Pump Engine Exhaust
S38	Emergency Generator Exhaust EGEN-1
S39	Emergency Standby Generator 1 (Admin)
S40	Emergency Standby Generator 2 (Security)

Emission Source Reference	**Emission Source Description**
S41	Emergency Standby generator 3 (HDS/ Sub 8)
S42	Emergency Standby Generator 4 (Utilities/ Sub 9)
S43	Standby Instrument Air Compressor
S44	Security/ Medical Building Heater
S45	Laboratory Building Heater
S46	Laboratory Test Engines
S47	Laboratory propane Consumption
S48	Gas Turbine Stack
S49	Hydrofiner Feed Furnace/ Reboiler F-206/ F-207 pilots
S50	Distillate Hydrofiner Heater F-501 pilots
S51	Hydrofiner feed/ Hot Oil Heater F-801/ F-802 pilots
S52	Sour Gas Tall Flare
S53	Sour Gas Tall Flare pilot

The table below lists the emission sources which are linked to the Regulated Activities at the installation.

Emission Source Reference	**Emission Source Description**
S1	Pipestill Furnace F-401
S2	Pipestill Furnace F-401 pilots
S3	Pipestill Furnace F-402
S4	Pipestill Furnace F-402 pilots
S5	Powerformer Preheater Furnace F-201X
S6	Powerformer Preheater Furnace F-201X pilots
S7	Powerformer Reheater Furnace F-202AN
S8	Powerformer Reheater Furnace F-202AN pilots
S9	Powerformer Reheater Furnace F-202BX/ F-202 CX
S10	Powerformer Reheater Furnace F-202BX/ F-202CX pilots
S11	Flue Gas Heater F-203N
S12	Flue Gas Heater F-203N pilots
S13	Stabiliser Reboiler Heater F-204
S14	Stabiliser Reboiler Heater F-204 pilots
S15	Hydrofiner Feed/ Reboiler Furnace F-206/ F-207
S16	Distillate Hydrofiner Heater F-501
S17	Hydrofiner Feed/ Hot Oil Heater F-801/ F-802
S18	Boiler Number 4 SG4
S19	Boiler Number 4 SG4 pilots

Emission Source Reference	**Emission Source Description**
S20	Boiler Number 5 SG5 (CHP bypass stack)
S21	Boiler Number 5 SG5 pilot (CHP Bypass stack)
S22	Boiler Number 6 SG6
S23	Boiler Number 6 SG6 pilots
S24	Distillate Hydrofiner Furnace F-901
S25	Distillate Hydrofiner Furnace F-901 pilots
S26	Compressor C-201A
S27	Compressor C-201B
S28	Compressor C-202
S29	ASA Stack (Waste heat Exchanger F-1101)
S30	Ground Flare
S31	Ground Flare Pilots
S32	Hydrocarbon Tall Flare
S33	Hydrocarbon Tall Flare pilots
S34	Reactor Regenerator Gas Outlet
S35	Diesel Crude Pump Engine Exhaust
S36	Diesel Fire Pump Engine Exhaust
S37	Diesel Fire Pump Engine Exhaust
S38	Emergency Generator Exhaust EGEN-1
S39	Emergency Standby Generator 1 (Admin)
S40	Emergency Standby Generator 2 (Security)
S41	Emergency Standby generator 3 (HDS/ Sub 8)
S42	Emergency Standby Generator 4 (Utilities/ Sub 9)
S43	Standby Instrument Air Compressor
S44	Security/ Medical Building Heater
S45	Laboratory Building Heater
S46	Laboratory Test Engines
S47	Laboratory propane Consumption
S48	Gas Turbine Stack
S49	Hydrofiner Feed Furnace/ Reboiler F-206/ F-207 pilots
S50	Distillate Hydrofiner Heater F-501 pilots
S51	Hydrofiner feed/ Hot Oil Heater F-801/ F-802 pilots
S52	Sour Gas Tall Flare
S53	Sour Gas Tall Flare pilot

I. Emission Points

The table below lists all the emission points at the installation, which may include directly associated activities/excluded activities.

Emission Point Reference	Emission Point Description
A1-1	Boiler Number 4 Stack
A1-2	Boiler Number 5 Stack (Combined Heat & Power stack)
A1-3	Boiler Number 6 Stack
A2-1	Furnace Stack F-401
A2-2	Furnace Stack F-402
A2-3	Furnace Stack F-501
A2-4	Furnace Stack F-204
A2-5	Furnace Stack F-201X
A2-6	Furnace Stack F-202BX/ F-202CX
A2-7	Furnace Stack F-202AN
A2-8	Furnace Stack F-206/ F-207
A2-9	Furnace Stack F-203N
A2-10	Furnace Stack F-801/ F-802
A2-11	Furnace Stack F-901
A2-12	Compressor Engine Stack C-201A
A2-13	Compressor Engine Stack C-201B
A2-14	Compressor Engine Stack C-202
A2-15	Ground Flare
A2-16	Hydrocarbon Tall Flare
A2-17	Sour Gas Tall Flare
A2-18	ASA Clean Gas Stack
A3-1	Reactor Regenerator Gas Outlet, PIC-207
A3-2	Diesel Crude Pump Engine Exhaust, GI-P-1B
A3-3	Diesel Fire Pump Engine Exhaust, GP-P-B
A3-4	Diesel Fire Pump Engine Exhaust, GP-P-C
A3-5	EGEN-1 (Sub 2)
A3-6	ESBG-1 (Admin)
A3-7	ESBG-2 (Security)
A3-8	ESBG-3 (HDS/ Sub 8)
A3-9	ESBG-4 (Utilities/ Sub 9)
A3-10	Standby Instrument Air Compressor, GAC-3B
A3-11	Security/ Medical Building Heater Sec B1
A3-12	Laboratory Building Heater Lab B2

Emission Point Reference	Emission Point Description
A3-13	Laboratory Test Engines Lab KE
A3-14	Laboratory Propane Consumption Lab C3
A4-1	Combined Heat & Power by-pass stack

m. Source Streams (fuels and/or materials)

The table below lists the source streams which are used in Schedule 1 Activities at the installation.

Source Stream Reference	Source Stream Type	Source Stream Description
HP-001	Combustion: Other gaseous & liquid fuels	Refinery Gas
LP-001	Combustion: Other gaseous & liquid fuels	Refinery Gas
GGD7-001	Combustion: Other gaseous & liquid fuels	Refinery Gas
Non-Permeate Gas	Combustion: Other gaseous & liquid fuels	Refinery Gas
Gas Oil-001	Combustion: Commercial standard fuels	Gas/Diesel Oil
BH-Gas-001	Combustion: Other gaseous & liquid fuels	Refinery Gas
C1-001 (Natural Gas)	Combustion: Other gaseous & liquid fuels	Natural Gas
HP-002	Combustion: Other gaseous & liquid fuels	Refinery Gas
Gas Oil-002	Combustion: Commercial standard fuels	Gas/Diesel Oil
GSL-001	Combustion: Commercial standard fuels	Motor Gasoline
C3-001	Combustion: Other gaseous & liquid fuels	Refinery Gas
C3-002	Combustion: Commercial standard fuels	Propane
Coke	Refineries: Catalytic cracker regeneration	Petroleum Coke

n. Emissions Summary

The table below provides a summary of the emission source and source stream details in the installation.

Source streams (Fuel / Material)	Emission Source Refs.	Emission Point Refs.	Annex 1 Activity
HP-001	S1,S15,S17,S24,S3,S5,S7	A2-1,A2-10,A2-11,A2-2,A2-5,A2-7,A2-8	Refining of mineral oil
LP-001	S1,S3	A2-1,A2-2	Refining of mineral oil
GGD7-001	S11,S13,S16,S9	A2-3,A2-4,A2-6,A2-9	Refining of mineral oil
Non-Permeate Gas	S20,S48	A1-2,A4-1	Refining of mineral oil
Gas Oil-001	S20,S48	A1-2,A4-1	Refining of mineral oil
BH-Gas-001	S18,S20,S22	A1-1,A1-2,A1-3,A4-1	Refining of mineral oil
C1-001 (Natural Gas)	S10,S12,S14,S19,S2,S21,S23,S25,S26,S27,S28,S29,S31,S33,S4,S49,S50,S51,S53,S6,S8	A1-1,A1-2,A1-3,A2-1,A2-2,A2-3,A2-4,A2-5,A2-6,A2-7,A2-8,A2-9,A2-10,A2-11,A2-12,A2-13,A2-14,A2-15,A2-16,A2-17,A2-18	Refining of mineral oil
C3-001	S10,S12,S14,S19,S2,S21,S23,S25,S26,S27,S28,S31,S33,S4,S49,S50,S51,S53,S6,S8	A1-1,A1-2,A1-3,A2-1,A2-2,A2-3,A2-4,A2-5,A2-6,A2-7,A2-8,A2-9,A2-10,A2-11,A2-12,A2-13,A2-14,A2-15,A2-16,A2-17	Refining of mineral oil
C3-002	S47	A3-14	Refining of mineral oil
HP-002	S30,S32,S52	A2-15,A2-16,A2-17	Refining of mineral oil
Gas Oil-002	S35,S36,S37,S38,S39,S40,S41,S42,S43,S44,S45	A3-10,A3-11,A3-12,A3-2,A3-3,A3-4,A3-5,A3-6,A3-7,A3-8,A3-9	Refining of mineral oil
GSL-001	S46	A3-13	Refining of mineral oil
Coke	S34	A3-1	Refining of mineral oil

o. Excluded Activities

Certain activities that result in greenhouse gas emissions may be excluded under the EU ETS Directive for example truly mobile sources such as vehicle emissions.

