



Headquarters,
Johnstown Castle Estate,
County Wexford, Ireland

GREENHOUSE GAS EMISSIONS PERMIT

Permit Register Number: IE-GHG012-10342-5

Operator: MSD International GmbH (trading as
MSD Ireland (Ballydine))
Ballydine
Kilsheelan
Clonmel
Tipperary

Installation Name: MSD International GmbH (trading as
MSD Ireland (Ballydine))

Site Name:

Location: Ballydine
Ballydine, Kilsheelan
Clonmel
Tipperary
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 N^o IE-GHG012-10342.

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
P0011-05

Status Log

Current Permit

Permit number	Date application received	Date Permit issued	Comment
IE-GHG012-10342-5	07 July 2018	07 September 2018	<p>Addition of two new emission sources S13 Emergency Generator at Potable Water Plant (0.3MW, emission Point EFP 05)and S14 Utilities & Maintenance Equipment (0.45MW, emission Point EFP 06).</p> <p>Update of emission source S6 from North Firewater pump house - 3 pumps (0.7 MW) to S6 North Firewater pump house - 2 pumps (0.5 MW).</p>

Previous Permits

Permit number	Change Type	Date application received	Date Permit issued	Comment
IE-GHG012-10342-1	GHG Permit Application	25 June 2013	27 June 2013	
IE-GHG012-10342-2	GHG Variation	11 September 2014	22 April 2015	Inclusion of the source stream AC-1, Acetylene and associated emission source S11.
IE-GHG012-10342-3	GHG Variation	10 February 2016	11 March 2016	<p>Inclusion of the source stream VOC 1.</p> <p>Removal of reference to the Electric Thermal Oxidiser.</p>
IE-GHG012-10342-4	GHG Variation	08 July 2016	22 August 2016	Addition of a new emission source S12 (boiler no 4) emission point A1-2A. Removal of emission source S1 (boiler no. 1).

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)	MSD International GmbH (trading as MSD Ireland (Ballydine))
“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 transfers this Greenhouse Gas Emissions Permit, subject to any subsequent revisions, corrections or modifications it deems appropriate, to:

The Operator:

MSD International GmbH (trading as MSD Ireland (Ballydine))
Ballydine
Kilsheelan
Clonmel
Tipperary

Company Registration Number: 906390

from

The Former Operator:

Merck Sharp & Dohme (Ireland) Ltd.
Ballydine
Kilsheelan
Clonmel
Tipperary

to carry out the following

Categories of activity:

Annex 1 Activity
Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)

at the following installation(s):

MSD International GmbH (trading as MSD Ireland (Ballydine)) **Installation number: 10**

located at

Ballydine, Kilsheelan
Clonmel
Tipperary
Ireland

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

In accordance with Joint Declaration made to the Agency on 14 December 2010, *MSD International GmbH (trading as MSD Ireland (Ballydine))* is deemed to have assumed and accepted all liabilities, requirements and obligations provided for in or arising under the permit, regardless of how and in respect of what period, including the period 2005-2010, prior to the transfer of the permit, that may arise.

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.: 10

Activity Description
Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)

Directly Associated Activity Description
(S9) Wastewater Treatment

- 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
S2	Boiler No 2	14.45	MW
S3	Boiler No 3	20.7	MW
S4	Vapour (Fume) Incinerator	1.33	MW
S5	South firewater pump house - 2 pumps	0.45	MW
S6	North Firewater Pump house - 2 pumps	0.5	MW
S7	Emergency Absorber Pump House	0.1	MW
S8	Emergency Generator at surface water diversion facility	0.12	MW

Emission Source Reference	Emission Source Description	Capacity	Capacity Units
S10	Regenerative Thermal Oxidiser	1.26	MW
S11	Acetylene for oxy acetylene cutting	0	MW
S12	Boiler No 4	10.75	MW
S13	Emergency Generator at Potable Water Plant	0.3	MW
S14	Utilities & Maintenance Equipment	0.45	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. This shall include all annual emissions reports submitted by the Former Operator(s) in respect of the installation.
- 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.
- 3.16 Any discrepancies with regard to reports submitted by the Former Operator(s) in respect of this installation become the liability of the Operator.

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,

including any liabilities arising from the period before the permit was transferred. 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.