Do you have any excluded activities which need to be identified in your monitoring plan?	No

7. Low Emissions Eligibility

p. Low Emissions Eligibility

The operator may submit a simplified monitoring plan for an installation where no nitrous oxide activities are carried out and it can be demonstrated that:

(a) the average verified annual emissions of the installation during the previous trading period was less than 25 000 tonnes $CO_{2(e)}$ per year or;

(b) where this data is not available or inappropriate a conservative estimate shows that emissions for the next 5 years will be less than 25 000 tonnes $CO_{2(e)}$ per year.

Note: the above data shall include transferred CO_2 but exclude CO_2 stemming from biomass.

Does the installation satisfy the criteria for installations with low emissions (as defined by Article 47 of the MRR)?	No

8. Monitoring Approaches

q. Monitoring Approaches

Emissions may be determined using either a calculation based methodology ("calculation") or measurement based methodology ("measurement") except where the use of a specific methodology is mandatory according to the provisions of the MRR. [MRR Article 21].

Note: the operator may subject to competent authority approval combine measurement and calculation for different sources. The operator is required to ensure and demonstrate that neither gaps nor double counting of reportable emissions occurs.

Please specify whether or not you propose to apply the following monitoring approaches. Select all monitoring approaches that are applicable to you. The consecutive sections will become mandatory based on the selected approaches.

Calculation	Yes
Measurement	No
Fall-back approach	No
Monitoring of N_2O	No
Monitoring of PFC	No
Monitoring of transferred / inherent CO_2	No

9. Calculation

r. Approach Description

The calculation approach including formulae used to determine annual CO_2 emissions:

Refinery fuel gases are analysed daily for consumption. The Natural Gas (C1-001) stream is measured using an in-line Gas Chromatograph (GG_AI004). It is calibrated to ISO 17025. The gaseous and liquid fuel flows to the various combustion units are measured using over 37 flow meters of different types including orifice plates, ultrasonic meters, coriolis meters etc. The results of the gas composition analysis and overall flow measurement are input into our fuel calculation spreadsheets.

The known composition of the fuel gases (from daily lab analysis) are used to calculate the overall molecular weight of the gas and the carbon content of the gas is also calculated from the lab analysis. Thereafter, the quantity of fuel metered to the different furnaces, boilers and compressors is used to generate the tonnes of carbon combusted. This in turn is converted to tonnes of carbon dioxide emitted using a conversion factor of 3.664 and an oxidation factor of 1.0.

Differential pressure transmitters on orifice plate meters are subject to an annual inspection and calibration to ensure their overall accuracy. The physical suitability of the installation is checked by the calibration company during this process. The main gas flows are temperature and pressure compensated. In a number of cases the flows are also density compensated in the DCS.

The refinery is located at sea level and so no compensation for altitude above sea level is required.

Refinery fuel gases are generated by the ongoing processing of crude oils and therefore vary in their composition. This generates a need to analyse these gases on a daily basis in line with the EU Monitoring and Reporting Regulations (MRR 2012).

For liquid fuels used on the refinery such as gasoil, analysis is carried out regularly for carbon content and NCV to allow accurate calculation of the overall CO2 generated during combustion. Samples are sent to external accredited laboratory for liquid fuel analysis. The coke burned off the catalyst during the regeneration process is converted to carbon dioxide which is measured by assuming that all of the oxygen content of the air which is metered is fully converted to the carbon dioxide emitted. To calculate the annual CO2 emissions from the generation of coke during reformer reactor regenerations emissions are calculated from the number of regens completed for each reactor multiplied by the respective CO2 produced.

To determine the CO2 emissions for gaseous and liquid fuels, the fuel usage in kg/hr or m3/hr must be converted to t/CO2/day.

The fuel readings are corrected for variation in molecular weight and converted to kg/hr using the formula below:

(Nm3/hr)*(SQRT(Design MW/MW))*(MW/22.4)=kg/hr

The kg/hr measurements are converted to ton/day of fuel:

(kg/hr)*(24/1000)=ton/day

The ton/day of fuel is finally converted to CO2/day:

(Ton/day fuel)*(% carbon fuel)*(3.664)= ton CO2/day

The above methodology is applied to each fuel source.

The NCV of each fuel is determined by analysing the fuel into each of its base components e.g. methane, ethane etc and multiplying each component by its molar calorific value. - see attached M&RP (ver 10 of July 2016)

s. Measurement Devices

Below is a description of the specification and location of the measurement systems used for each source stream where emissions are determined by calculation

Also a description of all measurement devices including sub-meters and meters used to deduct non-Annex I activities to be used for each source and source stream.

Source Stream Refs.	Emission Source Refs.	Measurement Device Ref.	Type of Measurement Device	Measurement Range	Metering Range Units	Specified Uncertainty (+/- %)	Location
HP-001	S1	FIC 406	Orifice meter	0-5591	nm3/hr	1.81	Pipestill
HP-001	S3	FIC 426	Orifice meter	0-3500	Nm3/hr	2.16	Pipestill
HP-001	S5	FIC 202	Orifice meter	0-2500	Nm3/hr	2.12	Hydrofiner
HP-001	S15	FIC 231	Orifice meter	0-760	Nm3/hr	2.12	Hydrofiner
HP-001	S15	FIC 232	Orifice meter	0-1250	Nm3/hr	2.44	Hydrofiner
HP-001	S7	FIC 233	Orifice meter	0-1350	Nm3/h	2.54	Hydrofiner
HP-001	S17	FT 813	Orifice meter	0-350	Nm3/h	4.71	Isomerisation
HP-001	S17	FT 823	Orifice meter	0-2800	Nm3/h	4.43	Isomerisation
HP-001	S24	FT 904	Vortex meter	0-1500	Nm3/h	1	Diesel HDS
LP-001	S1	FT 419	Orifice meter	0-500	Nm3/h	1.81	Pipestill
LP-001	S3	FT 417	Orifice meter	0-300	Nm3/h	1.79	Pipestill
GGD7-001	S9	FIC 203	Orifice meter	0-1000	Nm3/h	2.27	Hydrofiner
GGD7-001	S9	FIC 204	Orifice meter	0-500	Nm3/h	2.27	Hydrofiner
GGD7-001	S11	FT289_01	Vortex meter	0-400	Nm3/h	1	Hydrofiner
GGD7-001	S13	FIC 207	Orifice meter	0-789.8	Nm3/h	2.26	Hydrofiner
GGD7-001	S16	FIC 506	Orifice meter	0-1200	Nm3/hr	3.42	F501
C1-001 (Natural Gas),C3-001	S26,S27,S28	FI 225	Orifice meter	0-744.2	Nm3/h	1.26	Hydrofiner

Source Stream Refs.	Emission Source Refs.	Measurement Device Ref.	Type of Measurement Device	Measurement Range	Metering Range Units	Specified Uncertainty (+/- %)	Location
C1-001 (Natural Gas),C3-001	S19,S21,S23	FI 15	Orifice meter	0-500	Nm3/h	2.5	Boiler House
C1-001 (Natural Gas),C3-001	S2,S4,S6,S8,S10,S12,S14,S25,S31,S33,S49,S50,S51,S53	FI 228	Orifice meter	0-651.6	Nm3/h	1.38	Hydrofiner
C1-001 (Natural Gas)	S29	FIC 1103	Vortex meter	0-30	Nm3/hr	1.7	ASA
HP-002	S32	GZ-FI-20	Rotary meter	2-20	Nm3/h	1.6	Tall Flare
HP-002	S52	GZ-FI-19	Rotary meter	0 - 11	Nm3/h	2.1	Sour Flare
HP-002	S32	GZ-FI-11	Ultrasonic meter	0-45790	kg/hr	3	Tall Flare
HP-002	S52	GZ-FQI-16	Ultrasonic meter	0-3500	kg/hr	3	Sour Flare
HP-002	S30	GZ-FI-14	Ultrasonic meter	0-10000	kg/hr	3	Ground Flare
BH-Gas-001	S18,S20,S22	BH-FI-016	Coriolis meter	0-2700	Nm3/h	0.35	Boiler House
Non-Permeate Gas	S20,S48	BH-FQI-004	Coriolis meter	0-2400	kg/hr	0.5	CHP Gas Turbine
Gas Oil-001	S20,S48	CHP-FQI-1	Rotary meter	0-25000	Liters/day	0.5	CHP SG-5
Gas Oil-001	S48	CHP-FQI-2	Rotary meter	0-25000	Liters/day	0.5	CHP Gas Turbine
Gas Oil-002	S35,S36,S37,S38,S39,S40,S41,S42,S43,S44,S45	BOW-001	Fuel Pump	0-1500	Liters	N/A	Fuel Pump
GSL-001	S46	LAB-KE	Sample Volumes	0-10	Litres	7.00	Refinery Laboratory
Coke	S34	REGEN-001	Regerators	0-10	tons of carbon	7.50	Reformer
C3-002	S47	PROP-2-LAB	Estimate	0-20	m3/hr	7.50	Refinery Laboratory