Sealed by the seal of the Agency on this the 07 September 2018:

PRESENT when the seal of the Agency was affixed hereto:

Ms. Annette Prendergast
Inspector/ Authorised Person

Appendix 1 to Greenhouse Gas Emissions Permit Number IE-GHG012-10342

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	MSD International GmbH (trading as MSD Ireland (Ballydine))
Site name	Ballydine
Address	Ballydine, Kilsheelan Clonmel Tipperary Ireland

Grid reference of site main entrance	233442E, 123303N
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Licence held pursuant to the Environmental Protection Agency Act 1992, as amended.	Yes
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IPC/IE Licence Register Number	Licence holder	Competent body
P0011-05	MSD International GmbH, trading as MSD Ireland (Ballydine)	Environmental Protection Agency

Has the regulated activity commenced at the Installation? Yes

Date of Regulated Activity commencement	01 January 2008
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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	MSD International GmbH (trading as MSD Ireland (Ballydine))
Company Registration Number	906390

Operator Legal status

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

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

Registered office address

Address Line 1	Ballydine
Address Line 2	Kilsheelan
City/Town	Clonmel
County	Tipperary
Postcode	N/A

Principal office address

Is the principal office address different to the registered office address? No

Holding company

Does the company belong to a holding company? No

(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

Ballydine
Kilsheelan
Clonmel
Co. Tipperary
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 site lies on the northern bank of the River Suir, approximately 6 km upstream of the town of Carrick-on-Suir.

MSD Ballydine is a modular "Bulk Pharmaceutical" and "R&D Formulation" manufacturing facility with the flexibility to produce a large number of varying products.

Bulk synthesis operations are conducted in the two Operating areas – Chem. Ops 1(Fac 01) and Chem. Ops 2 (Fac 03). Bulk pharmaceutical products are exported to finishing (formulation) plants around the world, where they are formulated into final dosage form and distributed to market outlets.

Formulation R&D is conducted in the Pharm Operations.

The Chem. Ops 1 production area is responsible for the production of bulk pharmaceutical products, small scale API processing, solvent recovery (Fac 02), bulk solvent storage and the operation of atmospheric abatement equipment including scrubber towers, thermal oxidisers and fume incinerator.

The Chem. Ops 2 production area is responsible for the production of bulk pharmaceutical products and operates site utilities and the Waste Water Treatment Plant.

The Pharm Operations facility supports research and development (R&D) and formulation of pharmaceutical products.

The 2 bulk pharmaceutical production areas consists of a "Wet" process area for chemical synthesis, purification, isolation and a "Dry" process for drying, milling, blending and packaging operations. In the "Wet" section of the Operating areas; liquid, solid and gaseous raw materials are mixed and processed in a variety of multi-purpose equipment, to produce batches of product using a variety of unit operations. The production areas are modular, computer controlled and vessels / modules can be inter linked by a central process manifold system.

Utility services including steam, cooling water, glycol refrigeration, heat transfer fluids, compressed air, potable and demineralised water are supplied on a continuous basis to the operating areas. The solid, liquid and gaseous wastes generated from process operations are treated by a number of abatement systems. Gaseous waste streams are treated

by a combination of the following abatement technologies, caustic and water scrubber towers, carbon absorption units, thermal oxidiser and a fume incinerator. The waste solvents generated ex processing are stored in bulk storage tanks. These are subsequently either recovered in the onsite solvent recovery facility or shipped to offsite solvent recovery or incineration facilities.

The site has a tertiary waste water treatment facility to treat biodegradable liquid wastes. Waste process solids are drummed for subsequent disposal by offsite incineration. The solids generated by waste water treatment and utilities operations are dewatered and, if required dried, prior to offsite disposal.

Pharmaceutical Operations is a stand alone facility, however, general utility services such as steam, water, and waste water treatment are provided by the existing site facilities.

Installed boiler capacity at the site is approximately 45.9 MW. Higher efficiency Boiler No. 4, S12 is the main boiler onsite and emits via Licenced stack EP A1-2A. Boiler No. 2 (S2) and/or No. 3 (S3) are operated in support of Boiler No. 4 when the site steam demand is high or during maintenance. Boilers No. 2 & 3 emit via Licenced stack EP A1-1. Natural gas is also utilised as support fuel in vapour/fume incinerator on the site. The natural gas fired Regenerative Thermal Oxidiser (TO No. 4) has been in operation as the primary process off-gas abatement technology since Q1 2015, with the Fume Incinerator (TO No. 3) retained as back-up. TO No.'s 1 & 2 have been decommissioned.

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
Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)	50.41	MW	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
MSD Ireland (Ballydine) S13 Emergency Generator at Potable Water Plant.pdf	Emergency Generator, S13, datasheet
MSD Ireland (Ballydine) S14 Utilities & Maintenance Equipment.pdf	Utilities & Maintenance Equipment, S14, datasheet

Attachment	Description
MSD Ireland (Ballydine) GHG Emission Point Layout Drawing 13EA2639.1.pdf	Site GHG Emission Point Layout Drawing 04July18
Copy of S13 S14 thermal input capacity calculations.xlsx	S13 S14 calculate thermal input capacity

i. Estimated Annual Emissions

Detail of the estimated annual emission of CO₂ 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 CO₂ excluding CO₂ from biomass.

Estimated Annual Emissions (tonnes CO_{2(e)}) 9131

Installation Category: A

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
S2	Boiler No 2
S3	Boiler No 3
S4	Vapour (Fume) Incinerator
S5	South firewater pump house - 2 pumps
S6	North Firewater Pump house - 2 pumps
S7	Emergency Absorber Pump House
S8	Emergency Generator at surface water diversion facility
S9	Wastewater Treatment

Emission Source Reference	Emission Source Description
S10	Regenerative Thermal Oxidiser
S11	Acetylene for oxy acetylene cutting
S12	Boiler No 4
S13	Emergency Generator at Potable Water Plant
S14	Utilities & Maintenance Equipment

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

Emission Source Reference	Emission Source Description
S2	Boiler No 2
S3	Boiler No 3
S4	Vapour (Fume) Incinerator
S5	South firewater pump house - 2 pumps
S6	North Firewater Pump house - 2 pumps
S7	Emergency Absorber Pump House
S8	Emergency Generator at surface water diversion facility
S10	Regenerative Thermal Oxidiser
S11	Acetylene for oxy acetylene cutting
S12	Boiler No 4
S13	Emergency Generator at Potable Water Plant
S14	Utilities & Maintenance Equipment

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 stack for Boilers 2, 3
A2-2	Vapour (Fume) Incinerator Stack
EFP 01	South Firewater pump house
EFP 02	North Firewater Pump house
EFP 03	Emergency Absorber Pump House
EFP 04	Emergency Generator at surface water diversion
EP1	Wastewater Treatment
A2-3	Regenerative Thermal Oxidiser

Emission Point Reference	Emission Point Description
AC 1	Oxyacetylene cutting torches utilised throughout the site,
A1-2A	Boiler stack for Boiler 4
EFP 05	Emergency Generator at Potable Water Plant
EFP 06	Utilities & Maintenance Equipment

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
NG- 1	Combustion: Other gaseous & liquid fuels	Natural Gas
DSL-01	Combustion: Commercial standard fuels	Gas/Diesel Oil
AC-1	Combustion: Other gaseous & liquid fuels	Acetylene
VOC 1	Combustion: Other gaseous & liquid fuels	Process off-gas VOC vapours.

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
NG- 1	S10,S12,S2,S3,S4	A1-1,A1-2A,A2-2,A2-3	Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)
DSL-01	S5,S6,S7,S8,S13,S14	EFP 01,EFP 02,EFP 03,EFP 04,EFP 05,EFP 06	Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)
AC-1	S11	AC 1	Combustion of fuels in installations with a total rated thermal input

Source streams (Fuel / Material)	Emission Source Refs.	Emission Point Refs.	Annex 1 Activity
			exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)
VOC 1	S4,S10	A2-2,A2-3	Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)

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? Yes

Detail of these activities:

Source Stream Refs	Emission Source Ref	Emission Point Ref
n/a	S9	EP1

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 CO₂ but exclude CO₂ stemming from biomass.

Does the installation satisfy the criteria for installations with low emissions (as defined by Article 47 of the MRR)? Yes

If the installation is an installation with low emissions as defined above there are a number of special provisions which may be applied to provide a simplified monitoring plan. These provisions are set out in Article 47 of the MRR.

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 ₂ O	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 CO₂ emissions:

NATURAL GAS

Natural gas is utilised in the steam boilers and as a support fuel in the fume incinerator and the new RTO. These areas qualify as "combustion sources" and are designated as qualifying emissions in the site GHG Permit. Overall gas usage is tracked on the site EM&T system in terms of "steam" distribution. Results are available to all relevant operating areas. The EM&T system generates periodic reports which are distributed to operating areas. Gas usage is reviewed and tracked by comparison to both historical and the current site B&E plan figures. Monthly vendor gas invoices are received by Procurement, Financial Services and S&E personnel in either electronic or paper form. Invoiced quantities of gas are compared to EM&T system figures to check for gross errors. Invoices are approved by Procurement or delegate. Invoice data for volume consumed, calorific value and gross KWH used are transcribed by S&E environmental staff and entered into monitoring and tracking spreadsheets. Copies of the invoices are also archived/saved for a period of 10 years as per Agency guidance. The natural gas volume reported in the monthly gas invoices is transcribed from the monthly invoices into the Carbon Dioxide Emissions Monitoring Spreadsheet and converted to a standardised gas volume corrected to a temperature of 273.15 K. The gross overall site KWH usage is transcribed by S&E staff into the Carbon Dioxide Emissions Monitoring Spreadsheet. The natural gas spreadsheet utilises approved Agency factors and current guidance to convert firstly to net KWH, secondly to Net Calorific Value Terra Joules, and finally to net tonnes of carbon dioxide by applying a factor to take account of combustion efficiencies. The output from the spreadsheet is Net Tonnes of Carbon Dioxide emitted.