Source Stream Refs.	Measurement Device Ref.	Determination Method	Instrument Under Control Of	Conditions Of Article 29(1) Satisfied	Invoices Used To Determine Amount Of Fuel Or Material	Trade Partner And Operator Independent
HP-001	FIC 406	Continual	Operator	N/A	N/A	N/A
HP-001	FIC 426	Continual	Operator	N/A	N/A	N/A
HP-001	FIC 202	Continual	Operator	N/A	N/A	N/A
HP-001	FIC 231	Continual	Operator	N/A	N/A	N/A
HP-001	FIC 232	Continual	Operator	N/A	N/A	N/A
HP-001	FIC 233	Continual	Operator	N/A	N/A	N/A
HP-001	FT 813	Continual	Operator	N/A	N/A	N/A
HP-001	FT 823	Continual	Operator	N/A	N/A	N/A
HP-001	FT 904	Continual	Operator	N/A	N/A	N/A
LP-001	FT 419	Continual	Operator	N/A	N/A	N/A
LP-001	FT 417	Continual	Operator	N/A	N/A	N/A
GGD7-001	FIC 203	Continual	Operator	N/A	N/A	N/A
GGD7-001	FIC 204	Continual	Operator	N/A	N/A	N/A
GGD7-001	FT289_01	Continual	Operator	N/A	N/A	N/A
GGD7-001	FIC 207	Continual	Operator	N/A	N/A	N/A
GGD7-001	FIC 506	Continual	Operator	N/A	N/A	N/A
C1-001 (Natural Gas),C3-001	FI 225	Continual	Operator	N/A	N/A	N/A
C1-001 (Natural Gas),C3-001	FI 15	Continual	Operator	N/A	N/A	N/A
C1-001 (Natural Gas),C3-001	FI 228	Continual	Operator	N/A	N/A	N/A
C1-001 (Natural Gas)	FIC 1103	Continual	Operator	N/A	N/A	N/A
HP-002	GZ-FI-20	Continual	Operator	N/A	N/A	N/A
HP-002	GZ-FI-19	Continual	Operator	N/A	N/A	N/A
HP-002	GZ-FI-11	Continual	Operator	N/A	N/A	N/A
HP-002	GZ-FQI-16	Continual	Operator	N/A	N/A	N/A
HP-002	GZ-FI-14	Continual	Operator	N/A	N/A	N/A
BH-Gas-001	BH-FI-016	Continual	Operator	N/A	N/A	N/A
Non-Permeate Gas	BH-FQI-004	Continual	Operator	N/A	N/A	N/A
Gas Oil-001	CHP-FQI-1	Continual	Operator	N/A	N/A	N/A
Gas Oil-001	CHP-FQI-2	Continual	Operator	N/A	N/A	N/A

Source Stream Refs.	Measurement Device Ref.	Determination Method	Instrument Under Control Of	Conditions Of Article 29(1) Satisfied	Invoices Used To Determine Amount Of Fuel Or Material	Trade Partner And Operator Independent
Gas Oil-002	BOW-001	Batch	Operator	N/A	N/A	N/A
GSL-001	LAB-KE	Batch	Operator	N/A	N/A	N/A
Coke	REGEN-001	Batch	Operator	N/A	N/A	N/A
C3-002	PROP-2-LAB	Batch	Operator	N/A	N/A	N/A

t. Applied Tiers

The table below identifies the tiers applied against the relevant input data for each source stream and confirms whether a standard (MRR Article 24) or mass balance (MRR Article 25) approach is applied.

(i) The highest tiers as defined in Annex II of the MRR should be used by Category B and C installations to determine the activity data and each calculation factor (except the oxidation factor and conversion factor) for each major source stream. Category A installations should apply as a minimum the tiers listed in Annex V.

(ii) Operators may apply a tier one level lower than those referred to in sub paragraph (i) above for Category C installations and up to two levels lower for Category A and B installations with a minimum of tier 1 if the operator can demonstrate to the satisfaction of the competent authority that this is not technically feasible or would lead to unreasonable cost to apply the higher tier. The justification for not applying the higher tier should be recorded when completing the tier table.

(iii) The competent authority may allow an operator to apply even lower tiers than those referred to in the sub paragraph (ii) with a minimum of tier 1 for a transition period of up to three years if the operator can demonstrate to the satisfaction of the competent authority that this is not technically feasible or would lead to unreasonable cost to apply the higher tier and provides an improvement plan detailing how and by when at least the tier referred to in sub paragraph (ii) will be achieved. The improvement plan should be referenced in subsequent table and provided to the competent authority at the time of submission of this plan.

(iv) For minor source streams operators shall apply the highest tier which is technically feasible and will not lead to unreasonable costs with a minimum of tier 1 for activity data and each calculation factor. For de-minimis source streams operators may use conservative estimations rather than tiers unless a defined tier can be achieved without additional effort (MRR Article 26(2)).

(v) Installations with low emissions as identified in section 6(d) may apply as a minimum tier 1 for determining activity data and calculation factors for all source streams unless higher accuracy is achievable without additional effort.

* Note 1: For commercial standard fuels the minimum tiers listed in Annex V of the MRR may be applied for all activities in all installations.

* Note 2: If you are intending to apply a fall-back approach please complete the table below and select "n/a" for the tiers to be applied for each source stream where a fall-back approach is used. Section 10 "Fall-back" must also be completed for these source streams.

* Note 3: For biomass or mixed fuels the emission factor is the preliminary emission factor as defined in Definition 35 Article 3 of the MRR.

Source Stream Refs.	**Emission Source Refs.**	**Measurement Device Refs.**	**Overall Metering Uncertainty (less than +/- %)**	**Applied Monitoring Approach**	**Activity Data Tier Applied**	**Net Calorific Value Tier Applied**	**Emission Factor Tier Applied**	**Carbon Content Tier Applied**	**Oxidation Factor Tier Applied**	**Conversion Factor Tier Applied**	**Biomass Fraction Tier Applied**	**Estimated Emissions $tCO_{2(e)}$**	**% of Total Estimated Emissions**	**Source Category**	**Highest Tiers Applied**	**Justification for not applying the highest tiers**	**Improvement Plan Reference (where applicable)**
HP-001	S1,S3,S5,S7,S15,S17,S24	FIC 406,FIC 426,FIC 202,FIC 231,FIC 232,FIC 233,FT 813,FT 823,FT 904	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	192740.14	68.89	Major	Yes	n/a	n/a
LP-001	S1,S3	FT 419,FT 417	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	9567.4	3.42	Major	Yes	n/a	n/a
GGD7-001	S9,S11,S13,S16	FIC 203,FIC	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	18751.86	6.7	Major	Yes	n/a	n/a

Source Stream Refs.	**Emission Source Refs.**	**Measurement Device Refs.**	**Overall Metering Uncertainty (less than +/- %)**	**Applied Monitoring Approach**	**Activity Data Tier Applied**	**Net Calorific Value Tier Applied**	**Emission Factor Tier Applied**	**Carbon Content Tier Applied**	**Oxidation Factor Tier Applied**	**Conversion Factor Tier Applied**	**Biomass Fraction Tier Applied**	**Estimated Emissions $tCO_{2(e)}$**	**% of Total Estimated Emissions**	**Source Category**	**Highest Tiers Applied**	**Justification for not applying the highest tiers**	**Improvement Plan Reference (where applicable)**
		204,FT289_01,FIC207,FIC 506															
Non-Permeate Gas	S20,S48	BH-FQI-004	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	21303.79	7.61	Major	Yes	n/a	n/a
Gas Oil-001	S20,S48	CHP-FQI-1,CHP-FQI-2	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	3699.45	1.32	Minor	Yes	n/a	n/a
BH-Gas-001	S18,S20,S22	BH-FI-016	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	8304.83	2.97	Major	Yes	n/a	n/a
C1-001 (Natural Gas)	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S29,S31,S	FI225,FI15,FI228,FIC 1103	<1.5%	Standard	4	3	3	N/A	1	N/A	N/A	17490.35	6.25	Minor	Yes	n/a	n/a