DIESEL

Diesel is supplied for both stationary and transport uses. Separate grades of diesel are utilised for these sources and are tracked individually. Carbon dioxide emissions associated with the use of diesel in fixed stationary emission sources are licenced by the Agency. Diesel supplied to the firewater, potable water emergency absorber, surface water diversion and potable water plant backup engines, and used in the Utilities & Maintenance Equipment (back-up pumps, compressor, small generators, tower light & jet washer) is tracked to determine its contribution to the sites overall carbon dioxide emissions. Vendor invoices are received by Procurement, Financial Services and S&E personnel (transaction summary) in either electronic or paper form. Gross volume deliveries are transcribed by S&E staff into the Carbon Dioxide Emissions Monitoring Spreadsheet. Copies of the vendor transaction log (invoices) are also archived/saved for a period of 10 years as per Agency guidance. For diesel the spreadsheet utilises currently approved Agency factors to convert firstly to weight delivered, secondly to gross Terra Joules, thirdly to gross tonnes of carbon dioxide and finally applies a factor to take account of combustion efficiencies. The output from the spreadsheet is Net Tonnes of Carbon Dioxide emitted.

ACETYLENE

Acetylene is used for mobile oxy acetylene cutting torches at various site locations. Usage is taken to be the annual issue of new cylinders from the mechanical stores. The standard volume of each cylinder is taken as 10000lts. This is converted to weight using molar volumes at 20deg C and molecular weight. Standard Agency approved factors are utilised to convert the weight issued to firstly TJ and then tonnes of carbon dioxide.

CO2 FROM VOC OXIDISATION

Carbon dioxide emissions from the oxidation of VOC in the site abatement systems is included in the annual emissions report. VOC off-gas is oxidised to CO₂ and water in the sites main RTO thermal oxidiser and the backup Fume Incinerator. The Fume incinerator is utilised for short periods of time, estimated to be worst case less than 5% of site operating time. VOC's oxidised in the RTO are estimated by using the average of the 2 inlet LEL analysers and the waste gas and LEL control air flows to the unit. These values are entered into a calculation spreadsheet where LEL is converted to equivalent VOC concentration, for example Toluene, using known LEL to ppm/mg/m³ conversion factors. This is a conservative estimate of emissions. For Toluene, 100% of LEL is 1.2%v/v, or 46.gr/m³. Therefore 1% of LEL is equivalent to 0.46 gr/m³.

VOC content is calculated for each day of the year that the device is operated and the annual sum is converted to the stoichiometric quantity of CO₂ emitted (tonnes) using a factor of 3.347 tonnes of CO₂ to one tonne of Toluene. Published data indicate that the NCV for toluene is 0.00004059 TJ/kg. This figure will be applied to determine energy content (TJ). An oxidation factor of 1 is applied.

LEL is not measured at the inlet to the Fume incinerator, therefore the above method of calculation for VOC's oxidised in the Fume Incinerator cannot be used. Reductions in baseline gas usage, i.e. when no VOC is oxidised, is not a reliable indication of VOC's oxidised. Given the low operating time of the Fume incinerator the site utilises the highest RTO loadings observed in the periods preceding and following usage of the Fume Incinerator are utilised to calculate loading when the Fume incinerator is used as backup to the RTO.

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
NG- 1	S2,S3,S4,S10,S12	2637101001 (Duty/spare)	Turbine meter	230 - 3250	Nm3/h	1.41	On site Bord Gáis Networks Metering Station.
NG- 1	S2,S3,S4,S10,S12	2637101002 (Duty/Spare)	Turbine meter	230 - 3250	Nm3/h	1.41	On site Bord Gáis Networks Metering Station.
DSL-01	S5,S6,S7,S8,S13,S14	DSL meters - various truck deliveries	Rotary meter	na	litres	10	On delivery trucks
AC-1	S11	None	Bottles issued from mechanical stores	N/A	N/A	N/A	N/A
VOC 1	S4,S10	LEL analysers AI-S91376 and AI-S91476.FT-S90482 LEL control air. FT-S90382 Mod 48 waste gas. FT-S90282 S6 and S7 waste gas. FT-S90182 S4 waste gas.	LEL analysers and flow meters	Various	% LEL and m3/hr	n/a	Inlet to RTO