Source Stream Refs.	Emission Source Refs.	Measurement Device Refs.	Overall Metering Uncertainty (less than +/- %)	Applied Monitoring Approach	Activity Data Tier Applied	Net Calorific Value Tier Applied	Emission Factor Tier Applied	Carbon Content Tier Applied	Oxidation Factor Tier Applied	Conversion Factor Tier Applied	Biomass Fraction Tier Applied	Estimated Emissions $tCO_{2(e)}$	% of Total Estimated Emissions	Source Category	Highest Tiers Applied	Justification for not applying the highest tiers	Improvement Plan Reference (where applicable)
	33,S49,S50,S51,S53																
C3-001	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S31,S33,S49,S50,S51,S53	FI 225,FI 15,FI 228	<2.5%	Standard	3	3	3	N/A	1	N/A	N/A	500	0.18	De-minimis	Yes	n/a	n/a
HP-002	S30,S32,S52	GZ-FI-20,GZ-FI-19,GZ-FI-11,GZ-FQI-16,GZ-FI-14	<7.5%	Standard	3	3	3	N/A	1	N/A	N/A	7182.2	2.57	Major	Yes	n/a	n/a
Gas Oil-002	S35,S36,S37,S	BOW-001	<7.5%	Standard	No tier	3	3	N/A	1	N/A	N/A	127.41	0.05	De-minimi	Yes	n/a	n/a

Source Stream Refs.	**Emission Source Refs.**	**Measurement Device Refs.**	**Overall Metering Uncertainty (less than +/- %)**	**Applied Monitoring Approach**	**Activity Data Tier Applied**	**Net Calorific Value Tier Applied**	**Emission Factor Tier Applied**	**Carbon Content Tier Applied**	**Oxidation Factor Tier Applied**	**Conversion Factor Tier Applied**	**Biomass Fraction Tier Applied**	**Estimated Emissions $tCO_{2(e)}$**	**% of Total Estimated Emissions**	**Source Category**	**Highest Tiers Applied**	**Justification for not applying the highest tiers**	**Improvement Plan Reference (where applicable)**
	38,S39,S40,S41,S42,S43,S44,S45													s			
GSL-001	S46	LAB-KE	<10.0%	Standard	No tier	No tier	No tier	N/A	1	N/A	N/A	6.3	0	De-minimis	Yes	n/a	n/a
Coke	S34	REGEN-001	<10.0%	Standard	No tier	N/A	No tier	N/A	N/A	1	N/A	85.44	0.03	De-minimis	Yes	n/a	n/a
C3-002	S47	PROP-2-LAB	<10.0%	Standard	No tier	2a	2a	N/A	1	N/A	N/A	11.12	0	De-minimis	Yes	n/a	n/a

Total Estimated Emissions for Calculation (tonnes $CO_{2(e)}$) 279770.29

u. Uncertainty Calculations

The table below lists evidence attached to the application that demonstrates compliance with the applied tiers in accordance with Article 12 of the MRR.

Attachment	**Description**
1-A GHG Orifice Meter Uncertainty Report Rev A1.docx	Orifice Meter Uncertainty Report A1 Sep 2015
1-B GHG Meter Configuration Master Sep 2015.xlsx	GHG Meter Configuration Sep 2015
GZFI19 VA Accuracy.pdf	GZFI19 uncertainty
1-B GHG Meter Configuration Master Updated for GZ_FI-19 Aug 2018.xlsx	Meter uncertainty calculations updated August 2018
1-B GHG Meter Configuration Feb 2020.xlsx	Meter Configuration Feb 2020
AEMV10343-P3-04_Signed.pdf	Permit Variation Letter Feb 2020
FI 225 Uncertainty Calc 2020-02-19 SR.xlsx	Revised Uncertainty for FI 225 Feb 2020
FI 228 Uncertainty Calc 2020-02-19 SR.xlsx	Revised Uncertainty for FI 228 Feb 2020
FIC 203 Uncertainty Calc (1000 Nm3) 2020-02-18 SR.xlsx	Revised Uncertainty for FIC 203 Feb 2020
FIC 204 Uncertainty Calc (500 Nm3) 2020-02-18 SR.xlsx	Revised Uncertainty for FIC 204 Feb 2020
FIC 207 Uncertainty Calc (789.8 Nm3) 2020-02-18 SR.xlsx	Revised Uncertainty for FIC 207 Feb 2020
FIC 506 Uncertainty Calc (1200 Nm3) 2020-02-18 SR.xlsx	Revised Uncertainty for FIC 506 Feb 2020
FT 417 Uncertainty Calc 2020-02-19 SR.xlsx	Revised Uncertainty for FT 417 Feb 2020
FT 419 Uncertainty Calc 2020-02-19 SR.xlsx	Revised Uncertainty for FT 419 Feb 2020

v. Applied tiers

Applied tiers for each source stream

Source Stream Ref.	Emission Source Refs.	Activity Data Tier Applied	Net Calorific Value Tier Applied	Emission Factor Tier Applied	Carbon Content Tier Applied	Oxidation Factor Tier Applied	Conversion Factor Tier Applied	Biomass Fraction Tier Applied
HP-001	S1,S3,S5,S7,S15,S17,S24	4	3	3	N/A	1	N/A	N/A
LP-001	S1,S3	4	3	3	N/A	1	N/A	N/A
GGD7-001	S9,S11,S13,S16	4	3	3	N/A	1	N/A	N/A
Non-Permeate Gas	S20,S48	4	3	3	N/A	1	N/A	N/A
Gas Oil-001	S20,S48	4	3	3	N/A	1	N/A	N/A
BH-Gas-001	S18,S20,S22	4	3	3	N/A	1	N/A	N/A
C1-001 (Natural Gas)	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S29,S31,S33,S49,S50,S51,S53	4	3	3	N/A	1	N/A	N/A
C3-001	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S31,S33,S49,S50,S51,S53	3	3	3	N/A	1	N/A	N/A
HP-002	S30,S32,S52	3	3	3	N/A	1	N/A	N/A
Gas Oil-002	S35,S36,S37,S38,S39,S40,S41,S42,S43,S44,S45	No tier	3	3	N/A	1	N/A	N/A
GSL-001	S46	No tier	No tier	No tier	N/A	1	N/A	N/A

Source Stream Ref.	Emission Source Refs.	Activity Data Tier Applied	Net Calorific Value Tier Applied	Emission Factor Tier Applied	Carbon Content Tier Applied	Oxidation Factor Tier Applied	Conversion Factor Tier Applied	Biomass Fraction Tier Applied
Coke	S34	No tier	N/A	No tier	N/A	N/A	1	N/A
C3-002	S47	No tier	2a	2a	N/A	1	N/A	N/A

w. Justification for Applied tiers

Justifications for the applied tiers for each major source stream where highest tiers are not currently achieved.

Source Stream Ref.	**Emission Source Refs.**	**Justification for the applied tier**	**Improvement Plan Reference (where applicable)**
N/A	N/A	N/A	N/A

10. Calculation Factors

x. Default Values

The table below lists, for each parameter, where default values are to be used for calculation factors.

Source Stream Refs.	Emission Source Refs.	Parameter	Reference Source	Default Value applied (where appropriate)
HP-001,HP-002	S1,S15,S17,S24,S3,S30,S32,S5,S52,S7	OxF	M&RR Annex VI	1
LP-001	S1,S3	OxF	MRR Annex VI	1
GGD7-001	S11,S13,S16,S9	OxF	MRR Annex VI	1
C3-001	S10,S12,S14,S19,S2,S21,S23,S25,S26,S27,S28,S31,S33,S4,S49,S50,S51,S53,S6,S8	OxF	MRR Annex VI	1
C1-001 (Natural Gas)	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S29,S31,S33,S49,S50,S51,S53	OxF	MRR Annex VI	1
BH-Gas-001	S18,S20,S22	OxF	MRR Annex VI	1
Gas Oil-001	S20,S48	OxF	MRR Annex VI	1
Non-Permeate Gas	S20,S48	OxF	MRR Annex VI	1
Gas Oil-002	S35,S36,S37,S38,S39,S40,S41,S42,S43,S44,S45	OxF	MRR Annex VI	1
C3-002	S47	OxF	MRR Annex VI	1
GSL-001	S46	OxF	MRR Annex VI	1
GSL-001	S46	EF	MRR Article 3 Definition 13	3.06999
Coke	S34	EF	MRR Article 3 Definition 13	3.19
Coke	S34	Conversion Factor	Article 3-Definition 15 of the	1

Source Stream Refs.	Emission Source Refs.	Parameter	Reference Source	Default Value applied (where appropriate)
			MRR 2012	

Sampling and Analysis

Do you undertake sampling and analysis of any of the parameters used in the calculation of your CO_2 emissions? Yes

y. Analysis

The table below lists, for each source stream, where calculation factors are to be determined by analysis.