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
NG- 1	2637101001 (Duty/spare)	Continual	Trade partner	Yes	Yes	Yes
NG- 1	2637101002 (Duty/Spare)	Continual	Trade partner	Yes	Yes	Yes
DSL-01	DSL meters - various truck deliveries	Batch	Trade partner	Yes	Yes	Yes
AC-1	None	Batch	Operator	N/A	N/A	N/A
VOC 1	LEI analysers AI-S91376 and AI-S91476.FT-S90482 LEL control air. FT-S90382 Mod 48 waste gas. FT-S90282 S6 and S7 waste gas. FT-S90182 S4 waste gas.	Continual	Operator	N/A	No	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)
NG- 1	S2,S3,S4,S10,S12	26371 01001 (Duty/spare), 26371 01002 (Duty/ Spare)	<2.5%	Standard	3	2b	2a	N/A	1	N/A	N/A	8940.4	97.91	Major	Yes	n/a	n/a
DSL-01	S5,S6,S	DSL	N/A	Standard	No tier	2a	2a	N/A	1	N/A	N/A	10.7	0.12	De-	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)
	7,S8,S13,S14	meters - various truck deliveries		rd										minimis			
AC-1	S11	None	N/A	Standard	No tier	1	1	N/A	1	N/A	N/A	0.1	0	De-minimis	N/A	n/a	n/a
VOC 1	S4,S10	LEI analysers AI-S91376 and AI-S91476 .FT-S90482 LEL control air. FT-S90382 Mod 48 waste gas. FT-	N/A	Standard	No tier	No tier	No tier	N/A	1	N/A	N/A	180	1.97	De-minimis	No	Emissions are deminimus	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)
		S90282 S6 and S7 waste gas. FT-S90182 S4 waste gas.															

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

9131.2

u. 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
NG- 1	S2,S3,S4,S10,S12	3	2b	2a	N/A	1	N/A	N/A
DSL-01	S5,S6,S7,S8,S13,S14	No tier	2a	2a	N/A	1	N/A	N/A
AC-1	S11	No tier	1	1	N/A	1	N/A	N/A
VOC 1	S4,S10	No tier	No tier	No tier	N/A	1	N/A	N/A

v. 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)
VOC 1	S4,S10	Emissions are de minimus	n/a

10. Calculation Factors

w. 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)
NG- 1	S2,S3,S4,S10,S12	NCV	Supplier invoices - varying annually	n/a
NG- 1,DSL-01	S2,S3,S4,S5,S6,S7,S8,S10,S12,S13,S14	EF, Oxidation factor	EPA nationally published values	n/a
AC-1	S11	NCV, EF,Oxidation Factor	EPA nationally published values	n/a
VOC 1	S4,S10	EF	stoichiometric	3.347 t CO ₂ /tonne of Toluene
VOC 1	S10,S4	NCV	Published data	40.59 TJ/Kt
VOC 1	S10,S4	OxF	MRR	1
DSL-01	S5,S6,S7,S8,S13,S14	NCV	EPA nationally published values	n/a

Sampling and Analysis

Do you undertake sampling and analysis of any of the parameters used in the calculation of your CO₂ emissions? Yes

x. 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
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Source Stream Refs.	Emission Source Refs.	Parameter	Method of Analysis	Frequency	Laboratory Name	Laboratory ISO17025 Accredited	Evidence Reference
VOC 1	S10,S4	Carbon Content	LEL Analysers	Continuous	not applicable	No	LEL's are primary safety devices and are calibrated daily. The units are SIL2 approved.

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	Calibration of the LEL's is hard coded in the RTO PLC and maintained by the site PM(Preventative Maintenance) system as per manufacturer's requirements
Reference for procedure	Site and vendor operating Procedures for RTO.
Diagram reference	n/a
Brief description of procedure. The description should cover the essential parameters and operations performed	Calibration of the LEL's is hard coded in the RTO PLC and maintained by the site PM(Preventative Maintenance) system as per manufacturer's requirements.
Post or department responsible for the procedure and for any data generated	Duplicate SIL2 approved LEL analysers are provided. They operate continuously and are calibrated daily using certified calibration gases. The LEL data is stored on the PLC and transmitted to the site DCS and PI data repositories. LEL and waste gas flow data is extracted from the PI repository into spreadsheets and utilise to calculate the equivalent solvent, e.g. Toluene, content.
Location where records are kept	The Manufacturing, Automation and Maintenance groups are responsible the operation, programming and maintenance respectively.
Name of IT system used	Analysis data is retained by the site data repositories. Calibration records are maintained on the RTO PLC. Maintenance records are retained on the site PM system.
List of EN or other standards applied	RTO PLC. Plant DCS and PI data repositories. n/a

y. 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
ES POL 2 18 EMISSIONS TRADING MONITORING AND REPORTING PROCEDURE REV NO 6 0.doc	Emissions Trading Monitoring and Reporting Procedure.