Source Stream Refs.	Emission Source Refs.	Parameter	Method of Analysis	Frequency	Laboratory Name	Laboratory ISO17025 Accredited	Evidence Reference
HP-001	S1,S3,S5,S7,S15,S17 ,S24	NCV	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
LP-001	S1,S3	NCV	Gas Chromatogrpahy	Daily	Whitegate Refinery Laboratory	Yes	n/a
GGD7-001	S9,S11,S13,S16	NCV	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
Non-Permeate Gas	S20,S48	NCV	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
Gas Oil-001	S20,S48	NCV	ASTM D240	6 times annually	SGS Nederland B.V.-Oil, Gas & Chemical Services	Yes	n/a
BH-Gas-001	S18,S20,S22	NCV	Gas Chromatogrpahy	Daily	Whitegate Refinery Laboratory	Yes	n/a
C1-001	S2,S4,S6,S8,S10,S12 ,S14,S19,S21,S23,S	NCV	Gas Chromatography	Continuous	in-line analysis. Validated annually	Yes	n/a

Source Stream Refs.	Emission Source Refs.	Parameter	Method of Analysis	Frequency	Laboratory Name	Laboratory ISO17025 Accredited	Evidence Reference
	25,S26,S27,S28,S29,S31,S33,S49,S50,S51,S53				by EffecTech UK - ISO 17025 accredited		
C3-001	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S31,S33,S49,S50,S51,S53	NCV	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
Gas Oil-002	S35,S36,S37,S38,S39,S40,S41,S42,S43,S44,S45	NCV	ASTM D240	6 times annually	SGS Nederland B.V.-Oil, Gas & Chemical Services	Yes	n/a
HP-002	S30,S32,S52	NCV	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
C3-002	S47	NCV	Gas Chromatogrpahy	Daily	Whitegate Refinery Laboratory	Yes	n/a
HP-001	S1,S3,S5,S7,S15,S17,S24	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
LP-001	S1,S3	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
GGD7-001	S9,S11,S13,S16	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
C1-001	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S25,S26,S27,S28,S29,S49,S50,S51,S53	Carbon Content	Gas Chromatography	Continuous	in-line analysis. Validated annually by EffecTech UK - ISO 17025 accredited	Yes	n/a
C3-001	S2,S4,S6,S8,S10,S12,S14,S19,S21,S23,S	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a

Source Stream Refs.	Emission Source Refs.	Parameter	Method of Analysis	Frequency	Laboratory Name	Laboratory ISO17025 Accredited	Evidence Reference
	25,S26,S27,S28,S49 ,S50,S51,S53						
Non-Permeate Gas	S20,S48	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
BH-Gas-001	S18,S20,S22	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
HP-002	S30,S32,S52	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
C3-002	S47	Carbon Content	Gas Chromatography	Daily	Whitegate Refinery Laboratory	Yes	n/a
Gas Oil-001	S20,S48	Carbon Content	ASTM D5291	6 times annually	SGS Nederland B.V.-Oil, Gas & Chemical Services	Yes	n/a
Gas Oil-002	S35,S36,S37,S38,S3 9,S40,S41,S42,S43, S44,S45	Carbon Content	ASTM D5291	6 times annually	SGS Nederland B.V.-Oil, Gas & Chemical Services	Yes	n/a

Detail about the written procedures for the above analysis.

Where a number of procedures are used details of an overarching procedure which covers the quality assurance of analyses methods and links together individual analytical methods is listed.

Title of procedure	Fuel Gas Test and Data Handling Procedure
Reference for procedure	WG-TP010
Diagram reference	Equipment Calibration and Maintenance Procedure (WG-TP003)
Brief description of procedure. The description should cover the essential parameters and operations performed	The procedure for analysis of refinery gases is described in full in EN 15984. In summary, samples delivered to the Laboratory in Gas Bombs are connected directly to one of two Hi-Speed Refinery Gas Chromatographs (indicated above). The gas passes through a series of chromatographic columns which separates the gas into it's constituent components (Methane, Ethane, Carbon monoxide etcetera) and quantifies (Mol%) each by means of either of two types of detectors i.e. FID (Flame Ionisation Detector) and TCD (Thermal Conductivity Detector). Once quantified the contribution of each component to the overall carbon content and calorific value is determined. Natural Gas analysed continuously by inline, approved ISO 17025 Gas Chromatograph. ISO 10723 (Natural Gas performance evaluation for analytical systems) and ISO 6976: (Natural Gas calculation of calorific value, density relative density and Wobbe-index) apply. See attached accreditation and sampling certificate in additional information section. Gas Oil analysed 6 times anually by SGS ISO17025 lab. A full tank at the end of each two month period is taken as representative and a top, middle and bottom sample is taken as per EN ISO 3170:2004 (Petroleum Liquid-Manual Sampling). The three half litre samples are made up into a 1 litre composite sample, which is then labelled and sent off to an outside laboratory in the Netherlands which has ISO 17025 certification for analysis. See attached proof of certification from Dutch Accredidation Council RvA.
Post or department responsible for the procedure and for any data generated	Laboratory Lead, Technical Department
Location where records are kept	Whitegate Refinery Laboratory
Name of IT system used	Records are primarily paper based however results are entered into our Thermo Scientific LIMS (laboratory Information management system).
List of EN or other standards applied	ISO 17025, EN 15984, ASTM D240, ASTM D5291-09, ISO 10723, ISO 6976

z. Sampling Plan

Details about the procedure covering the sampling plan for the analysis table above.

The procedure below covers the elements of a sampling plan as required by Article 33 of the MRR. Where a number of procedures are used, details of an overarching procedure which covers the sampling methods and links together individual sampling methods are listed.

Attachment	**Description**
TP002 Sampling, receipt, handling and disposal of Refinery Fuel Gases.doc	Refinery Fuels Gas Samples
ISO17025-Whitegate Lab.pdf	Whitegate Lab ISO17025 Accreditation Cert
Phillips-66-Whitegate-Refinery-Ltd-258T.pdf	Current Laboratory Accreditation Cert.

Title of procedure	Sampling, receipt, handling and disposal of Refinery Fuel Gases
Reference for procedure	WG-TP002
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Basically sampling is mandatory once daily for all fuel gases on site. This procedure covers the receipt of this sample and how it is tracked through the system until disposed. The gas oil samples are sampled externally six times annually. Natural Gas analysed continuously by inline, approved ISO 17025 Gas Chromatograph. See attached accreditation and sampling certificate in additional information section. Gas Oil analysed 6 times anually by SGS ISO17025 lab. A full tank at the end of each two month period is taken as representative and a top, middle and bottom sample is taken as per EN ISO 3170:2004 (Petroleum Liquid-Manual Sampling). The three half litre samples are made up into a 1 litre composite sample, which is then labelled and sent off to an outside laboratory in the Netherlands which has ISO 17025 certification for analysis. See attached proof of certification from Dutch Accredidation Council RvA.
Post or department responsible for the procedure and for any data generated	Laboratory Lead, Technical Departments for sample tracking purposes
Location where records are kept	Whitegate Refinery Laboratory
Name of IT system used	Thermo Scientific LIMS system
List of EN or other standards applied	EN ISO 3170:2004 (Petroleum Liquid-Manual Sampling)

aa. Sampling Plan Appropriateness

The procedure to be used to revise the appropriateness of the sampling plan.

Title of procedure	Compulsory Training-Auditing. Also ISO 17025 audit annually by INAB. Also Corporate Audit Std
Reference for procedure	Human Resources-Training Module. HSE Dept Policies and Governance
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Level 2 auditing procedure. The procedure ensures that elements of the sampling plans can be updated where

	analytical results indicate that the heterogeneity of the fuel differs from the original information on which the sampling plans were based or where results indicate that derived samples are not representative.
Post or department responsible for the procedure and for any data generated	HSE department
Location where records are kept	HSE department and HR Department
Name of IT system used	N/A
List of EN or other standards applied	N/A
Are stock estimates carried out as part of the emission calculations?	No

bb. Tracking Instruments

The procedure used to keep track of instruments installed in the installation used for determining activity data.

Title of procedure	Management of Green House Gas Instrumentation
Reference for procedure	WG-TD-12
Diagram reference	N/A
Brief description of procedure.	Flow transmitter calibration checks are performed annually (except in the case of FRCs, that can only be isolated from the control loop when the unit is shutdown). Flow elements themselves are inspected / serviced / replaced at least once every 5 years during a major turnaround. Instruments used for pressure and temperature compensation of the flow meters are maintained and calibrated annually. Flow-meters such as Coriollis meters and Ultrasonic flow-meters can only be fully calibrated by verification against a reference meter. This involves installing a reference meter in series with the meter under test or sending the meter away to an outside test facility. At present there are no such facilities in Ireland. However these meters may have an electronic verification option available. This option is an acceptable form of calibration provided there are no physical changes or damage to the meter. Instrumentation used for pressure, temperature and S.G. compensation of GHG flow-meters will be calibrated, maintained, managed and reported on the same as GHG flow-meters. Any significant unscheduled downtime, or otherwise recording inaccuracy, of these metering devices (including failed calibration checks) should be reported in a timely

	manner to the Environmental Lead. Relevant flow-meter and analyser calibration certificates/records, and supporting documentation in respect of the maintenance and calibration of these devices, must be kept for a period at least equal to the EU ETS obligatory retention period of 10 years. Pressure and temperature compensation of the flow-meters is done in the DCS using a standard algorithm. Access to this function is through the engineer security key only. The test instruments used for the calibration of all instruments involved in the measurement of fuel must be tested and calibrated by an approved calibration company and certificates of these calibrations or a reference to the location must be kept on file with the meter calibrations. Where a contract company is employed to do calibrations of the refinery fuel meters they must follow this procedure and they must have their detailed PPM and calibration procedures approved by refinery Lead Instrument & Electrical Engineer.
Post or department responsible for the procedure and for any data generated	Instrument & Electrical Engineer Lead, Whitegate Refinery, Whitegate
Location where records are kept	Maintenance, Whitegate Refinery, Whitegate
Name of IT system used	N/A
List of EN or other standards applied	N/A

11. Management

cc. Monitoring and Reporting Responsibilities

Responsibilities for monitoring and reporting emissions from the installation are listed below:

Relevant job titles/posts and provide a succinct summary of their role relevant to monitoring and reporting are listed below.

Job Title / Post	**Responsibilities**
HSE Lead	Ensuring overall compliance with the facilities green house gas measurement and reporting requirements. Attends weekly and monthly meetings which assess the accuracy of GHG data. The HSE Lead is a designated Primary Account Representative(PAR).
Environmental Lead	a) Developing the strategy to remain in full compliance with all legal and other obligations in respect of the monitoring and reporting of Greenhouse Gases to the EU Emissions Trading Scheme and others. b) Maintaining this procedure. c) Ensuring that key personnel are aware of their responsibilities as detailed in this procedure. d) Training a nominee (as appropriate) and a deputy in the use of the CO2 emissions calculation spreadsheets and other activities as defined by the responsibilities as detailed below. e) Ensuring that independent verification of GHG emissions data is undertaken by a UKAS-accredited verification body in accordance with the terms of the EU ETS. f) Reporting of GHG emissions/data to Regulatory and Corporate bodies. g) Using the internal (Management of Health, Safety & Environment Committee) MHSEC to highlight to the Refinery Leadership Team any deficiencies in respect to compliance with the Refinery's GHG Emissions Permit(2), the Commission's Monitoring & Reporting Regulation(1) and any other relevant requirements to which the organisation subscribes. h) The retention of calculation spreadsheets and supporting documentation for a period at least equal to the obligatory retention period of the EU ETS. i) Reporting of GHG emissions (actuals and forecasts) to the Corporate Commercial group in

Job Title / Post	**Responsibilities**
	accordance with prevailing guidance, and supplying GHG emissions forecasts to the Lead Strategic Planner for use in the corporate Long Range Planning process. j) Assigning Level 2 Health, Safety & Environmental [HSE] audits on the subject of 'EU ETS compliance' in accordance with the Environmental Auditing Procedure and the associated L2 audit programme, and helping the audit teams to develop their audits plans. k) Maintaining the process of collecting and recording monthly fuel deliveries of diesel/gas oil by bowser to fixed equipment on site
Instrument/Electrical Supervisors	a) The maintenance and calibration of relevant flow metering devices as listed in the Refinery's GHG Emissions Permit (3), in accordance with the scheduled routines and production of appropriate records. b) Reporting any significant unscheduled downtime, or otherwise recording inaccuracy, of these metering devices in a timely manner to the Environmental Lead or his nominee. c) The scheduling of Planned Preventative Maintenance (PPM) routines for flow measurement devices (flowmeters) through SAP in accordance with the requirements of the EU ETS and as laid out in this procedure.
Laboratory Leader	a) Implementation and maintenance of the ISO17025 standard in the onsite laboratory for the analysis of Refinery fuel gas samples. b) Maintenance and calibration of analytical equipment in the Refinery Laboratory that is used for testing of fuel gas samples. Conducting inter laboratory testing and or proficiency testing to demonstrate the accuracy of the onsite laboratory and to comply with the requirements of the EU Regulations and the ISO17025 standard. c) Responsible for ensuring all fuel gas samples are correctly processed once they are submitted for analysis. This includes ensuring GC data is correctly transferred into the LIMS system. Responsible for carrying out periodic checks of the data flow system to ensure submitted data is a true and accurate assessment of the fuel
Advanced Process Control Engineer	a) The maintenance and development of the Refinery's plant information (PHD) system and its

Job Title / Post	**Responsibilities**
	interfaces, and to keep records of the reliability of the system. b) Advising the Environmental Lead of any scheduled downtime of the PHD system so that alternate means can be put in place to recover the 'missing' data (e.g. printed trends from PHD history). c) Working with the Environmental Lead to introduce new PHD tags for the improved recording and tracking of calculated CO2 emissions and/or constituent activity or compositional data.
Process Fuel Engineer	a) Producing the monthly Refinery fuel gas consumption figures and storing these in a secure project workspace within the common drive for the Environmental Lead (or nominee), Energy Coordinator or other authorised personnel to access. b) The maintenance and up keep of the Molecular Weights spreadsheet, Plant Fuel Usage spreadsheet and CO2 spreadsheets. Ensuring checks are carried out regularly on all fuel stream data to ensure compliance with the various tier requirements. Maintains a malfunctions spreadsheet to identify any measurement defects in the fuel system and corrects data which is not a correct assessment of fuel conditions. Attends weekly and monthly meetings which assess the accuracy of GHG data
Energy Co-Ordinator	Has responsibility for organising monthly reviews of CO2 data to ensure a select group review and assess the accuracy and validity of monthly data. Carries out cross checks of fuel data to identify improvement opportunities and efficiency projects which can reduce GHG. Attends weekly and monthly meetings which assess the accuracy of GHG data
Senior Process Superintendent	Responsible for ensuring process fuel gas streams are sampled as per Section A4.4 of the Monitoring and Reporting Plan. Also responsible for ensuring process operators have sufficient training to ensure samples are labelled and identified correctly prior to submission to the laboratory for analysis.
IT Leader	a) The maintenance and development of the Refinery's computer networks and systems where much of the data and calculations relevant to the EU ETS is stored. The provision of a 100% reliable back-up system for the retrieval of 'lost' data due to either power or network failure. b) The introduction the Corporate Document & Records Retention Policy is such a way that the

Job Title / Post	Responsibilities
	regulatory retention period for the EU ETS (currently 10 years) is not compromised.

Attachment	Description
N/A	N/A

dd. Assignment of Responsibilities

Details of the procedure used for managing the assignment of responsibilities for monitoring and reporting within the installation and for managing the competencies of responsible personnel in accordance with Article 58(3)(c) of the MRR:

This procedure identifies how the monitoring and reporting responsibilities for the roles identified above are assigned and how training and reviews are undertaken.

Title of procedure	MOC For Organisational And Personnel Change
Reference for procedure	WG-SOP-67
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	All personnel assigned responsibilities relating to the monitoring and reporting of Greenhouse Gas emissions are qualified, experienced personnel. The review group who assess data validity on a monthly basis are senior plant personnel with many years experience in refining operations. Before any individual is replaced on the GHG reporting team a detailed handover is performed to ensure incoming personnel are fully aware of the responsibilities and expectations of the position been taken. SOP 67 of our Standard Operating Procedures requires that all personnel changes are managed and implemented correctly to ensure function competence is maintained. The purpose of the standard is to ensure a systematic method to evaluate proposed organizational and personnel changes within Refining affecting operations, emergency response, process safety and mechanical integrity, and HSE responsibilities. The objective is to identify and evaluate the risks to the business arising from the change and then implement the steps necessary to mitigate those risks. Organizational changes is evaluated and documented by a Management Of Organisational Change (MOOC) team comprised of an appropriate mix of experience and skills to properly assess the change. MOOC teams shall have a minimum of two members but for complex changes will be comprised of membership similar to a Process Hazard Analysis team. Factors considered in the formation of the team include, experience, understanding of Human Factors, technical capability, organizational and business expertise, and knowledge of risk management principles. Each position that is being changed, moved, or eliminated shall be assessed to ensure all GHG reporting and monitoring responsibilities are maintained. An assessment is made and instruction is given on the appointment of new personnel to the GHG reporting team. This ensures competency of personnel in fulfilling defined roles.
Post or department responsible for the procedure and for	Environmental Lead

any data generated	
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

ee. Monitoring Plan Appropriateness

Details of the procedure used for regular evaluation of the monitoring plan's appropriateness covering in particular any potential measures for the improvement of the monitoring methodology:

Title of procedure	Audit to ensure Whitegate Refinery compliance with Greenhouse Gas Emission Licence
Reference for procedure	Level 2 Auditing Procedure
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Overall compliance with the greenhouse gas emission licence is an extensive topic with multiple variable and contributory aspects. Certain aspects are independently verified by certified external bodies such as INAB (Irish National Accreditation Board) for laboratory fuel gas testing.Orifice Meters (Calibration and Maintenance). Accuracy of greenhouse gas emission reporting is hugely dependent on the reliability of the information provided by the 17 orifice meters used on site. This procedure covers the auditing of Douglas Calibration Services (DCS) the company which provides calibration services for the 17 orifice meters used on site as well as an audit of the current Whitegate Refinery Greenhouse Gas Monitoring and reporting plan. The current Version of the M&RP includes for CO2 emissions and calculations based on maximum throughputs of all the units on site. A capacity increase will require submission of a revised M&RP and an application for a revised Green House Gas licence. A revised IPPC licence would also be required. Monitoring plan appropriateness is reviewed by on-site personnel periodically and prior to any changes in emission sources, source streams and metering and fuel analysis. All reviews cover checking emission sources and source streams for completeness and that any changes have been taken into account, assessing compliance with uncertainty thresholds for activity data and assessing potential measures for improvement of monitoring methodology.
Post or department responsible for the procedure and for any data generated	Energy Co-ordinator
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

ff. Data Flow Activities

Details of the procedures used to manage data flow activities in accordance with Article 57 of the MRR:

Title of procedure	Monitoring and Reporting Procedure V8
Reference for procedure	Whitegate GHG M & R Procedure
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Refinery CO2 emissions from combustion of fuels are calculated from fuel flows and the carbon content of the respective fuels from site specific analysis. Fuel consumption is measured by meters and flow transmitters located on the fuel supply lines to each process unit. The refinery fuel streams and respective metering systems, as detailed in the EPA approved Monitoring and Reporting Proposal are as follows: Fuel gas analysis is carried out on a daily basis, natural gas analysis is obtained from the natural gas supplier gas chromatograph, and for liquid fuel, gasoil, analysis is carried out 6 times per year by an external laboratory. For the deminimis source streams, Gasoil 002, C3 002 and GSL 001 fuel flows are estimated. Gasoil 002 emission factors are as per main Gasoil, C3 002 emission factors are EPA default values and GSL 001 emission factors are EPA approved estimate values. There are also deminimis process CO2 emissions from catalyst regeneration.
Post or department responsible for the procedure and for any data generated	Energy Co-ordinator
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A
List of primary data sources	Metering Results, Laboratory reports
Description of the relevant processing steps for each specific data flow activity. Identify each step in the data flow and include the formulas and data used to determine emissions from the primary data. Include details of any relevant electronic data processing and storage systems and other inputs (including manual inputs) and confirm how outputs of data flow activities are recorded	The DCS calculated flow rates are stored in an industry standard PHD (Process Historian Data) collector and from there into a dedicated PHD Server under individual tag numbers which calculates minute, hourly, or daily average data as required. Similarly, the DCS connect to the natural gas Gas Chromatograph to get a daily average of the composition and calorific value. This information is stored in a Natural gas file and exported to the 'Plant fuel Usage' file in a similar fashion as described below. The data is imported from the PHD database to a spreadsheet 'Plant Fuel Usage' where the flows are downloaded to their associated process unit e.g. crude unit, HDS unit etc. Within this spreadsheet the downloaded normalised flow rates (Nm3/hr) are converted and further compensated for variation in density, to a mass basis (kg/hr) by utilizing the daily fuel molecular weight, calculated from daily fuel compositional analysis in the molecular weight analysis spreadsheet. The exceptions to this are the boiler and CHP

gasoil flows which are manually read meters.

The 'Plant fuel usage' spreadsheet is laid out in a daily sequential order, which allows for daily tracking of the overall plant fuel usage as well as the fuel usage associated with each process unit and total usage of each individual fuel.

The Lab Information Monitoring System information for refinery fuel gases is imported into a molecular weight analysis spreadsheet from where daily C% and NCV is obtained for CO2 calculation and daily MW data for 'Plant fuel use' mass flow calculation. For Gas oil the external analysis data is manually transferred from analysis reports to the CO2 calculation spreadsheet.

A CO2 emissions spreadsheet imports the activity data in tonnes from the 'Plant fuel usage' spreadsheet and imports the C% and NCV from the 'MW analysis' spreadsheet. CO2 is calculated from the fuel consumed, energy and carbon content in accordance with the monitoring and reporting regulations of greenhouse gas emissions pursuant to Directive 2003/87/EC. Similarly, for natural gas, the continuous analysis results from the in-line GC is imported to a spreadsheet and daily averages of the parameters (NCV, C%, density) are used to calculated CO2 emissions. The total determined CO2 emission figure for each month is fed into a monthly report spreadsheet which is reviewed and verified on a monthly basis by an interdisciplinary meeting.

Submit relevant documents to record data flow activities

Attachment	**Description**
N/A	N/A

gg. Assessing and Controlling Risks

Details of the procedures used to assess inherent risks and control risks in accordance with Article 58 of the MRR:

Title of procedure	Risk Assessment
Reference for procedure	WG-SOP-42
Diagram reference	N/A

Brief description of procedure. The description should cover the essential parameters and operations performed	To ensure compliance with specific company and legislative requirements where control measures are identified as necessary. This procedure describes the method of assessing, recording and reviewing risks
Post or department responsible for the procedure and for any data generated	Environmental Lead
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

hh. Quality Assurance of Metering / Measuring Equipment

Details of the procedures used to ensure quality assurance of measuring equipment in accordance with Article 58 and 59 of the MRR.

Title of procedure	Greenhouse Gas Monitoring and Reporting Procedure: Quality Assurance of Measurement Equipment and Information Technology
Reference for procedure	MRG Section 10.3.3
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Details of meter tolerances, range calculations & flow calculation checks and calibration or check frequencies are held in the "In-Tools" software. Planned Preventative Maintenance (PPM) routines have been established for these devices and their transmitters in accordance with manufacturer's recommendations; it is the responsibility of the Instrument/Electrical Supervisor and Technicians to carry out maintenance and calibration. A master spread sheet has been generated that contains all relevant information on GHG meters and ancillary equipment to track installation, operation, inspection, calibration, uncertainty and maintenance. The spread sheet will be managed and kept current by the refinery's E&I dept.
Post or department responsible for the procedure and for any data generated	Instrument/Electrical Supervisor
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

ii. Quality Assurance of Information Technology used for Data Flow Activities

Details of the procedures used to ensure quality assurance of information technology used for data flow activities in accordance with Article 58 and 60 of the MRR:

Title of procedure	Greenhouse Gas Monitoring and Reporting Procedure: Quality Assurance of Measurement Equipment and Information Technology
Reference for procedure	MRG Section 10.3.3
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	The control of information technology is carried out by the I.T. section who have extensive back up systems including off site secure information management facilities. All hard discs are backed up on a daily basis. In the very unlikely event of a failure of refinery back up power and storage systems, there is a ninety days period during which the data can be recovered from the offsite information management system. The procedure also describes how information technology is tested and controlled including access control and security.
Post or department responsible for the procedure and for any data generated	IT Leader
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

jj. Review and Validation of Data

Details of the procedures used to ensure regular internal reviews and validation of data in accordance with Articles 58 and 62 of the MRR.

Title of procedure	Greenhouse Gas Monitoring and Reporting Procedure: Internal Review of Reported Data
Reference for procedure	MRG Section 10.3.4
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	All data used in the CO2 emissions calculations must be thoroughly checked and validated by the Environmental Lead (or nominee) and by the Fuels Engineer prior to completion of the calculations. Although the spreadsheets include various checks to enable bad source data or mis-calculations to be spotted more easily, there is no substitute for a rigorous visual check of all the data. A computer operated and controlled by a Technical Department process engineer has access to this PHD Server. It contains three detailed excel spreadsheet programmes which are used in the calculation of our daily, weekly, monthly and annual CO2 emissions. The three programmes are titled, Fuel Calculation, Molecular Weight Calculation and CO2 Calculation. Our annual verification

process utilises these systems and programmes before verifying our total annual emissions.

The process engineer prepares a report for a weekly review meeting which is attended by senior Operations, Technical and HSE personnel. This meeting reviews all aspects of the week's performance including fuel and CO2 emissions. All trends and possible impacts on the environmental figures are discussed and reviewed and action items identified at this meeting are the subject of review and correction as may be necessary. A more detailed monthly review meeting follows where, the Technical Manager, HSE Manager or his deputy, the Lead process engineer, the Lead planner (laboratory operations) and the CO2 process engineer meet to review the past months performance. Once the data has been reviewed and the accuracy has been verified the monthly data is locked to further editing.

The annual Level 2 HSE Audit programme must include audit(s) on the subject of 'EU ETS Compliance' and this procedure. Two half-day, or one whole day, audit(s) per annum undertaken by a two-person audit team is appropriate. The audit(s) should test that the monitoring and reporting processes as documented in this procedure are robust and continue to be maintained (e.g. meter calibrations). To further strengthen this process Level 2 audit(s) should also include an internal review of reported data and calculations to supplement the checks made by the Environmental Lead (or nominee) and Fuels Engineer– see 6.4.1 above. Any deficiencies should be brought to the attention of the Environmental Lead or the HSE Lead, and Findings (issues of non-compliance) and agreed Next Steps should be recorded and tracked to closure.

Issues of non-compliance with the Refinery's GHG Emissions Permit, the Monitoring & Reporting Regulation and any other relevant requirements to which the organisation subscribes must be highlighted to the Leadership Team through annual review using the Environmental Management Review and Goal Setting Process, MHSEC.

As a consequence of the above it may be appropriate to include improvement items in the annual Targets and Objectives programme in accordance with the process.