Title of procedure	LEL measurement is continuous. Calibration of the LEL's is hard coded in the RTO PLC and maintained by the site PM(Preventative Maintenance) system as per manufacturer's requirements
Reference for procedure	Site and vendor operating Procedures for RTO.
Diagram reference	n/a
Brief description of procedure. The description should cover the essential parameters and operations performed	Duplicate SIL2 approved LEL analysers are provided. They operate continuously by design and are calibrated daily

<p>Post or department responsible for the procedure and for any data generated</p> <p>Location where records are kept</p> <p>Name of IT system used</p> <p>List of EN or other standards applied</p>	<p>using certified calibration gases. Flow measurements are made of all RTO inputs. The LEL and flow data is stored on the PLC and transmitted to the site DCS and PI data repositories. LEL and waste gas flow data is extracted from the PI repository into spreadsheets and utilise to calculate the equivalent solvent, e.g. Toluene, content. Flow measurements are made of all RTO inputs.</p> <p>The Manufacturing, Automation and Maintenance groups are responsible the operation, programming and maintenance respectively.</p> <p>Analysis and flow data is retained by the site data repositories. Calibration records are maintained on the RTO PLC. Maintenance records are retained on the site PM system.</p> <p>RTO PLC. Plant DCS and PI data repositories.</p> <p>n/a</p>
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z. Sampling Plan Appropriateness

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

<p>Title of procedure</p> <p>Reference for procedure</p> <p>Diagram reference</p> <p>Brief description of procedure. The description should cover the essential parameters and operations performed</p> <p>Post or department responsible for the procedure and for any data generated</p> <p>Location where records are kept</p> <p>Name of IT system used</p> <p>List of EN or other standards applied</p>	<p>The emissions associated with VOC oxidation is de-minimus. Not applicable</p> <p>The emissions associated with VOC oxidation is de-minimus. Not applicable</p> <p>N/A</p> <p>The emissions associated with VOC oxidation are de-minimus. Not applicable</p> <p>The emissions associated with VOC oxidation are de-minimus. Not applicable</p> <p>Analysis and flow data is retained by the site data repositories. Calibration records are maintained on the RTO PLC. Maintenance records are retained on the site PM system.</p> <p>N/A</p> <p>N/A</p>
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Are stock estimates carried out as part of the emission calculations? No

aa. Tracking Instruments

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

<p>Title of procedure</p>	<p>The site preventative maintenance keeps track of all instruments utilised to determine VOC oxidised activity level. These are LEL and flow meters.</p>
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Reference for procedure	PM procedure
Diagram reference	N/A
Brief description of procedure.	PM procedure determines the type and frequency of required maintenance and electronically tracks completion.
Post or department responsible for the procedure and for any data generated	Maintenance Department
Location where records are kept	Maintenanc Department
Name of IT system used	N/A
List of EN or other standards applied	N/A

11. Management

bb. 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
Financial Services	Process invoices and payments
Procurement	Approve invoice payments
S&E Chemists	Tabulate data and perform roles as set out in procedure ES Pol 2.18.

Attachment	Description
N/A	N/A

cc. 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	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES POL 2.18
Diagram reference	Appendix 1. M&R Roles and Responsibilities Flow Sheet
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines the monitoring and reporting responsibilities for each job post (as per diagram reference) and documents the training requirements to be completed in accordance with the approved training matrix (Peoplesoft Code IE4973)
Post or department responsible for the procedure and for any data generated	S&E Chemists
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

dd. 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	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES POL 2.18
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines that approvals are sought by S&E staff prior to the implementation of any modification that could materially alter the nature or extent of carbon dioxide emissions. The procedure used for regular evaluation of the monitoring plan's appropriateness includes, checking on a regular basis the list of emissions sources and source streams, ensuring completeness of the emissions and source streams and that all relevant changes in the nature and functioning of the installation are included in the monitoring plan, assessing compliance with the uncertainty thresholds for activity data and other parameters (where applicable) for the applied tiers for each

	source stream and emission source; and assessment of potential measures for improvement of the monitoring methodology applied.
Post or department responsible for the procedure and for any data generated	S&E Chemists
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

ee. Data Flow Activities

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

Title of procedure	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES Pol 2.18
Diagram reference	Appendix 1. M&T Flowsheet
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines the main steps of data flow activities from primary data to annual emissions.
Post or department responsible for the procedure and for any data generated	S&E Chemists, Procurement & Financial Services
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A
List of primary data sources	Natural Gas vendor invoices (received in both electronic and paper form). Usage reading (in m3) are recorded.
	Annual overall diesel deliveries are recorded from individual vendor invoices and transaction summary.
	Acetylene is used for mobile oxy acetylene cutting torches at various site locations. Usage is taken to be the annual issue of new cylinders from the mechanical stores.
	Carbon dioxide emissions resulting from thermal oxidation of VOC's are calculated from both RTO inlet LEL and flows. Fume incinerator contribution is estimated based on RTO data.
Description of the relevant processing steps for each specific data flow activity.	Natural gas.
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	Natural Gas utilised in the above applications is "commercially traded". It is metered and invoiced to MSD by third parties. The natural gas volume reported/activity data (AD) in the monthly gas invoices is transcribed from the monthly invoices into the Carbon Dioxide Emissions Monitoring Spreadsheet and converted to a standardised gas volume corrected to a temperature of 273.15 K. The natural gas gross overall site calorific Value kWh usage is transcribed from the monthly vendor invoices into the

Carbon Dioxide Emissions Monitoring Spreadsheet. The spreadsheet utilises approved Agency factors (Emission factor (EF) taken from national inventories, the Oxidation factor (OF) is 1) and current guidance to convert firstly to net kWh, secondly to Net Calorific Value Terra Joules, and finally to net tonnes of carbon dioxide by applying a factor to take account of combustion efficiencies. The output from the spreadsheet is Net Tonnes of Carbon Dioxide emitted. The formula for calculation is $Em = AD \times EF \times NCV \times OF$

Diesel

The diesel oil volume utilised in stationary engines i.e. in the firewater, potable water emergency absorber backup diesel engines, surface water diversion emergency generator engine, potable water plant emergency generator engine, and in the Utilities & Maintenance Equipment is transcribed from vendor invoices and transaction summary into the Carbon Dioxide Emissions Monitoring Spreadsheet. The spreadsheet utilises currently approved Agency factors and guidance to convert firstly to tonnes delivered, secondly to Terra Joules, thirdly to net tonnes of carbon dioxide and finally applies a factor to take account of combustion efficiencies. The output from the spreadsheet is Net Tonnes of Carbon Dioxide emitted. The quantity of carbon dioxide associated with these units is less than 1% of the total annual emissions of the installation and are determined to be de minimis.

Acetylene.

Acetylene is used for mobile oxy acetylene cutting torches at various site locations. Usage is taken to be the annual issue of new cylinders from the mechanical stores. The standard volume of each cylinder is taken as 10000lts. This is converted to weight using molar volumes at 20deg C and molecular weight. Standard Agency approved factors are utilised to convert the weight issued to firstly TJ and then tonnes of carbon dioxide.

VOC OXIDISED

VOC off-gas is oxidised to CO₂ and water in the sites main RTO thermal oxidiser and the backup Fume Incinerator. The Fume incinerator is utilised for short periods of time, estimated to be worst case less than 5% of site operating time. VOC's oxidised in the RTO are estimated by using the average of the 2 inlet LEL analysers and the flow rates to the unit. LEL is converted to equivalent VOC concentration, for example Toluene, using known LEL to ppm/mg/m³ conversion factors. For Toluene, 100% of LEL is 1.2%v/v, or

46.gr/m3. Therefore 1% of LEL is equivalent to 0.46 gr/m3. VOC content is calculated for each day of the year that the device is operated and the annual sum is converted to the stoichiometric quantity of CO2 emitted (Tonnes). One tonne of Toluene is equivalent to 3.347 tonnes of CO2. LEL is not measured at the inlet to the Fume incinerator, therefore the above method of calculation for VOC's oxidised in the Fume Incinerator cannot be used. Reductions in baseline gas usage, i.e. when no VOC is oxidised, is not a reliable indication of VOC's oxidised. Given the low operating time of the Fume incinerator the site utilises the highest RTO loadings observed in the periods preceding and following usage of the Fume Incinerator are utilised to calculate loading when the Fume incinerator is used as backup to the RTO.

Submit relevant documents to record data flow activities

Attachment	Description
N/A	N/A

ff. 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	Emissions Trading Monitoring and Reporting Procedure
Reference for procedure	Rev. No 6.0
Diagram reference	ES Pol 2.18
Brief description of procedure. The description should cover the essential parameters and operations performed	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines that an initial risk assessment of the MR & T process is performed by the environmental chemists to evaluate the potential failure modes and identify the controls in place to mitigate against the risk of data error. The risk assessment is repeated whenever there are material changes to the M R & T process that could affect the quality of data. An annual audit is carried out to identify any material risks to data integrity.
Post or department responsible for the procedure and for any data generated	S&E Chemists
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