Post or department responsible for the procedure and for any data generated	Environmental Lead & Fuels Engineer
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

kk. Corrections and Corrective Actions

Details of the procedures used to handle corrections and corrective actions in accordance with Articles 58 and 63 of the MRR:

Title of procedure	Greenhouse Gas Monitoring and Reporting Procedure: Corrections and Corrective Actions
Reference for procedure	MRG Section 10.3.6
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Any apparent erroneous or missing data must be thoroughly investigated. It is a permit condition that any deviation from the approved M&R methodology must be notified to the EPA immediately together with proposed data correction and corrective actions for EPA approval. Note that any under reporting of emissions data also carries significant civil penalties. The approved back-up, or replacement data must be clearly annotated in the relevant spreadsheets. The GHG Malfunction Register must be updated to detail: a. Unique reference number b. Date & time of any meter or defect or analysis error. c. Date of notification to maintenance department of defect. d. Date and time of effective repair / re-calibration. b. Date & time of notification to EPA e. Details of EPA agreed data correction method, including calculations
Post or department responsible for the procedure and for any data generated	Environmental Lead & Fuel Engineer
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

ll. Control of Outsourced Activities

Details of the procedures used to control outsourced processes in accordance with Articles 59 and 64 of the MRR.

Title of procedure	Greenhouse Gas Monitoring and Reporting Procedure:

	Outsourced Processes
Reference for procedure	MRG Section 10.3.5
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	The following processes are outsourced: • Annual transmitter calibrations • Meter health checks, and calibrations • Natural Gas sampling and analysis • SRAR and gasoil analysis QA/QC of external meter maintenance and calibration companies is achieved by: Ensuring any such company is accredited to a quality management standard, e.g. ISO9001. Audit to review: Test equipment certification and calibration records, competency statements and training, calibration and maintenance procedures and records and document control procedures. QA/QC of natural gas analysis is achieved by annual review of the GC ISO 17025 certificate and report and by continuous review of data for anomalies. QA/QC of the SRAR and gas oil analysis is achieved by annual review of the laboratory ISO17025 certificate for the carbon and NCV analysis of liquid fuels.
Post or department responsible for the procedure and for any data generated	Environmental Lead
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

mm. Record Keeping and Documentation

Details of the procedures used to manage record keeping and documentation:

Title of procedure	Greenhouse Gas Monitoring and Reporting Procedure: Records and Documentation
Reference for procedure	MRG Section 10.3.6
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Calculation spreadsheets and supporting documentation must be kept for a period at least equal to the obligatory retention period of the EU ETS. Information on our GHG calculation based methodology is held in this IT system for a minimum of 10 years as per Article 66 and Annex IX of the

	Monitoring and Reporting Regulations.
Post or department responsible for the procedure and for any data generated	IT Leader
Location where records are kept	Whitegate Refinery
Name of IT system used	N/A
List of EN or other standards applied	N/A

nn. Risk Assessment

The results of a risk assessment that demonstrates that the control activities and procedures are commensurate with the risks identified:

Attachment	Description
Greenhouse Gas Monitoring and Reporting Procedure-Risk Assessment.doc	Risk Assessment of Data Control System

oo. Environmental Management System

Does your organisation have a documented Environmental Management System?	No

12. Changes in Operation

pp. Changes in Operation

Article 24(1) of Commission Decision 2011/278/EC requires that Member States must ensure that all relevant information about any planned or effective changes to the capacity activity level and operation of an installation is submitted by the operator to the competent authority by 31 December each year. Article 12(3) of the MRR further provides that Member States may require information to be included in the monitoring plan of an installation for the purposes of meeting these requirements.

Details of the procedure used to ensure regular reviews are carried out to identify any planned or effective changes to the capacity activity level and operation of the installation that have an impact on the installation's allocation:

The procedure specified below cover the following:

- planning and carrying out regular checks to determine whether any planned or effective changes to the capacity activity level and operation of an installation are relevant under Commission Decision 2011/278/EC; and
- Procedures to ensure such information is submitted to the competent authority by 31 December of each year.

Title of procedure	Management of Change
Reference for procedure	WG-SOP-62
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Procedures are implemented on-site to ensure that regular reviews are carried out to identify any planned or effective changes to the capacity, activity level and operation of the installation that have an impact on the installation's allocation. Where such changes occur the required information is included in the "application form amending amounts allocated free of charge" and submitted to the EPA by 31 December. The intent of the Management of Change document is to outline the way in which Whitegate Refinery manages change. Its scope is broad with references to other procedures that cover the different types of change. The ultimate goal of 'Management of Change' is to ensure that: a) The Safety, operability, maintainability and reliability of people, plant and equipment are not compromised. b) The Irving Oil Whitegate Refinery Environmental performance is not compromised. c) Changes are fully reviewed and formally authorised by appropriate personnel with relevant competency. d) All documentation, training and communication required as a consequence of a change take place and are recorded. Improved equipment and plant reliability is achieved by reducing the possibility of failures that occur as a result of an incorrect change or through non-communication of changes. Changes will be managed through EFCNs, ASCNs and Design Specs. Changes to the following items trigger the use of the

	Management of Change Procedure: • New or modified Product or Feed • Installation of new plant or equipment or change of design to existing plant or equipment etc. • Change to Work Processes and Work instructions • Change of Standard Operating Procedures • Changes in Legislation applicable to the facilities. • New chemicals.
Post or department responsible for the procedure and for any data generated	Environmental Lead
Location where records are kept	Whitegate Refinery
Name of IT system used	Livelink

13. Abbreviations

qq. Abbreviations Acronyms or definitions

Abbreviations acronyms or definitions that have been used in this monitoring plan:

Abbreviation	**Definition**
HP	High pressure (gas at ~3.65barg)
LP	Low pressure, <1 barg
Non Permeate Gas	Effluent from a membrane unit after a hydrogen rich gas for use in thr process has been removed

14. Additional Information

Any other information:

Attachment	Description
Bord gais calibration-Efftech ISO 17025 Accreditation.pdf	Bord Gais GC ISO 17025 Accredidation
Bord Gais Efftech Audit-Sampling procedure.pdf	Bord Gais GC Sampling Procedure pg 8 of 14
Bord Gais EN ISO 9001.pdf	Bord Gais EN ISO 9001 Accreditation
Fuel Gas Sampling cabinet.pdf	P66 Fuel Gas Sampling cabinet
P66 Whitegate Refinery fuel Gas sampling procedure.doc	P66 Whitegate Fuel Gas sampling Plan-see Attached diagram of Cabinet
SGS lab ISO 17025 Accredidation cert.pdf	SGS Lab ISO 17025 accreditation
Greenhouse Gas Monitoring and Reporting Procedure(Rev9-APR 2013).doc	GHG Monitoring and REporting Procedure Rev9 April 2013
SG5 Tech - capacity .pdf	Manufacturer's declaration of SG-5 capacity
Glanagow Calibration Report 2012.pdf	calculating CO2 emissions from the burning of Nat gas
Certificaat L092 2017 UK 05-2013.pdf	Gas oil analysis - lab accreditation
Orifice uncertainty calculations 2013.xls	Orifice Uncertainty Calculations and Justification
1-A GHG Orifice Meter Uncertainty Report Rev A2.docx	Orifice meter uncertainty
1-B GHG Meter Configuration Master Rev A2.xlsx	Meter configuration Dec 2015
Permit variation updates requested 2310.pdf	Operator request update variation
gas oil BH.pdf	Gas Oil uncertainty
Greenhouse Gas Monitoring and Reporting Procedure(Rev10-July 2016) .doc	Revised M&RP
Calculation of Emission factor used for Coke and GSL.doc	Description of determination of emission factors
Change of Name Certificate Irving Oil Whitegate Refinery Limited.pdf	Change of Name Cert Irving Oil Whitegate Refinery Limited
Change of Name Certificate Irving Oil Whitegate Holdings Limited.pdf	Cert Irving Oil Whitegate Holdings Limited
AEMV01343-P3-03 Flow Meter Replacement GZ_FI-19_Signed.pdf	Signed letter detailing proposed change to GZ-FI-19
AEMV10343-P3-4 GHG Flow Meter Ranges TA 19.pdf	GHG fuel gas flow meter range changes TA 2019_signed
AEMV10343-P3-4 GHG Flow Meter Ranges TA 19_Appendix 1.pdf	GHG Flow Meter Ranges TA 19_table
GHG Meter Cals New Orifice Ranges TA 19.pdf	GHG Flow Meter Calibrations_New Ranges TA 19

15. Confidentiality

rr. Confidentiality Statement

It is the Environmental Protection Agency's policy to make information received by it in the course of its work open to inspection by any person on request. This is in accordance with the provisions of the European Communities (Access to Information on the Environment) Regulations 2007 to 2011.

In the event that you considered that some of the information being submitted of a confidential nature, then the nature of this information and the reasons why it should be considered confidential, with reference to the European Communities (Access to Information on the Environment) Regulations 2007 to 2011 and any amendments must be explicitly requested using the facility below. The Board of the Environmental Protection Agency will consider the requests and if the information can be deemed as confidential and necessary.

Notwithstanding any request for confidentiality, the Environmental Protection Agency explicitly reserves the right to release data to the Commission, including emissions and allocations to the public, on the basis that the data will be used for the purposes foreseen in Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

Please tick this box if you consider that any part of your form should be treated as commercially confidential/sensitive:	false

END of Appendix I.