gg. 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	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES Pol 2.18
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines that a risk assessment is performed by the environmental chemists to evaluate potential failure modes and identify the controls in place to mitigate against the risk of data error. All measurement equipment for natural gas and diesel is owned, maintained and calibrated by third party suppliers. RTO inlet LEL and flow is measured by internal MSD monitors. Copies of external vendor and MSD calibration records are maintained on-site and are reviewed when received. Appropriate action will be taken with third party suppliers and MSD where non-compliance with required performance is identified.
Post or department responsible for the procedure and for any data generated	S&E Chemists
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

hh. 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	There is no bespoke information technology utilised for the monitoring, tracking and reporting of emissions.
Reference for procedure	n/a
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	All data is manually transcribed from invoices, store issue records and RTO inlet LEL/flow. The data is entered into spreadsheets.
	All data is stored on MSD servers that have appropriate levels of access control, back-up, recovery and security.
Post or department responsible for the procedure and for any data generated	S&E are responsible for recording energy data from invoices, stores issue and RTO inlet LEL/flow records in

	spreadsheets and utilising appropriate factors to generate associated emissions.
Location where records are kept	Records are maintained by S&E Chemists.
Name of IT system used	N/A
List of EN or other standards applied	N/A

ii. 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	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES Pol 2.18
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines the activity required for internal review/validation of the accuracy of data.
Post or department responsible for the procedure and for any data generated	S&E Chemists, Procurement & Financial Services
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

jj. 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	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES Pol 2.18
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines corrections and corrective action. Any identified proposed deviations from requirements are either corrected or preventative measures put in place. Agency approvals are sought by S&E staff prior to the implementation of any modifications that could materially alter the nature or extent of carbon dioxide emissions, or the agreed monitoring and reporting plan.
Post or department responsible for the procedure and for any data generated	S&E Chemists, Procurement & Financial Services
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

kk. 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	Not Applicable
Reference for procedure	Not Applicable
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	Not Applicable - MSD do not outsource any process in the data flow. Commercially traded fuels are purchased on vendor invoice and analysis. VOC's oxidised are calculated using internal analysers and flow meters.
Post or department responsible for the procedure and for any data generated	Not Applicable
Location where records are kept	Not Applicable
Name of IT system used	N/A
List of EN or other standards applied	N/A

ll. Record Keeping and Documentation

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

Title of procedure	Emissions Trading Monitoring and Reporting Procedure Rev. No 6.0
Reference for procedure	ES Pol 2.18
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	This procedure outlines document retention activities such as archiving/saving copies of invoices and calibration records for a period of 10 years as per Agency guidance. All of the data specified in Annex IX of the MRR for stationary installations of relevance to this installation will be retained for 10 years in accordance with requirements of Art. 66 of the MRR.
Post or department responsible for the procedure and for any data generated	S&E Chemists, Materials Management & Financial Services
Location where records are kept	Office of the Safety & Environment Chemist
Name of IT system used	MIDAS Document Retention System
List of EN or other standards applied	N/A

mm. Risk Assessment

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

Attachment	Description
N/A	N/A

nn. Environmental Management System

Does your organisation have a documented Environmental Management System? Yes

Is the Environmental Management System certified by an accredited organisation? No

12. Changes in Operation

oo. 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	Equipment Change Control Procedure / Emissions Trading Monitoring and Reporting Procedure
Reference for procedure	PE-08 and ES Pol 2.18
Diagram reference	N/A
Brief description of procedure. The description should cover the essential parameters and operations performed	PE-08 All changes to equipment or facility infrastructure are covered by PE-08. S&E chemists review all change forms. All changes are assessed in terms of their potential impact on the capacity, activity level and operation of the Ballydine

installation.

ES-Pol 2.18

All site changes to either process or equipment are reviewed by S&E staff for compliance with the terms and conditions of the current GHG Permit. Any identified proposed deviations from requirements are either corrected or preventative measures put in place. Agency approvals are sought by S&E staff prior to the implementation of any modifications that could materially alter the nature or extent of carbon dioxide emissions.

ES-Pol 2.18 has been revised as necessary to specifically include the required elements, i.e

- 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.

Post or department responsible for the procedure and for any data generated Project Engineers / S&E Chemists

Location where records are kept Electronic copies of procedures are retained in site procedure retention system.

Name of IT system used MIDAS document retention system

13. Abbreviations

pp. Abbreviations Acronyms or definitions

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

Abbreviation	Definition
N/A	N/A

14. Additional Information

Any other information:

Attachment	Description
TO 1 and 2 Decommissioning Memo Feb 2016.pdf	Confirm decomission TO 1,2 electric TO's
Calculation of VOC CO2 emissions.pdf	Calculation of CO2 emissions from the VOC source stream
PM Memo Boiler no 1 S1 decomissioning 09Aug16.pdf	Independent confirmation decomission S1

15. Confidentiality

qq. 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.